

M5 Junction 10 Improvements Scheme

Environmental Statement

Appendix 1.4 Major accidents and disasters assessment

TR010063 - APP 6.15

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Infrastructure Planning Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Appendix 1.4 Major accidents and disasters assessment

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1. Major accidents and disasters: long list of major events

Table 1-1 – Long list of major events

Disaster type	Relevant to Scheme	Source of disaster	Potential receptors	Consequence	Covered in ES (Y/N, where)	Covered outside ES (Y/N, where)	Embedded mitigation	Additional mitigation to reduce risk	Further assessment required (Y/N, what)
Geological disasters									
Avalanches	No	The Scheme is not located close to hills or mountains. Avalanche is not considered to be a risk now or in the future, and this is not considered further under major events.	N/A	N/A	N	N/A	N/A	N/A	N
Earthquakes	No	The Scheme is not located in an area of significant geological activity. Whilst minor earthquakes have been recorded in Gloucestershire they have not been of structural significance and are not considered to be a risk now or in the future. This is not considered further under major events.	N/A	N/A	N/A	N/A	N/A	N/A	N
Volcanic eruptions	No	The Scheme is not located in an area of significant geological activity and as such volcanic eruptions are not considered to be a risk now or in the future. This is not considered further under major events.	N/A	N/A	N/A	N/A	N/A	N/A	N
Sinkholes and/or ground dissolution	No	The Scheme is not located on geological units that are considered to be prone to dissolution, and therefore sinkholes and / or ground dissolution are not considered to be risks now or in the future. This is not considered further under major events.	N/A	N/A	The potential impacts arising from climate change, including hotter summers, drier summers, heavier rain, wetter winters and changes to extreme weather (intense storms, strong winds / lightning strikes) are considered in Chapter 14: Climate (Application document TR010063 – APP 6.12)	N/A	N/A	N/A	N
Ground instability	No	The Scheme is not located on geological units, made ground or fill that is considered to have potential for collapsible ground, compressible ground, landslide, running sand or shrinking / swelling clay. No historical underground mining has been identified within the vicinity of the Scheme. This is not considered further under major events.	N/A	N/A	The potential impacts arising from climate change, including hotter summers, drier summers, heavier rain, wetter winters and changes to extreme weather (intense storms, strong winds / lightning strikes) are considered in Chapter 14: Climate (Application document TR010063 – APP 6.12)	N/A	N/A	N/A	N

Disaster type	Relevant to Scheme	Source of disaster	Potential receptors	Consequence	Covered in ES (Y/N, where)	Covered outside ES (Y/N, where)	Embedded mitigation	Additional mitigation to reduce risk	Further assessment required (Y/N, what)
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 (Application document TR010063 – APP 6.15) and are also reported in EIA terms in Chapter 8 - Road Drainage and the Water Environment (Application document TR010063 – APP 6.6). Both assessments address the risk to the Scheme and increased risk due to the Scheme with regards to flooding. The Flood Risk Assessment (Application document TR010063 – APP 6.15) has concluded that based the incorporation of flood risk mitigation / considerations the Scheme would be at an acceptable level of flood risk and would not increase flood risk outside of the Order limits.	Structures, adjacent land parcels, waterbodies, farming interests, vegetation, wildlife, residents, road users	Potential journey delays, infrastructure damage, loss of farming or other business revenue, loss of wildlife	Yes- in Chapter 8 - Road Drainage and the Water Environment (Application document TR010063 – APP 6.6) and the Flood Risk Assessment (Application document TR010063 – APP 6.15)	The Flood Risk Assessment (Application document TR010063 – APP 6.15)	The Scheme includes areas of flood compensation and flood storage. In addition, the new Link Road will be on embankment and will include two substructure groups to allow flood water to pass beneath the road.	No	N
Tsunami / Storm surge	No	The Scheme is not in a coastal location. It is not anticipated that tsunami / storm surge will be a risk now or in the future. This is not considered further under major events.	N/A	N/A	N/A	N/A	N/A	N/A	N
Limnic eruptions	No	The Scheme is not located near any lakes and as such limnic eruptions are not considered to be a risk or serious possibility. This is not considered further under major events.	N/A	N/A	N/A	N/A	N/A	N/A	N
Major change to groundwater levels	Yes	The vulnerability of the Scheme to groundwater flooding and its potential to exacerbate groundwater flooding, are covered in the Flood Risk Assessment (Application document TR010029 – APP 6.6), which 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. Due to the extent of the Scheme relative to current conditions, the Scheme is not considered likely to affect groundwater recharge rates and therefore will not affect groundwater levels.	Structures, adjacent land parcels, waterbodies, farming interests, water supplies	Potential structural damage. Potential disturbance to farming operations due to changes in ground conditions. Potential pollution events and loss of or pollution of water supplies.	Yes- in the ES Chapter 8 Road Drainage and the Water Environment (Application document TR010063 – APP 6.6) and the Flood Risk Assessment (Application document -TR010063 – APP 6.15)	The Flood Risk Assessment is included as ES Appendix 8.1 (Application document TR010063 – APP 6.15)	N/A	N/A	N
Meteorological disasters									

Disaster type	Relevant to Scheme	Source of disaster	Potential receptors	Consequence	Covered in ES (Y/N, where)	Covered outside ES (Y/N, where)	Embedded mitigation	Additional mitigation to reduce risk	Further assessment required (Y/N, what)
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, temporary in nature, and as such is not considered further under major events.	Road users, WCH	N/A	N/A	N/A	N/A	N/A	N
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. This is not considered further under major events.	Road users, WCH	N/A	N/A	N/A	N/A	N/A	N
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 under major events.	Road users, WCH	N/A	The potential impacts arising from climate change, including hotter summers, drier summers, heavier rain, wetter winters and changes to extreme weather (intense storms, strong winds / lightning strikes) are considered in Chapter 14: Climate (Application document TR010063 – APP 6.12)	N/A	N/A	N/A	N
Droughts	Yes	Droughts are only considered as a disaster due to water shortages for essential services and where there are indirect impacts on food production, vegetation, loss of soils etc. Whilst the UK is vulnerable to drought, the Scheme is not located in an area of particular vulnerability to drought and as such any risk of drought is not considered to be greater than any other road in the UK and is not considered further under major events.	Habitats, wildlife, residents. Secondary impact on air quality and dust generated by ash from fires	Loss of habitat, loss of wildlife from thirst or loss of habitat. Damage to structures / embankments through ground shrinkage	The potential impacts arising from climate change, including hotter summers, drier summers, heavier rain, wetter winters and changes to extreme weather (intense storms, strong winds / lightning strikes) are considered in Chapter 14: Climate (Application document TR010063 – APP 6.12)	N/A	N/A	N/A	N
Thunder-storms	Yes	As the junction interchange is elevated, some consideration has been given to the potential risk of lightning strikes, though the risk is not considered to be any greater than any other road bridges and is not considered further under major events.	Structures, road users, WCH, vegetation, wildlife	Lightning strike leading loss of life or structural damage	The potential impacts arising from climate change, including hotter summers, drier summers, heavier rain, wetter winters and changes to extreme weather (intense storms, strong winds / lightning strikes) are considered in Chapter 14: Climate (Application	N/A	N/A	N/A	N

Disaster type	Relevant to Scheme	Source of disaster	Potential receptors	Consequence	Covered in ES (Y/N, where)	Covered outside ES (Y/N, where)	Embedded mitigation	Additional mitigation to reduce risk	Further assessment required (Y/N, what)
					document TR0100063 – APP 6.12)				
Hailstorms	Yes	The risk of hailstorms is no different to other roads / road users in the UK and as such is not considered further under major events.	Road users, WCH, structures	Damage to vehicles, signage, or injury from hailstones	The potential impacts arising from climate change, including hotter summers, drier summers, heavier rain, wetter winters and changes to extreme weather (intense storms, strong winds / lightning strikes) are considered in Chapter 14: Climate (Application document TR0100063 – APP 6.12)	N/A	N/A	N/A	N
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 under major events.	Vegetation, wildlife, road users, WCH, structures.	Damage to road surface, vehicles, danger of heat exhaustion to people, horses and wildlife. Loss of vegetation. Damage to structures from excess heat.	The potential impacts arising from climate change, including hotter summers, drier summers, heavier rain, wetter winters and changes to extreme weather (intense storms, strong winds / lightning strikes) are considered in Chapter 14: Climate (Application document TR0100063 – APP 6.12)	N/A	N/A	N/A	N
Tornadoes	No	Although there are tornadoes in the UK, their destructive force tends to be much less than in other parts of the world. The Scheme is not located in an area of particular risk nor is its design particularly vulnerable to any potential effects. Not considered further.	N/A	N/A	N/A	N/A	N/A	N/A	N
Wildfires	Yes	There may be some potential for bush, scrub, grassland or heather fires, though the Scheme is not located in an area of particular risk nor is its design any more vulnerable to any potential effects than any similar scheme in similar environmental conditions.	Habitats, wildlife, property, residents, road users, WCH. Secondary impact on air quality and dust generated by ash from fires	Loss of life for road users, horses or wildlife. Loss of habitat. Damage to infrastructure.	N/A	N/A	N/A	N/A	N
Poor air quality episodes	Yes	Although vehicle emissions can contribute to poor air quality, these are most likely during temporary changes in normal traffic operation. It is not considered necessary to undertake any more assessment than is already being undertaken for normal operation in the Air quality assessment of the EIA, in the ES Chapter 5 Air quality	Road users, residents, property, surrounding environment (including designated habitats).	Abnormal traffic operation would be of relatively short duration and temporary, consequently there would not be a significant effect on meeting annual mean air quality objectives.	Yes- in the ES Chapter 5 Air quality (Application document TR010063 – APP 6.3)	N/A	N/A	N/A	N

Disaster type	Relevant to Scheme	Source of disaster	Potential receptors	Consequence	Covered in ES (Y/N, where)	Covered outside ES (Y/N, where)	Embedded mitigation	Additional mitigation to reduce risk	Further assessment required (Y/N, what)
		(Application document TR010063 – APP 6.3).							
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 under major events.	Road users, buildings, infrastructure, vegetation	Flying debris causing injury or loss of life. Damage to signage, buildings, vegetation.	The potential impacts arising from climate change, including hotter summers, drier summers, heavier rain, wetter winters and changes to extreme weather (intense storms, strong winds / lightning strikes) are considered in Chapter 14: Climate (Application document TR010063 – APP 6.12)/A	N/A	N/A	N/A	N
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 under major events.	N/A	N/A	N/A	N/A	N/A	N/A	N
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 under major events.	N/A	N/A	N/A	N/A	N/A	N/A	N
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 under major events.	N/A	N/A	N/A	N/A	N/A	N/A	N
Transportation disasters									
Road traffic 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 ES Chapter 8: Road Drainage and Water Environment (Application document TR010063 – APP 6.6). Mitigation included in the Scheme design ensures the risk is acceptable. Diverted traffic onto local roads following a road accident can cause a change in air quality emissions to the surrounding area. There is not considered to be any increased risk to the Scheme and road users than for other roads, effects	Road users, water environment, vulnerable habitats and wildlife using them. People living, working or travelling locally.	Delays causing business costs, changes in air quality where traffic is diverted, potential pollution from spillages, potential increased risk of road traffic accidents where road users are following unfamiliar routes or where road traffic users have uncertainty and / or frustration.	Yes- in the ES Chapter 8: Road Drainage and Water Environment (Application document TR010063 – APP 6.6).	N/A	N/A	N/A	N

Disaster type	Relevant to Scheme	Source of disaster	Potential receptors	Consequence	Covered in ES (Y/N, where)	Covered outside ES (Y/N, where)	Embedded mitigation	Additional mitigation to reduce risk	Further assessment required (Y/N, what)
		would be temporary, and this is not considered further under major events.							
Rail accidents	No	The Scheme is not located near railway lines. This is not considered further under major events.	N/A	N/A	N/A	N/A	N/A	N/A	N
Aircraft disasters	Yes	Gloucestershire airport is located approximately 5.5km from the Scheme. There is not considered to be any increased risk to the Scheme than currently exists for the existing M5 Junction 10. At detailed design, the construction contractor will address whatever considerations are required in order to ensure safety. This is not considered further under major events.	Road users, WCH	Airplane malfunction causing accidents, injury and / or death for road users, WCH and / or wildlife using associated habitats. Subsequent associated route diversions, see road traffic accidents above.	N/A	N/A	N/A	N/A	N
Maritime disasters	No	The River Severn is the closest navigable waterway to the west of the Scheme. The River Chelt is not navigable. There is not considered to be any increased risk to the Scheme than currently exists. This is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A	N
Engineering accidents / failures									
Bridge failure	Yes	The existing bridges will be replaced. The bridges that form part of the Scheme design are not considered to be at any increased risk of bridge failure and will be designed to current National Highways standards. This is not considered further.	Road users, WCH, wildlife	causing accidents, injury and / or death for road users, WCH and / or wildlife using associated habitats, bridges or underpasses. Subsequent associated route diversions, see road traffic accidents above.	N/A	N/A	N/A	N/A	N
Flood defence failure / reservoir failure	Yes	The Scheme is not protected by any existing raised flood defences. However, it is in the inundation zone for the Dowdeswell Reservoir, located east of Cheltenham. The Scheme includes new embankments facing the flood storage area which will fall under the remit of the Reservoirs Act 1975.	Road users, built infrastructure, water environment, vulnerable habitats and wildlife using them. People living, working or travelling locally.	Failure of built infrastructure with accidents, injury and / or death for road users, residents and / or wildlife using associated habitats, bridges or underpasses. Subsequent associated route diversions, see road traffic accidents above.	N	N	The Scheme is subject to the Reservoirs Act 1975 and the diligence and monitoring as a result of this legislation. A qualified civil engineer sitting on Defra's "All Reservoirs Panel Engineer" panel (as defined under Section 6 of the Act) has been appointed for the supervision of the design and	The Scheme is subject to the Reservoirs Act 1975 and the diligence and monitoring as a result of this legislation. An Inspecting Engineer and Supervising Engineer will need to be appointed to monitor the raised works following	N

Disaster type	Relevant to Scheme	Source of disaster	Potential receptors	Consequence	Covered in ES (Y/N, where)	Covered outside ES (Y/N, where)	Embedded mitigation	Additional mitigation to reduce risk	Further assessment required (Y/N, what)
							construction of the relevant works.	construction in perpetuity, to ensure the relevant parts of the Scheme are maintained in a good, safe condition at all times. There is considered to be a low risk that the embankments could collapse and release flood waters.	
Mast / tower collapse	No	It is not considered that any existing masts or towers could collapse onto the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A	N
Building failure or fire	No	No large buildings exist or are proposed close by the Scheme to cause a risk greater than currently exists.	N/A	N/A	N/A	N/A	N/A	N/A	N
Utilities failure (gas, electricity, water, sewage, oil, communications)	Yes	The required diversion of some utility routes due to the Scheme will increase the risk of failure during diversion. However all best industry practice and safety measures will be incorporated and the utility companies consulted.	Road users, 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.	N
Industrial accidents / failures									
Defence industry	No	No defence industries are located within 2km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A	N
Energy industry (fossil fuel)	No	No energy industries are located within 2km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A	N
Nuclear power	No	No nuclear power plants are located within 2km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A	N
Oils and gas refinery / storage	No	No oil or gas refineries or storage facilities are located within 2km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A	N
Food industry	Yes	No food production premises are located within 2km of the Scheme. The Sainsburys superstore located within the Gallagher Retail Park close to the eastern boundary of the Scheme will not be at greater risk from the Scheme than any risk that currently exists. Not considered further.	N/A	N/A	No	No	N/A	N/A	N
Chemical industry	No	No chemical industry premises are located within 2km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A	N

Disaster type	Relevant to Scheme	Source of disaster	Potential receptors	Consequence	Covered in ES (Y/N, where)	Covered outside ES (Y/N, where)	Embedded mitigation	Additional mitigation to reduce risk	Further assessment required (Y/N, what)
Manufacturing industry	No	No manufacturing industry premises are located within 2km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A	N
Mining industry	No	No mining industry premises are located within 2km of the Scheme.	N/A	N/A	N/A	N/A	N/A	N/A	N
Terrorism / crime / civil unrest									
Bomb / vehicle attack on people	Yes	The Scheme is unlikely to be any more of a target for an attack of this kind than currently exists and this is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A	N
Bomb / vehicle attack on infrastructure	Yes	The Scheme is unlikely to be any more of a target for an attack of this kind than currently exists and this is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A	N
Mass shooting	No	Mass shooting events are extremely uncommon in the UK. The Scheme is unlikely to be any more of a target for an attack of this kind than currently exists and this is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A	N
Chemical / gas attack	Yes	The Scheme is unlikely to be any more of a target for an attack of this kind than currently exists and this is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A	N
Rioting / demonstrations	Yes	Rioting / demonstrations involving transportation infrastructure have become more frequent recently. However, it is considered that the Scheme is no more likely to be a target for such demonstrations than any other road or Scheme and this is therefore not considered further.	N/A	N/A	N/A	N/A	N/A	N/A	N
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. However it is not considered that the Scheme is more vulnerable to cyber attack than any other comparable Scheme. Roadside technology is designed to mitigate the effects of cyber attack.	N/A	N/A	N/A	N/A	N/A	N/A	N
War									
Conventional	No	No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A	N
Chemical	No	No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A	N
Nuclear	No	No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A	N
Disease									

Disaster type	Relevant to Scheme	Source of disaster	Potential receptors	Consequence	Covered in ES (Y/N, where)	Covered outside ES (Y/N, where)	Embedded mitigation	Additional mitigation to reduce risk	Further assessment required (Y/N, what)
Human disease	No	No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A	N
Animal disease	No	No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A	N
Plant disease	No	The potential effects of climate change include weakening vegetation. No more vulnerable than any other infrastructure.	N/A	N/A	N/A	N/A	N/A	N/A	N
Animal infestation	No	An animal infestation event is no more likely than currently exists and is not considered further.	N/A	N/A	N/A	N/A	N/A	N/A	

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