A417 Missing Link

Preliminary Environmental Information Report

Chapter 4 Environmental Assessment Methodology - Appendices

28 September 2020

Contents

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Preliminary Environmental Information Report

Appendix 4.1
Major accidents and disasters legislation and methodology

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Major event		Relevance to the scheme	Potential receptors	Include on short list?
Natural disasters				
1	Geological disasters			
1.1	Slope instability, including landslides and rockfall	There is a history of landslides in the study area, and the existing slopes have been reported to be marginally stable. The cutting slopes could generate global instability during construction due to unforeseen ground conditions (e.g. presence of gulls) or reactivation of relic landslides. Severe weather can trigger slope instability, for example through increased pore water pressure. This could be exacerbated by a projected 47% increase in pore water pressures in the winter months due to climate change.	Road users Infrastructure Construction workers Maintenance workers Environment & Landscape	Yes
1.2	Earthquakes	The site is not in a seismically active area and as such earthquakes are not considered to be a risk to, or can occur as a result of, the scheme.	N/A	No
1.3	Sinkholes	Construction over previously mined areas may accelerate natural rates of subsidence or collapse of shallow underground mine workings. Construction over unforseen ground conditions (e.g. presence of gulls, natural cavities or dissolution features) and consolidation and differential settlement of compressible soils due to applied load embankment materials could generate sinkholes.	Road users Infrastructure Construction workers Environment & Landscape	Yes
1.4	Volcanic eruptions	The site is not in a volcanic area. Although volcanic eruptions can impact on air travel, it is considered highly unlikely that an ash cloud could significantly impact on any aspect of the scheme.	N/A	No
2	Hydrogeological disasters			
2.1	Floods	There a history of flooding on the A417, and the project has the potential to exacerbate this flooding by altering flow paths (e.g. the diversion of Norman's Brook culvert) and increasing peak run-off - this should be considered in terms of the risk to the scheme and the increased risk to receptors due to the scheme.	Waterways Infrastructure Road users Downstream water environment and communities	Yes
2.2	Tsunami/storm surge	Not applicable as the site is not in a coastal location.	N/A	No
3	Meterological disasters			
3.1	Blizzards, storms and gales	Blizzards could cause adverse conditions on the scheme, causing accidents, traffic delays or trapping road users.	N/A	Yes
3.2	Fog, mist and reduced visibility	Severe weather could cause decreased visibility on the approach up or down Crickley Hill. This could worsen with a projected 47% increase (2070-2099) in precipitation in the winter months due to climate change.	Road users	Yes
3.3	Cyclonic storms	Not applicable to the UK climate.	N/A	No
3.4	Droughts	Droughts are considered a disaster when a sustained lack of rainfall causes a water shortage. This can cause fatalities amongst vulnerable groups, distruption to essential services, environmental damage and additional pressure on healthcare. The scheme is not considered to be vulnerable or a potential contributor to drought.	N/A	No
3.5	Lightning strikes	There are several new bridges being constructed. However, the risk is not considered to be any greater than any other road bridge.	N/A	No
3.6	Hail storms	Hail storms could cause adverse conditions on the scheme, causing accidents, slow moving traffic or traffic delays. However, the risk to the scheme is considered no greater than the current A417. Consideration should be given to changing conditions due to climate change, and the scheme will be designed to account for this.	N/A	No
3.7	Heatwaves	Heatwaves are considered a disaster when high temperatures last several weeks, harming people's health. This can cause fatalities amongst vulnerable groups, environmental damage and additional pressure on healthcare. The scheme is not considered to be vulnerable or a potential contributor to heatwaves.	N/A	No
3.8	Low (sub-zero) temperatures	Winter temperatures are projected to increase between 1.1-5 degrees (2070-2099) from current levels due to climate change. This can cause fatalities amongst vulnerable groups, environmental damage and additional pressure on healthcare. The scheme is not considered to be vulnerable or a potential contributor to low temperatures.	N/A	No
3.9	Tornadoes	Although tornadoes have been known to occur in the UK, their destructive force is less than that in other parts of the world. The scheme is not considered more vulnerable to tornadoes than the existing A417 or any other development, nor will the scheme contribute to the hazard of torndaoes.	N/A	No
3.10	Wildfires	There is potential for scrub, grassland or heathland fires, especially given the expected increase in temperatures and heatwaves associcated with climate change. Although the scheme is considered no more vulnerable than the existing A417, and the expected reduced accident rate due to improved traffic flow limiting potential wildfire sources, wildfires still require some consideration.	Road users Infrastructure Ecology Environment & landscape Residents	Yes

3.11	Air quality events	Vehicle emissions can contribute to poor air quality, and smog can be induced by weather events - temperature inversions - 'trapping' pollution. These events are more likely in dense urban areas with multiple sources of pollution, although events have been known to occur in the Welsh valleys near industrial sites.	Road users Residents Ecology Environment & landscape	Yes
4	Space disasters			
4.1	Impact events and airburst	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
4.2	Solar flare	Solar flares can interupt radio and other electric communications. The increased reliance on roadside technology could mean the scheme is more vulnerable than the existing A417.	Motor vehicles Electrical infrastructure	Yes
5	**Transport**			
5.1	Road accidents	A driving factor for the scheme is to increase safety on a road that has an above-average accident rate. Although the aim of the scheme is to increase traffic flow and hence reduce accidents, there is still the potential for fatal accidents. There is also a risk posed by spillage from hazardous loads as a result of a road traffic accident. This risk is unlikely to increase due to the scheme.	Road users Infrastructure	Yes
5.2	Rail accidents	No railways are located within the study area.	N/A	No
5.3	Aircraft disasters	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
5.4	Maritime disasters	Not applicable as the site is not in a coastal location.	N/A	No
6	**Engineering accidents/failures**			
6.1	Bridge collapse or failure	There are structures in the scheme that could be at risk of collapse, including the overbridge and underbridge crossings and retaining walls.	Construction workers Infrastructure Road users	Yes
6.2	Tunnel collapse or failure	There are no tunnels designed into the scheme.	N/A	No
6.3	Dam failure	There are no dams in the study area.	N/A	No
6.4	Flood defence failure	There are no formal flood defences in the scheme area.	N/A	No
6.5	Mast and tower collapse	There are radio communication and telecommunication masts in the study area servicing EE, O2 and Vodaphone. The emergency services use the EE tower on the escarpment for their communications.	Infrastructure Businesses Emergency services Residents	Yes
6.6	Building failure or fire	There is the potential for building collapse during the demolition phase.	Construction workers Property and infrastructure	Yes
6.7	Temporary structure failure	There is the potential for temporary structure failure during the construction of elements of the scheme. This could be due to inclement weather, an infrastructure strike by road traffic or a lack of maintenance of temporary structures during construction.	Construction workers Infrastructure Road users	Yes
6.8	Utilities failure (gas, electricity, water, sewage, oil communications)	There are electricity and water utility pipes beneath the scheme. A cable strike or damage to one of the utlities could cause electrical failure, cut off radio communication, flooding, or a fire or explosion. The emergency services use the EE tower on the escarpment for their communications.	Electrical infrastructure Emergency services Residents Businesses	Yes
6.9	Pollution of watercourses	Construction activities close to an existing watercourse or earthworks drainage causing fouling due to carbonate deposits can lead to pollution of watercourses.	Environment Waterways - water environment and ecological habitats	Yes
6.10	Demolition contamination	Tar is potentially present in existing pavement layers. Tar is a carcinogenic hazardous waste which was used to bound pavements and carriageways before the 1980s. There are therefore restrictions on how the waste is handled and disposed of. Data provided by Highways England indicates that a section of the Missing Link from the start of the single carriageway, through the Air Balloon roundabout and down to Birdlip Junction was constructed in 1972. The construction of the scheme will involve breaking out some of this existing pavement. Disturbance of the pavement can release fumes and the material itself is carcinogenic. If this waste is not handled correctly, it may be improperly disposed of, leading to contamination events through leaching.	Environment Waterways Construction workers	Yes
7	**Industrial accidents (historical and existing risks)**			
7.1	Defence industry/military accidents	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
7.2	Energy industry (fossil fuel)	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No

7.3	Nuclear power	The Oldbury Nuclear Power Station lies within a 50 mile radius of the scheme, which is a potential source for radiation leakage. However, the power plant is decommissioned and is expected to be closely managed by the Nuclear Decommissioning Authority (NDA).	N/A	No
7.4	Oil and gas refinery/storage	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
7.5	Food industry	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
7.6	Chemical industry	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
7.7	Manufacturing industry	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
7.8	Mining industry	There is a history of mining and quarrying within the study area, which could cause hazards such as ground instabilty.	Infrastructure Construction workers	Yes
8	**Terrorism/Crime/Civil unrest**			
8.1	Bomb/vehicle attack on people	Possible that the structures could be a target for a terrorist attack.	Road users Infrastructure	Yes
8.2	Bomb/vehicle attack on infrastructure	Possible that the structures could be a target for a terrorist attack.	Road users Infrastructure	Yes
8.3	Mass shooting	Unlikely to be a taget for this type of incident due to the low number of exposed targets.	N/A	No
8.4	Chemical/gas attack	Unlikely to be a taget for this type of incident due to the low number of exposed targets.	N/A	No
8.5	Rioting	Unlikely to occur in a rural location. The scheme is not considered more vulnerable than the existing A417.	N/A	No
8.6	Cyber attacks	Increasing reliance on roadside technology could render the scheme more vulnerable to a cyber attack.	Road users Electrical infrastructure	Yes
9	**War**			
9.1	Conventional	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
9.2	Chemical	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
9.3	Nuclear	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
10	**Disease**			
10.1	Human	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
10.2	Animal	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No
10.3	Plant	The scheme is considered no more vulnerable than the exisitng A417 or any other development.	N/A	No

Major event		Does the major event need to be considered further?	Where considered
Natural disasters			
1	Geological disasters		
1.1	Slope instability, including landslides and rockfall	Yes - slope instability that may impact the scheme could have health and safety consequences for road users, maintenance workers and potentially damage existing infrastructure. Design of slopes and rockfall protection measures will be developed in accordance with CD622 Managing Geotechnical Risk with the aim of mitigating the occurrence and severity of slope instability. This will manage the risk both in terms of the vulnerability of the scheme to these types of event, and in terms of the potential for the Scheme to increase the risk of such an event happening. Ensure structures are designed in consideration of environmental conditions including climate change.	Design, mitigation and monitoring to be detailed in the Geotechnical reporting in accordance with CD622 Managing Geotechnical Risk
1.3	Sinkholes	Yes - the risk will be managed in accordance with CD622 Managing Geotechnical Risk and will be assessed based on the ground investigation and considered during design development where appropriate.	Design and mitigation to be detailed in the Geotechnical reporting in accordance with CD622 Managing Geotechnical Risk
2	Hydrogeological disasters		
2.1	Flooding	Yes - Flood Risk Assessment (FRA) of Scheme to be undertaken, and an EMP will be prepared for the Scheme. The Scheme will be designed to cope with new ranges of precipitation and temperature.	FRA and Chapter 13 - Road Drainage and the Water Environment
3	Meterological disasters		
3.1	Blizzards, storms and gales	Yes - using a design of shallower cuttings and slopes will mitigate the wind tunnel effect and limit the carbon use of the retaining walls. Consideration should be given to changing conditions due to climate change, and the Scheme will be designed to account for this.	Severe weather considered as part of design scheme
3.2	Fog, mist and reduced visibility	No - although the presence of the Scheme will not increase the risk above baseline conditions, variable speed limits could be used to increase reaction times when visibility is low, and the Scheme will be designed to cope with new ranges of precipitation and temperature.	N/A
3.10	Wildfires	No - the reduced accident rate achieved by the new road will limit the potential fires caused by road traffic collisions compared to baseline conditions,	Safety Appraisal in the Economic Assessment
3.11	Air quality events	Yes - an Air Quality Assessment will be undertaken and any necessary design action will be taken. The road will be moved away from sensitive receptor locations at the Air Balloon roundabout. The Scheme is designed to increase the capacity of the current road, which will improve flow and reduce emissions. Acute air quality phenomena, such as smog are highly unlikely to be an issue given the rural location of the Scheme. There is no real risk or serious possibility of acute air quality effects as a result of, or likely to affect the Scheme. The scheme is considered no more vulnerable than the current road and so will not be considered further.	Chapter 5 - Air Quality
4	Space disasters		
4.2	Solar flares	No - the Scheme is considered no more vulnerable than any other new development and so will not be considered further. There are back up generators at the Birdlip radio tower in case of widespread electricity failure.	N/A
5	**Transport**		
5.1	Road accidents	No - the reduced accident rate achieved by the new road will limit the potential fatal road accidents.	Safety Appraisal in the Economic Assessment
6	**Engineering accidents/failures**		
6.1	Structural failure (i.e. bridge collapse)	Yes - ensure structures are designed and maintained in accordance with standards and with consideration of environmental conditions including climate change. It is necessary to ensure mainentance activities are undertaken for the lifetime of the structure.	Considered in CDM Risk Register, Project Risk Register and as part of design
6.5	Mast and tower collapse	No - not considered to be a risk as these can be designed out of the Scheme.	N/A
6.6	Building failure or fire	No - will be appropriately managed and mitigated by competent contractors adhering to CDM and construction planning.	Buildability Report
6.7	Temporary structure failure	No - will be appropriately managed and mitigated by competent contractors adhering to CDM and construction planning. Structures are designed in accordance with design codes and with consideration of environmental conditions including climate change.	Buildability Report
6.8	Utilities failures (including gas, localised electricity failure, fuel, water and sewerage)	No - there are back up generators at Birdlip telecommnications tower, and the risk will be appropriately managed and mitigated by design and competent contractors adhering to CDM and construction planning.	Buildability Report and Statutory Undertakers Report
6.9	Pollution of watercourses	Yes - the mitigation measures will be included in Outline EMP.	EMP
6.10	Demolition contamination	Yes - encountering tar in pavements is common for all roads constructed before the 1980s and as such there are codes and best practice to minimise the risk. Arup have suggested pavement core testing based on the available information, followed by lab testing to identify the appropriate acceptable thresholds. This requires a pavement investigation spec. It is necessary to inform contractors where tar is identified, so they can apply their hazardous waste procedures and workers can protect themselves with the appropriate PPE. Designing out the risk is not an option due to the significant level changes between the existing road and the proposed scheme.	Buildability Report
7	**Industrial accidents (historical and existing risks)**		
7.8	Mining industry	No - the design avoids any areas of historic mining e.g. north of Birdlip	N/A
8	**Terrorism/Crime/Civil unrest**		
8.1	Bomb/vehicle attack on people	There is considered to be no greater risk of a bomb/vehicle attack as a result of the Scheme compared to any other road/tunnel within the highways network, therefore this does not need to be considered further. Infrastructure are designed in accordance with design codes and in consultation with authorities. The UK Governmnet's counter-terrorism strtategy (CONTEST, 2011), has provided clear objectives to reduce the terrorism risk to the UK.	N/A
8.2	Bomb/vehicle attack on infrastructure	There is considered to be no greater risk of a bomb/vehicle attack as a result of the Scheme compared to any other road/tunnel within the highways network, therefore this does not need to be considered further. Infrastructure are designed in accordance with design codes and in consultation with authorities. The UK Governmnet's counter-terrorism strtategy (CONTEST, 2011), has provided clear objectives to reduce the terrorism risk to the UK.	N/A
8.6	Cyber attacks	There is considered to be no greater risk of a cyber-attack as a result of the Scheme compared to any other road/tunnel within the highways network, therefore this does not need to be considered further. Infrastructure are designed in accordance with design codes and in consultation with authorities	N/A

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Appendix 4.2
Major accidents and disasters long list and short list

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1 Major accidents and disasters legislation and methodology

1.1 Legislation

1.1.1 The revised EIA Directive 2014/52/EU requires that appropriate precautionary actions are taken for those schemes which, 'because of their vulnerability to major accidents and/or natural disasters (such as flooding, sea level rise, or earthquakes), are likely to have significant adverse effects on the environment'.

1.1.2 The design, management, operation and maintenance of the proposed scheme must comply with the following UK legislation and EU regulations:

- EU Regulation 402/2013 on the Common Safety Method on Risk Evaluation and Assessment (CSM-RA) (as amended by EU Regulation 2015/1136). An EU Regulation that describes the methods required to be used to assess compliance with safety levels and safety requirements.
- Health and Safety at Work etc. Act 1974 (HSWA). This legislation places general duties on employers, people in control of premises, manufacturers and employees. Health and safety regulations made under this Act contain more detailed provisions. The Act provides the framework for the regulation of industrial health and safety in the UK. The overriding principle is that foreseeable risks to persons shall be reduced so far as is reasonably practicable and that adequate evidence shall be produced to demonstrate that this has been done.
- The Management of Health and Safety at Work Regulations 1999. These regulations generally make more explicit what employers are required to do to manage health and safety under the HSWA.
- Construction Design and Management (CDM) 2015 Regulations. These regulations place specific duties on clients, designers and contractors, so that health and safety is taken into account throughout the life of a construction project from its inception to its subsequent final demolition and removal. Under CDM regulations, designers have to avoid foreseeable risks so far as reasonably practicable by: eliminating hazards from the construction, cleaning, maintenance, and proposed use and demolition of a structure; reducing risks from any remaining hazard; and giving collective safety measures priority over individual measures.

1.1.3 In broad terms, risks associated with major accidents and disasters will be identified, assessed and mitigated during the design, construction, operation and maintenance of the proposed scheme. The legislation described above sets out the requirement, duties, and in some cases establishes the mechanisms for doing this.

1.1.4 In accordance with paragraph 15 of the revised EIA Directive (2014/52/EU), safety assessments undertaken for the proposed scheme have been used to inform the identification and assessment of major accidents and natural disasters to which the proposed scheme may be vulnerable.

1.1.5 In addition to the other regulations described in 1.1.2, the proposed scheme is also being designed and its implementation guided by other industry standards and codes, many of which are mandatory. These require infrastructure and

systems to be designed so that risks to people and the environment are either eliminated or reduced to levels that are considered acceptable.

1.2 Methodology

1.2.1 To address the requirements of the EIA Regulations, the factor of major accidents and disasters has been assessed. In considering the elements of vulnerability, professional judgement has been applied to develop proposed scheme specific definitions of major events and to determine the overall pre and post-mitigation consequence rating of each of the major events.

1.2.2 Major events that are relevant to and can affect a project, both man-made and naturally occurring, were identified. Where major events were identified, the potential for any change in the assessed significance of the proposed scheme on relevant environmental topics was described in qualitative terms and likely mitigation measures included as part of the assessment.

1.2.3 The potential receptors of impacts resulting from major events will be reported in the relevant topic chapters of the ES, and as such major events is not included as a standalone chapter. Any consequences for receptors will be reported in the applicable topic chapters as appropriate.

1.2.4 With regards to the methodology, the assessment evaluates the potential for significant effects (during construction and operation) of major accidents and disasters following a three-stage approach:

Stage 1: Long list

1.2.5 A long list of possible major events ('risks') was developed. This list drew upon a variety of sources, including the UK National Risk Register of Civil Emergencies (2017), the proposed scheme risk register and the proposed scheme design hazard assessment log.

1.2.6 In general, major events relating to the proposed scheme fall into three categories:

- Events that could not realistically occur, due to the type of scheme or its location.
- Events that could realistically occur, but for which the proposed scheme, and associated receptors, are no more vulnerable than any other development.
- Events that could occur, and to which the proposed scheme is particularly vulnerable, or which the proposed scheme has a particular capacity to exacerbate.

1.2.7 The aim of the screening process was to identify major events which fall into the third category.

1.2.8 The assessment therefore typically focused on low likelihood but potentially high consequence events[i]. This screening stage included input from a number of topic specialists whose topics are most likely to interact with major events.

1.2.9 For each identified major event, the long list details the relevance of the major event to the proposed scheme and the potential receptors. If the major event was considered relevant to the proposed scheme, it is indicated to be taken forward to the short list to be considered further.

1.2.10 Risks were screened out if:

- There is no source-pathway-receptor linkage.
- The receptor is not within scope, as defined through scoping.
- The likelihood and consequences are as follows:
  - high likelihood/high consequence – this is considered unreasonable to the proposed scheme and therefore is assumed designed out or managed;
  - low likelihood/low consequence – this does not constitute a major event and therefore can be screened out; and
  - high likelihood/low consequence – this does not constitute a major event and therefore can be screened out.

Stage 2 Short list screening

1.2.11 A screening exercise was undertaken to review the long list of major events and to consider their relevance to the proposed scheme, and whether they should be given further consideration.

1.2.12 For each major event, the short list details:

- a description of the relevance of the risk event to the proposed scheme;
- the potential receptors;
- the relevant phases of the proposed scheme the event could affect;
- the environmental receptor category or categories that could be impacted if the major event were to occur;
- the reasonable worst-case consequence if the major event were to occur;
- any mitigation for the major event currently embedded within the proposed scheme through legislation, standards, policy and other measures; and
- a conclusion on whether each risk will be considered further throughout the design process. If a risk is already managed to 'as low as reasonably practicable', they are not assigned to be considered further. The results of this further investigation will be reported in the relevant chapters of the ES.

1.2.13 The level of consequence of the risk of a major event was determined through several factors to identify potentially significant effects. These are:

- the **geographic extent** of the effects. Effects beyond the proposed scheme boundaries are more likely to be considered significant;
- the **duration** of the effects. Effects which are permanent (i.e. irreversible) or long lasting are more likely to be considered significant;
- the **severity** of the effects in terms of number, degree of harm to those affected and the response effort required. Effects which trigger the mobilisation of substantial civil emergency response effort are more likely to be considered significant;
- the **sensitivity** of the identified receptors; and
- the **effort required to restore the affected environment**. Effects requiring substantial clean-up or restoration efforts are more likely to be considered significant.

Stage 3: Short list

1.2.14 Where further design mitigation is unable to remove the potential interaction between a major event and a particular topic, the relevant ES chapter will identify the potential consequence for receptors covered by the topic and will give a

qualitative evaluation of the potential for the significance of the reported effect to be increased as a result of a major event.

1.2.15 A general guideline for screening is that risks can be screened out if:

- There is no source-pathway-receptor linkage.
- The receptor is not within scope, as defined through scoping.
- The consequence does not meet the criteria of 'serious damage' and therefore, the risk is not a potential major accident or disaster.
- The consequence and likelihood of the risk is high, such that it is considered unreasonable to the proposed scheme, therefore will be designed out or managed.

1.3 Sources

1.3.1 The long list of possible major events was developed using a variety of sources, including the following:

- UK National Risk Register of Civil Emergencies[ii];
- Project risk register; and
- Project Construction, Design and Management (CDM) risk register.

1.4 Assumptions and exclusions

1.4.1 There is no recognised standard methodology for the assessment of major accidents and disasters. A number of methodologies have been presented such as the DMRB LA 104 Environmental Assessment and Monitoring[iii], the Institute of Environmental Management and Assessment (IEMA)[iv], and a methodology developed by Arup[v] which follows a risk assessment using a source-pathway-receptor based approach. This together with professional judgement and experience has been used to undertake and inform the assessment.

1.4.2 The risk registers used to compile the long list were assumed to be current and correct at the time of producing the long list.

1.4.3 Climate projections included in the long list are those from PEI report Chapter 14 climate.

1.4.4 It is considered reasonable and proportionate to exclude certain receptor groups from the outset. Construction workers, as a receptor, have been excluded from the assessment, because existing legal protection is considered to be sufficient to reduce any risk from major events to a reasonable level. Legislation in force to ensure the protection of workers in the workplace includes:

- Construction (Design and Management) (CDM) 2015 Regulations;
- The Management of Health and Safety at Work Regulations (1999);
- The Workplace (Health, Safety and Welfare) Regulations 1992; and
- Health and Safety at Work etc. Act 1974 (HSWA).

1.4.5 Another potential source of major events related to the proposed scheme is road traffic accidents during its operation. These can clearly impact on people though fatalities and serious injury, but can also impact on the environment, through the spillage of fuel and hazardous loads. However, for the proposed scheme, the *Proposed scheme Assessment Report* identified that there would be an overall reduction in the number of incidents. The report states that:

"High volumes of traffic, poor forward visibility and steep gradients contribute towards a particularly poor safety record on the existing single-carriageway section of the A417. Accident severity is particularly high on this section, with the number of killed and seriously injured casualties (KSIs) much higher than the national average for this category of road. The scheme has the opportunity to significantly improve safety on this section of road by increasing forward visibility and reducing the steep gradients on Crickley Hill."

1.4.6 As such, although the Environmental Impact Assessment will still consider the risk of spillages, as part of the assessment of road drainage and the water environment, the potential for such incidents to affect people, as receptors under the topic of human health, is not considered further.

1.4.7 Major events considered at the earliest stage to be irrelevant to the proposed scheme are excluded from the long list, for example military incidents.

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[i] Arup (2017) EIA Toolkit Major Accidents and Disasters. Available at: https://www.iema.net/assets/uploads/Webinar%20presentations/2017%2007%2013%20MA&D%20Arup%20IEMA%2013.07.17.pdf

[ii] National Risk Register (NRR) of Civil Emergencies – 2017 Edition available at https://www.gov.uk/government/collections/national-risk-register-of-civil-emergencies

[iii] Highways England (July 2019) DMRB LA 104 - Environmental assessment and monitoring

[iv] https://www.iema.net/event-reports/2017/07/13/major-accidents-and-natural-disasters-in-eia/

[v] Arup (2017) EIA Toolkit Major Accidents and Disasters. Available at: https://www.iema.net/assets/uploads/Webinar%20presentations/2017%2007%2013%20MA&D%20Arup%20IEMA%2013.07.17.pdf