Table A.2.1 Suggested resilient network and impact criteria

Link name	Safety	Third party	Economic	Accessibility	Environment
A127 (Full length)			50,000 AADT No alternative routes with sufficient capacity. Access to all TGSE Key Development Sites (London Southend Airport, Central Area, Seafront and Shoeburyness)		High population density along corridor results in potential high exposure to NO2 and particulates during major congestion events
A13 London Road			18,000 AADT Access to and from Central Area, Westcliff and Leigh Disruption leads to excess traffic pressure on A127 which is currently beyond capacity		Mixed priority route, bus corridor and high incidence of cycle accidents, parking over most of the length. Passes through dense residential areas
A13 Queensway			20,000 AADT Access to the Central Area and Seafront		
A1160			16,000 AADT		

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Link name	Safety	Third party	Economic	Accessibility	Environment
Queensway			Access to the Central Area including seafront		
A1159 Manners Way			13,000 AADT TGSE Key Development Site at London Southend Airport and Airport Business Park Traffic flows will grow with development in JAAP Area		
A1159 Priory Crescent			36,000 AADT Access to and from development in west Southend and Shoeburyness	Access to Southend Hospital from Shoeburyness	
A1159 Eastern Avenue	Access from Essex County Fire and Rescue Service		36,000 AADT Access to and from development in west Southend and Shoeburyness	Access to Southend Hospital from Shoeburyness	
Sutton Road	Access from Essex County Fire and Rescue Service				

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Link name	Safety	Third party	Economic	Accessibility	Environment
A1159 Royal Artillery Way			36,000 AADT		
A13 Bournes Green Chase			21,000 AADT		
A13 North Shoebury Road			21,000 AADT		
A1158 Southbourne Grove	Access to Southend University Hospital		9,000 AADT		
A1158 Westbourne Grove	Access to Southend University Hospital		7,000 AADT		
Prittlewell Chase	Access to Southend University Hospital				
Kenilworth Gardens	Access to Southend University Hospital Access from Leigh Fire Station				
Fairfax Drive (between A127 and Prittlewell Chase)	Access to Southend University Hospital				
Mountdale	Access from Leigh				

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Link name	Safety	Third party	Economic	Accessibility	Environment
Gardens (access from Leigh Fire Station to junction with Kenilworth Gardens)	Fire Station				
Cliff Parade	Stability of cliffs are critical to safety of large numbers of visitors, residents and employees	Cliffs supporting road also support large number of adjacent residential, business and heritage properties	Key route within the Sea Front Area		
Grand Parade	Stability of cliffs are critical to safety of large numbers of visitors, residents and employees	Cliffs supporting road also support large number of adjacent residential, business and heritage properties	Key route within the Sea Front Area		
The Ridgeway	Stability of cliffs are critical to safety of large numbers of visitors, residents and employees	Cliffs supporting road also support large number of adjacent residential, business and heritage properties	Key route within the Sea Front Area		
Chalkwell Esplanade	Stability of cliffs are critical to safety of large numbers of	Cliffs supporting road also support large number of adjacent	Key route within the Sea Front Area		

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Link name	Safety	Third party	Economic	Accessibility	Environment
	visitors, residents and employees	residential, business and heritage properties			
The Leas	Stability of cliffs are critical to safety of large numbers of visitors, residents and employees	Cliffs supporting road also support large number of adjacent residential, business and heritage properties	Key route within the and Seafront Area		
Western Esplanade	Stability of cliffs are critical to safety of large numbers of visitors, residents and employees	Cliffs supporting road also support large number of adjacent residential, business and heritage properties	Key route within the Town Centre and Seafront Area		Adjacent to Benfleet and Southend Marshes SSSI
Marine Parade (Leigh)	Stability of cliffs are critical to safety of large numbers of visitors, residents and employees	Cliffs supporting road also support large number of adjacent residential, business and heritage properties	Key seafront route		Adjacent to Benfleet and Southend Marshes SSSI
Westcliff Parade	Stability of cliffs are critical to safety of large numbers of visitors, residents and employees	Cliffs supporting road also support large number of adjacent residential, business and heritage properties	Key route within the Town Centre and Sea Front Area		

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Link name	Safety	Third party	Economic	Accessibility	Environment
Clifftown Parade	Stability of cliffs are critical to safety of large numbers of visitors, residents and employees	Cliffs supporting road also support large number of adjacent residential, business and heritage properties	Key route within the Town Centre and Sea Front Area		
B1016 Eastern Esplanade	Within critical areas for coastal flooding	Adjacent to residential and business development	Key route within Sea Front Area and access to Shoeburyness		Adjacent to Benfleet and Southend Marshes SSSI
B1016 Thorpe Esplanade	Within critical areas for coastal flooding	Adjacent to residential and business development	Key route within Sea Front Area and access to Shoeburyness		Adjacent to Benfleet and Southend Marshes SSSI Pollution incidents could impact on Foulness SSSI and Essex Estuaries SAC
B1016 Ness Road			Key route within Sea Front Area and access to Shoeburyness		Adjacent to Benfleet and Southend Marshes SSSI Pollution incidents could impact on Foulness SSSI and Essex Estuaries SAC

Table A.2.2 Resilient network critical failure modes

Road name	Resilience risks	Critical Failure modes	Preventative interventions	Monitoring method
A127 (Full length)	High risk of surface water flooding on Arterial Road, Eastwood and Prince Avenue in Prittlewell Eastwoodbury and Prittlebrook Critical Drainage Areas Continuous central reservation prevents temporary diversion of traffic to contraflow in case of closure of one of the carriageways	Blocked or damaged gulley pots Blocked or damaged carrier pipes Concrete road base can become unstable where fatigue/ local settlement or thermal cracking combined with heavy loading from HGVs causes it to break up into blocks	Use of crack sealing/ overbanding of newly emerging cracks prevents damage to road base from ingress of water and debris with minimal traffic disruption. High frequency of gulley cleansing	Visual assessment using Carriageway Treatment Survey Ground Probing Radar to identify settlement, high moisture content and associated damage Falling Weight Deflectograph Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys
A13 London Road	High risk of surface water flooding between Leigh Gardens and Canvey Road	Blocked or damaged gulley pots Blocked or damaged carrier pipes Concrete road base can become unstable where fatigue, local settlement or thermal cracking combined with heavy loading from HGVs causes it to break up into blocks	Use of crack sealing/ overbanding of newly emerging cracks prevents damage to road base from ingress of water and debris with minimal traffic disruption. High frequency of gulley cleansing	Visual assessment using Carriageway Treatment Survey Ground Probing Radar to identify settlement, high moisture content and associated damage Falling Weight Deflectograph Gully cleansing and blockage frequency

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Road name	Resilience risks	Critical Failure modes	Preventative interventions	Monitoring method
				Drainage connectivity surveys Drainage CCTV surveys
A13 Queensway	High risk of surface water flooding	Blocked or damaged gulley pots Blocked or damaged carrier pipes	High frequency of gulley cleansing	Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys
A1160 Queensway	High risk of surface water flooding	Blocked or damaged gulley pots Blocked or damaged carrier pipes	High frequency of gulley cleansing	Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys
A1159 Manners Way				
A1159 Priory Crescent	High risk of surface water flooding	Blocked or damaged gulley pots Blocked or damaged carrier pipes	High frequency of gulley cleansing	Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys
A1159 Eastern Way	High risk of surface water flooding	Blocked or damaged gulley pots Blocked or damaged carrier	High frequency of gulley cleansing	Gully cleansing and blockage frequency Drainage connectivity

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Road name	Resilience risks	Critical Failure modes	Preventative interventions	Monitoring method
		pipes		surveys Drainage CCTV surveys
A1159 Royal Artillery Way	High risk of surface water flooding Temple Sutton and Southchurch Critical Drainage Areas	Blocked or damaged gulley pots Blocked or damaged carrier pipes	High frequency of gulley cleansing Trash screen clearance	Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys
A13 Bournes Green Chase	High risk of surface water flooding	Blocked or damaged gulley pots Blocked or damaged carrier pipes	High frequency of gulley cleansing	Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys
A13 North Shoebury Road	High risk of surface water flooding	Blocked or damaged gulley pots Blocked or damaged carrier pipes	High frequency of gulley cleansing	Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys
A1158 Southbourne Grove	High risk of surface water flooding	Blocked or damaged gulley pots Blocked or damaged carrier pipes	High frequency of gulley cleansing	Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys
A1158 Westbourne	High risk of surface water flooding	Blocked or damaged gulley pots	High frequency of gulley cleansing	Gully cleansing and blockage frequency

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Road name	Resilience risks	Critical Failure modes	Preventative interventions	Monitoring method
Grove		Blocked or damaged carrier pipes		Drainage connectivity surveys Drainage CCTV surveys
Prittlewell Chase	High risk of surface water flooding at entrance to Southend University Hospital	Blocked or damaged gulley pots Blocked or damaged carrier pipes Concrete road base can become unstable where fatigue, local settlement or thermal cracking combined with heavy loading from HGVs causes it to break up into blocks	High frequency of gulley cleansing Use of crack sealing/ overbanding of newly emerging cracks prevents damage to road base from ingress of water and debris with minimal traffic disruption.	Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys
Cliff Parade	Risk from land slippage	Blocked or damaged drainage pipes or culverts		Geotechnical surveys Ground movement monitoring
Grand Parade	Risk from land slippage	Blocked or damaged drainage pipes or culverts		Geotechnical surveys Ground movement monitoring
The Ridgeway	Risk from land slippage	Blocked or damaged drainage pipes or culverts		Geotechnical surveys Ground movement monitoring
Chalkwell Esplanade	Risk from land slippage	Blocked or damaged drainage pipes or culverts		Geotechnical surveys Ground movement

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Road name	Resilience risks	Critical Failure modes	Preventative interventions	Monitoring method
				monitoring
The Leas	High risk of surface water flooding Risk from land slippage	Blocked or damaged gulley pots Blocked or damaged carrier pipes Blocked or damaged culverts	High frequency of gulley cleansing	Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys Geotechnical surveys Ground movement monitoring
Western Esplanade	High risk of surface water flooding at Pier Hill junction High risk from river and estuarine flooding (Environment Agency Flood Risk Area 3) Risk from land slippage	Blocked or damaged gulley pots Blocked or damaged carrier pipes Blocked or damaged culverts	High frequency of gulley cleansing	Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys Geotechnical surveys Ground movement
Marine Parade	High risk of surface water flooding Risk from land slippage	Blocked or damaged gulley pots Blocked or damaged carrier pipes Blocked or damaged culverts	High frequency of gulley cleansing	Gully cleansing and blockage frequency Drainage connectivity surveys Drainage CCTV surveys
B1016 Eastern	High risk of surface water flooding	Blocked or damaged gulley pots	High frequency of gulley cleansing	Gully cleansing and blockage frequency

APPENDIX 2 – DRAFT RESILIENT NETWORK IN THE EVENT OF EXTREME WEATHER

Road name	Resilience risks	Critical Failure modes	Preventative interventions	Monitoring method
Esplanade		Blocked or damaged carrier pipes Blocked or damaged culverts		Drainage connectivity surveys Drainage CCTV surveys
B1016 Thorpe Esplanade	High risk from river and estuarine flooding (Environment Agency Flood Risk Area 3)	Condition defects on Shoeburyness Sea Wall Scour		
B1016 Ness Road	High risk from river and estuarine flooding (Environment Agency Flood Risk Area 3)	Condition defects on Shoeburyness Sea Wall Scour		
Westcliff Parade	Risk from supporting land slippage	Blocked or damaged gulley pots Blocked or damaged carrier pipes Blocked or damaged culverts		Geotechnical surveys Ground movement monitoring Visual assessment using Carriageway Treatment Survey (longitudinal cracks and subsidence indicators)
Clifftown Parade	Risk from supporting land slippage	Blocked or damaged gulley pots Blocked or damaged carrier pipes Blocked or damaged culverts		Geotechnical surveys Ground movement monitoring Visual assessment using Carriageway Treatment Survey (longitudinal cracks and subsidence indicators)