26. Cumulative Effects Summary

26.1. The methodology for the assessment of inter and intra project cumulative effects has had regard, amongst other matters, to the EIA Regulations 2017, the NPS NN, and the Planning Inspectorate guidance note on the Rochdale Envelope (April 2012), which sets out the views of PINs with regard to how this approach should be used in the context of the PA2008. The methods utilised in this PEIR are described in detail at **Chapter 7** and are not, therefore, repeated here. The purpose of this chapter (**Chapter 26**) is to provide an high level overview and summary of the findings of the technical chapters.

26.2. **Chapters 9-25** have identified the potential environmental impacts arising from the proposed Project in respect of specific environmental parameters, and assessments have been undertaken to determine whether cumulative effects may arise during construction, operation and decommissioning.

26.3. Cumulative effects assessment is an iterative and ongoing process. It is accepted at this stage in the Project that further work will be required in relation to cumulative effects as the environmental assessment work progresses and as project information becomes more certain.

26.4. A fuller assessment and summary of cumulative effects will be provided with the DCO submission. Significant adverse cumulative effects will be clearly set out, with mitigation and monitoring identified to reduce significant effects. Nevertheless, the assessments undertaken within the technical chapters of this PEIR reflect reasonably available information at the time of writing. The limitations of the assessment are acknowledged.

26.5. At the point of DCO submission this chapter will reflect a full summary of assessments for both intra and inter-related cumulative effects.

Cumulative Assessment: Intra-Project Effects

26.6. The assessment of intra-related effects considers only those effects produced by the Proposed Development, and not those from other projects (which are considered via the cumulative assessment inter-project process). The assessment of intra-relationships considers the likely significant effects of a proposed development on the same receptor. These occur (for example) when a number of separate impacts, such as noise and air quality, affect a single receptor, such as fauna.

26.7. The assessment of potential intra-related effects, therefore, considers receptor-led effects through an assessment of the scope for all effects to interact, spatially and temporally, to create intra-related impacts on a receptor. These might be short term, temporary or transient effects or incorporate longer term effects.

26.8. The final DCO submission will include within **Chapter 26** of the ES a clear summary of the relevant receptors from the intra-relationship effects sections of the cumulative assessments undertaken for **Chapters 9-25**. The assessment will therefore be based on information drawn from the individual topic chapters for the most part, with the identification of potential intra-related effects being based on qualitative assessment and using expert judgement. Where required **Chapter 26** will summarise the impact source pathways that can affect the receptors concerned, identify where those pathways are described and assessed, and summarise the effects via review of the assessment sections across all relevant topics.

26.9. At the current point in the assessment process, the chapters where intra-relationships are anticipated to arise are set out at **Table 26.1** below.

Cumulative Assessment: Inter-Project Effects

26.10. Inter-project cumulative effects arise as a result of the Proposed Development interacting with other developments/projects in the vicinity. An example of an inter-project cumulative effect may result from the proposed construction traffic for the project using the same access routes as other construction traffic for another un-related major project in the vicinity. The resulting effect may be an increase in vehicles on the local road network and an increase in dust from construction vehicles over and above that which would be created by the development in isolation.

26.11. The other projects considered within the cumulative assessments for each technical topic chapter have been considered based on a tiered approach. The 'Tier' identifies the level of detail that is likely to be available, where Tier 1 is a higher level of certainty and Tier 3 is a lower level of certainty. **Table 7.3** of **Chapter 7** sets out the project tiers, and provides full details of the methodology.

26.12. The assessments provided at **Chapters 9-25** have taken account of whether significant effects are likely, and have included consideration of (where known), the following information as a minimum:

- proposed design and location information;
- proposed programme of construction, operation and decommissioning; and
- environmental assessments that set out baseline data and effects arising from the 'other development'

26.13. As recommended in PINS Advice note 17, the shortlisting process for the inter-project cumulative assessment has been documented.

26.14. The final DCO submission will include within **Chapter 26** of the ES a clear summary of the projects assessed and the conclusions drawn.

26.15. A descriptive summary in relation to inter-project cumulative effects is included below as **Table 26.3**, along with **Table 26.2** which identifies which of the 'long-list' of projects set out at **Appendix 7.1**, have been expressly identified for assessment in each of the technical topic chapters.

Table 26.1: Potential intra-relationships by technical topic chapter

Assessments in the left hand column suggest the environmental topic could affect (blue), be affected by (yellow) or both affect and be affected by (green) topics in the first row.

Environmental Receptor (PEIR Chapter)	9 – Air Quality	10 – Agricultural Land	11 – Archaeology	12 – Built Heritage	13 – Ground Conditions	14 – Hydrology, Drainage and Flood Risk	15 – Utilities	16 – Biodiversity	17 – Landscape and Visual	18 – Noise and Vibration	19 – Highways and Transportation	20 – Socio Economics	21 – Lighting	22 – Waste	23 – Climate Change	24 – Human Health	25 – Major Accidents and Disasters
9 – Air Quality					x			x			x	x		x	x	x	x
10 – Agricultural Land			x		x	x	x	x	x			x			x		x
11 – Archaeology		x		x	x	x	x	x	x	x	x				x		x
12 – Built Heritage			x			x	x	x	x	x	x		x		x		x
13 – Ground Conditions	x	x	x			x	x	x			x			x	x	x	x
14 – Hydrology, Drainage and Flood Risk		x	x	x	x		x	x	x		x	x		x	x	x	x
15 – Utilities		x	x	x	x	x		x	x	x	x		x		x		x
16 – Biodiversity	x	x	x	x	x	x	x		x	x	x		x		x		x
17 – Landscape and Visual		x	x	x		x	x	x		x	x		x		x		x
18 – Noise and Vibration			x	x			x	x	x		x					x	

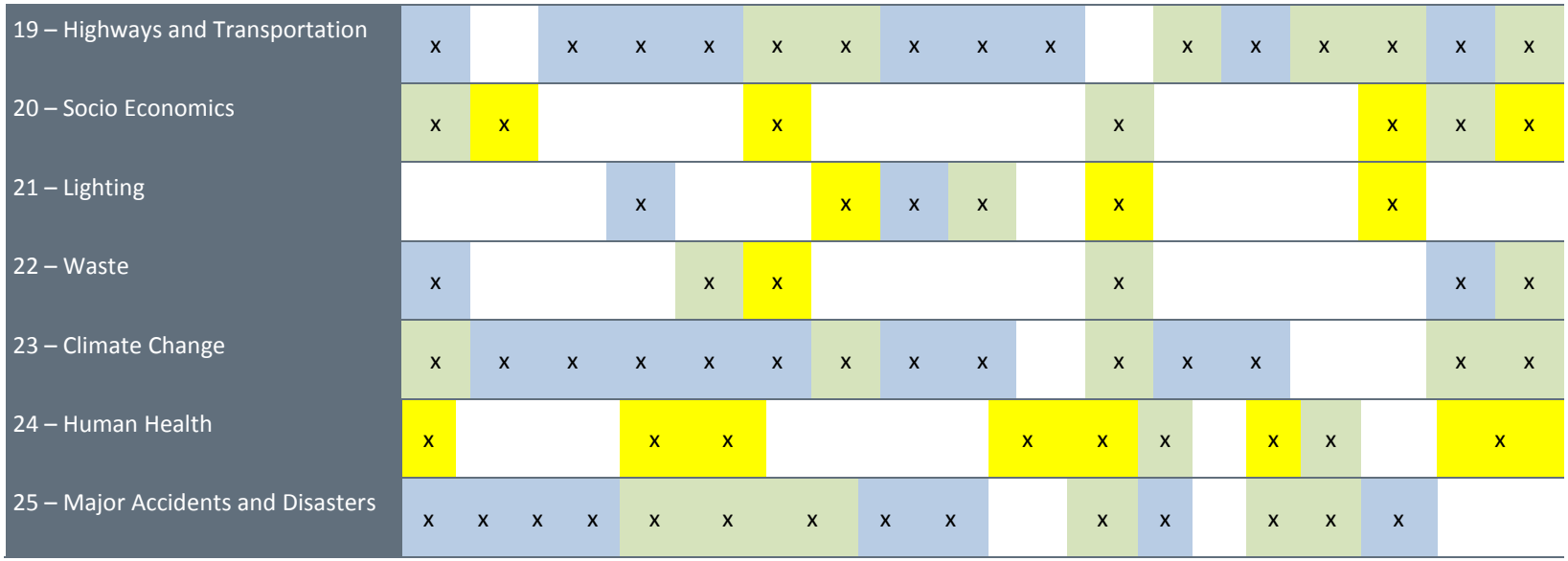
19 – Highways and Transportation
20 – Socio Economics
21 – Lighting
22 – Waste
23 – Climate Change
24 – Human Health
25 – Major Accidents and Disasters

Table 26.2: Potential inter-relationships by technical topic chapter, by Cumulative Impact (CI) reference

Topic	Cumulative Impact (CI) project reference number, where stated in Topic Chapter (CI number as identified by Appendix 7.1)
Air Quality	Developments within 700m
Agricultural Land	2, 4, 6, 9, 10, 79
Archaeology	2, 15, 31
Built Heritage	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 31, 33, 49, 55, 56, 59, 60, 62, 66, 67, 68, 69, 92
Ground Conditions	2
Hydrology, Drainage and Flood Risk	Considered, none expressly taken forward for further assessment
Utilities	2, 4, 5, 9, 10, 80, 98
Biodiversity	1, 2, 4, 5, 9, 10, 16, 19, 49, 85, 91, 92,98
Landscape and Visual	2, 4, 5, 9, 10
Noise and Vibration	2, 4, 6, 15, 22, 33, 34, 48, 50, 60, 62, 68, 70, 81
Highways and Transportation	2. Others inherent in modelling where identified.
Socio Economics	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 74, 80, 97, 98
Lighting	2, 24, 26, 29, 31, 32, 34, 81
Waste	2. All.
Climate Change	2. Others as addressed in other technical topic chapters
Human Health	Cross reference made to other technical topic chapters
Major Accidents and Disasters	2

Table 26.3: Potential inter-relationships by technical topic chapter

Topic	General comments and assessment
Air Quality	Dust: For the construction phase, the IAQM guidance considers the effect of dust up to 350 m from the site boundary. Therefore other developments more than 700 m (2 × 350 m) from the site boundary are not considered to have a cumulative effect. A review of the list of potential cumulative projects has been undertaken and there are a number of developments within 700 m of the Order Limits (including Northampton Gateway) where cumulative dust from the construction phase has the potential to be an issue. Provided both the Proposed Development and the cumulative developments incorporate appropriate mitigation measures the residual cumulative effect would be 'not significant'. Additionally, it is unlikely that many of the cumulative developments will be built at the same time. Construction and operational traffic: Road traffic from other developments have been included in the traffic data that will be modelled when further/full traffic data is available.
Agricultural Land	The assessment of cumulative effects has considered a total of 25 potential schemes in the locality that would involve the loss of agricultural land. The resultant cumulative loss would exceed 800ha of agricultural land, predominantly of Subgrade 3b but with substantial areas of Subgrade 3a and a smaller area of Grade 2. The sensitivity is moderate to low, and the magnitude of change is high, resulting in a 'moderate adverse' effect on Best and Most Versatile agricultural land.
Archaeology	The potential cumulative effect of the Proposed Development in combination with other proposed developments has been considered; in particular the potential for cumulative effects in combination with the proposed Northampton Gateway development site. It has been assessed that there would be a direct cumulative effect on a group of potentially contemporary archaeological sites on the adjoining developments, but that the cumulative effect will not be significant in EIA terms when the embedded mitigation for the Rail Central development is taken into account.
Built Heritage	It has been assessed that there will be a cumulative effect with the Northampton Gateway scheme. Construction works such as the movement of materials and construction machinery, including the use of tall construction equipment would be expected to give rise to a moderate adverse level of cumulative effect on Built Heritage, specifically Milton Malsor Conservation Area and Grade II Listed Mortimers. Considering the potential for cumulative effects on Built Heritage during the operational phase, the Proposed Development and its associated landscaping works will largely screen the Northamptonshire Gateway scheme in views from the south and south-east. The scheme will, however, remove a further section of agricultural fields (to the east) which surround the village and Milton Malsor Conservation Area. The overall effect of this and the Proposed Development are considered to cumulatively result in a moderate adverse effect on the significance of the Milton Malsor Conservation Area. In addition to this and due to the orientation

	of the grade II listed Mortimers with views of the building facing towards the scheme, it is likely that there will be additional built development and/or gantry cranes experienced within this view (subject to mitigation by the scheme). Cumulatively, the overall effect of this and the Proposed Development are considered to result in a moderate adverse effect on the significance of Mortimers.
Ground Conditions	In general, potential cumulative effects to geology, hydrogeology and ground conditions from a contamination perspective are considered possible only where the footprint of proposed development interacts with the footprint of other developments that have the potential to impact upon ground conditions. This is in consideration and in recognition that other major developments will be required to be undertaken in accordance with statutory guidance and best practice relating to construction and land contamination. Northampton Gateway is the only project which has the potential to have inter-project cumulative effects. Potential cumulative effects could occur in respect of: • Ground stability, with the Northampton Gateway site being located immediately adjacent to the Rail Central Main SRFI site on the southern side of the Northampton Loop Rail Line. • Potential for surface water discharge and runoff during construction. However, it is considered that no significant cumulative effects will in practice occur as: • The existing Northampton Loop Rail Line, effectively acts as a barrier to interaction between the two developments. • Based on a review of the ground conditions at the sites, and on the assumption that all works will be undertaken in accordance with suitable geotechnical designs and Specifications, to the satisfaction of Network Rail and Building Control, ground stability will not be a significant concern. • All works should be undertaken in line with Environmental best practice including PPG5, which would reduce and restrict surface water discharge and run off.
Hydrology, Drainage and Flood Risk	The Proposed Development and any surrounding development will collectively increase the impermeable area. This will increase the volume and rate of surface water runoff from the area. However, surface water for each of the other projects assessed will have a surface water system designed with the requisite attenuation capacity required by both the Environment Agency and LLFA in order to result in no increase in flood risk elsewhere, and as such no cumulative impacts are anticipated with regard to surface water. From a review of the identified cumulative sites, none of these are located within the catchment of the Study Area (including Northampton Gateway). All of the identified sites are topographically separated from the site and would therefore have no interaction. As such, and despite the policy requirements that will be met through the planning process, no cumulative impact would affect the site. The only impacts to the site would be in the event of attenuated discharges or unmitigated significant ground reprofiling and loss of floodplain storage within areas in the upstream sections of the catchment within which all works are proposed. Given no sites are shown in this location, no cumulative impacts are considered to affect the Main SRFI.

Utilities	The cumulative effects assessment considers how the Proposed Development will combine and interact with the effects of other major developments in the context of utilities. These would be minimised through DNO design in order to safeguard the networks. In presenting an applicant with a formal connection offer the DNO confirms the requested connection can be physically achieved, the connection will not result in any long term adverse impacts to other network users and that adequate capacity will be available for the applicant's site. The key cumulative projects will be the grid connection to the Northampton West substation, and the adjacent Northampton Gateway SRFI project. The latter project would be served from the Northampton East primary ring main so there is no foreseen significant cumulative capacity impact. The route of the proposed grid connection is currently unknown. However, it is assumed it will be routed underground along the routes of existing utilities within the highway boundary, so there will be minimal cumulative impact other than the potential for routine "roadwork" delays on the highway network, minimised through use of good practice measures.
Biodiversity	Given the impact assessments reached in respect of the other projects considered, there are no cases where the impacts of the Proposed Development could add to something identified as an impact in another project. There is, however, potential to add to cumulative impacts of hedgerow loss, which could be significant at a county scale. Here it is the integrity of hedgerow networks that is likely to be the main concern, though loss of individually important hedges may also occur. There is some potential for cumulative effects on commuting and foraging bats in consequence of this. Similarly there is potential to add to the cumulative impacts of farmland habitat loss on specialist farmland bird species which could be significant at county scale. Although habitat provided in compensation for the Rail Central project, and others, is likely to lead to a net gain in habitat for a broad spectrum of birds, especially garden birds, the compensatory habitat would not be suitable for specialist farmland birds which favour the traditional landscape of hedgerows and large open fields. An additional cumulative project will include the proposed grid connection for the Main SRFI Site to the Northampton West primary substation. This is anticipated to be an underground connection following existing utilities conduits in the highway boundary. Given this will largely be in an urban setting with different ecological receptors, and the additional impact to the construction of the Proposed Development (which is anticipated to be constructed at the same time) will be negligible, there is not considered to be the potential for significant cumulative impact on ecological receptors. Assessment of Cumulative Effects, Northampton Gateway: A review of the scoping report for the Northampton Gateway project indicates that the sensitive ecological receptors are very similar to those at the Main SRFI Site, comprising hedgerows, mature trees, bat foraging and commuting habitat, and farmland bird habitat. However in addition there are great crested newt breeding and terrestrial habitat; golden plover over-wintering habitat (in regular use); and reptile habitat (including a low population of common lizard). There is approximately 13.8ha of land that lies within both Order Limits, which is earmarked for retained farmland although not for ecological mitigation. If the Northampton Gateway Project were to secure this land as proposed, for rail infrastructure associated with that project, then the green infrastructure provision would be reduced. If the Northampton Gateway Project were to not proceed, there is potential for Rail Central to enhance this area for ecology, as it is not required for other purposes.

	Assessment of Cumulative Effects, Minor Highway Works: As the minor highway works are largely within the adopted highway, no significant cumulative effects to ecological features are expected. An assessment of junctions with development proposed outside the highway boundary will be made in the DCO submission.
Landscape and Visual	Potential cumulative visual effects during the construction and operational phases considering the Proposed Development and Northampton Gateway are very limited. Highly significant adverse visual cumulative effects have been identified for one viewpoint, Viewpoint 3, representative of views to users of PRoW's RD3, RD6, KZ14 and RD22 located to the east of Blisworth. The cumulative assessment (for other cumulative projects) concludes that should all identified developments be constructed simultaneously, this would give rise to some adverse effects on landscape character particularly in the areas between Collingtree and Milton Malsor. Construction works such as the movement of materials and construction machinery, including the use of tall construction equipment would be expected to give rise to a highly significant adverse cumulative effect on the landscape during construction.
Noise and Vibration	The effects are assessed to be minor adverse and not significant in respect of construction noise and vibration, and negligible in relation to operational vibration. Cumulative operational noise assessment cannot be completed at this stage as the requisite information does not exist to enable this.
Highways and Transportation	The traffic associated with sites suggested by South Northamptonshire Council in their Scoping Report are included within the NSTM assessments. The NSTM also includes a number of large scale committed and proposed development and infrastructure schemes. In addition the model includes a number of smaller committed schemes (less than 10 dwellings). The traffic associated with the sites suggested by South Northamptonshire Council in their Scoping Report are included within the NSTM assessments. The cumulative effect in relation to the topic areas considered within this chapter has therefore already been considered. To assess cumulative effects of the Northampton Gateway scheme, a full cumulative assessment will be carried out, providing a comparison with the 2031 baseline. This will be undertaken using traffic flows obtained from the NSTM. The 2031 base line scenario will include all committed and allocated developments and infrastructure within the NSTM. The cumulative assessment scenario will include the following: • all committed and allocated development and infrastructure included within the DM scenario; • the Rail Central development and its proposed package of mitigation; • the Northampton Gateway development and its proposed package of mitigation; and • any mitigation schemes required to address the cumulative impact of Rail Central and Northampton Gateway, not provided by either development in isolation. At this stage, the relevant information for the Northampton Gateway development which is required for the assessment is not available. Therefore, it is not possible to carry out a cumulative assessment for the purpose of this PEIR. However, initial NSTM runs have been carried out including the following:

	• all committed and allocated development and infrastructure included within the DM scenario; • the Rail Central development and the proposed mitigation scheme at M1 Junction 15a; and • the Northampton Gateway development and the associated mitigation schemes at M1 Junction 15 and the Roade Bypass. An initial assessment of this scenario has been carried out within the Transport Assessment (Appendix 19.1) which seeks to confirm whether the mitigation schemes proposed as part of the Rail Central development are appropriate to accommodate the cumulative development scenario. Further work will be carried out in advance of the final submission to determine the full cumulative impact as outlined above.
Socio-economics	Of the projects identified, several are expected to be primarily residential in nature, with only small scale employment effects generated. The provision of housing at these sites – in combination with employment cumulatively generated by the Proposed Development and other employment-generating projects – can be expected to positively contribute towards accommodating the additional labour force required to support employment. The assessment presented within the chapter acknowledges and allows for the growth in labour force resulting from planned new housing development, including those identified within the cumulative assessment. The creation of employment opportunities for residents living at new residential developments can therefore be considered beneficial, with no adverse effect requiring mitigation. Several sites are expected to generate relatively substantial levels of job creation and indirect and induced employment effects once operational. The creation of new jobs through cumulative schemes is considered beneficial and unlikely to result in significant adverse effects in the local and wider economy. Accordingly, the cumulative development of the Main SRFI Site and Northampton Gateway in particular would be unlikely to generate significant adverse employment effects in the local and wider economy. The cumulative schemes will draw upon a wider labour force beyond the district's boundary. The labour force of the wider area is expected to grow and provide capacity to support over 66,000 new jobs over the next decade as planned new housing is delivered and occupied and as a consequence the labour force grows. There are also 7,800 existing residents currently claiming JSA and seeking employment in the wider impact area, that could potentially take up roles in the cumulative schemes assessed. The scale of growth in the labour force (supporting over 66,000 jobs) and available capacity of unemployed people finding work (7,800 people) exceeds job creation in cumulative projects including the Proposed Development (46,500 jobs). In headline terms there is labour force capacity within the wider impact area and there will not be an adverse labour force effect generated by cumulative projects. In terms of cumulative skills effects, the workforce of the local and wider impact areas has capacity to adapt to change. This is linked to the increase in the labour force that will occur as new homes are delivered as well as enhancements to the skills base of residents associated with delivery of planned skills and training initiatives. The cumulative projects have also been reviewed and found to incorporate measures in relation to skills and training provision which will also contribute to workforce skills and suitability. The magnitude of the cumulative effect on skills will be greater than that of the Proposed Development in isolation, but will not generate a significant effect.

Lighting	Cumulative sites within the Proposed Order Limits and those that fall within a precautionary 200m zone from the Order Limits (based on a 100m obtrusive light zone of influence for each Site including the Order Limits) have been assessed. The operation of the proposed Northampton Gateway development would be 24 hour, as a worst-case. Therefore, a number of residential receptors considered in the assessment have the potential to receive a cumulative obtrusive light magnitude of effect that exceeds negligible. However, the closest residential receptor, R1: Properties on Barn Lane, is approximately 350m from the boundary of the Northampton Gateway development. This is far in excess of the precautionary 100m zone and therefore it is considered that any lighting which is compliant with modern standards would be of negligible magnitude of effect which would result in a negligible cumulative effect. In terms of direct sky glow, as with the Proposed Development it is anticipated that the embedded measures for Northampton Gateway would include for all luminaires to be full cut-off (zero light output above the horizontal) resulting in a pre-mitigation negligible cumulative effect. The Proposed Development would have a negligible magnitude of effect, resulting in a negligible significant effect on railway receptors T1 and T2. Based on the assumption that the Northampton Gateway project would be designed to similar standards and would be situated similar distances from these receptors it too would be expected to have a negligible magnitude of effect, resulting in a negligible significant effect on railway receptors T1 and T2. A negligible potential glare to vehicle users and a negligible magnitude of effect to highway receptors is reported for the Proposed Development. Given the proximity to highway receptors T3 and T4 it is anticipated that the proposed Northampton Gateway project would not cumulatively add to this. Therefore, there would be a negligible cumulative effect on highway receptors T3 and T4.
Waste	Potential cumulative effects from construction waste generated by surrounding projects have been assessed as negligible based on the local waste management authority forecasting no growth in construction waste based on anticipated improved management due to increasing costs for disposal. Also, the future calculated waste arisings for the local authority area will have included an allowance for new developments, and waste infrastructure has been planned accordingly. Finally it has been assumed that these new schemes will be required to follow the requirements of the local and national legislation and waste planning, including the maximisation of reuse and recycling of construction wastes through site waste management plans and meeting targets for recycling of waste. Therefore, collectively, these developments are unlikely to significantly deplete the existing and planned waste capacity of Northamptonshire. Similarly the potential cumulative effects of operational waste from other proposed development sites in the region will have been accounted for in the waste forecasts and waste infrastructure planning. It is also anticipated that similar mitigation measures will be required for other developments ensuring that the waste hierarchy (prevention, preparation for reuse, recycling, other recovery and disposal) and disposal to one of the nearest appropriate facilities are observed wherever practical and commercially viable. It is reasonable to conclude that other schemes would effectively mitigate the impact of their waste arising during their operation. Given the current and predicted waste production levels within Northamptonshire, it is reasonable to anticipate that there shall be

	suitable capacity to effectively manage the wastes associated with all current and proposed schemes.
Climate Change	Climate change - mitigation: With regard to inter-project cumulative effects the GHG emissions presented in the assessment are based on circumstances specific to the Proposed Development and whilst external factors could have an impact on the quantity of estimated emissions, reasonable endeavours have been taken to ensure that likely scenarios are accounted for, for example in projections of future emission factors. Beyond this, there are no specific projects identified that are likely to have an inter-project effect on the quantity of GHG emissions. Climate change - adaptation: With regard to inter-project cumulative effects, the effects of Climate Change predominantly impact on the development rather than the development impacting on Climate Change, with the exception of flooding whereby other major development such as Northampton Gateway could theoretically result in greater flooding episodes. However it has been assumed that this development would be designed to reduce flooding impacts in a similar manner to this Proposed Development and therefore there are no inter-project cumulative effects.
Human Health	Human health is protected through controls on all the key health pathways associated with the construction and operation. These are addressed through the individual EIA technical disciplines (air quality, noise and vibration, highways and transportation and socioeconomics, for example) to objective levels set to be protective of health. Therefore no cumulative effect would occur.
Major Accidents and Disasters	Cumulative risks with other projects are not considered to escalate the likelihood of major accidents or natural disasters from or to the Proposed Development. The principal risks identified and assessed are within the Order Limits. Northampton Gateway may cumulatively increase the use of highways and the rail network but the management and control of the risk of accidents within this context is controlled by the highways authorities and rail network operator.