

THE LONDON RESORT

The London Resort Development Consent Order

BC080001

Environmental Statement Volume 2: Appendices

Appendix 8.4 – Literature Review

Document reference: 6.2.8.4

Revision: 00

December 2020

Planning Act 2008

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

Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

Regulation 12(1)

[This page is intentionally left blank]

Appendix 8.4 ◆ Health literature review

CONTENTS

CONTENTS	1
INTRODUCTION	3
CONSTRUCTION PHASE EFFECTS AT THE LONDON RESORT	9
Potential health effect of displacement or change in access affecting public services and community facilities	9
Potential health effect of displacement or change in access to open spaces	14
Potential health effects from displacement of commercial uses	17
Potential health effects from displacement of residential dwellings	22
Potential health effect of changes to local traffic and transport and changes in the use of active travel modes	24
Potential health effect of construction resulting in changes in noise and vibration	28
Potential health effect of construction resulting in changes in air quality	30
Potential health effect of construction resulting in hazardous waste	33
Potential health effect of construction resulting in water contamination	35
Potential health effects of construction related to changes to levels of neighbourhood amenity	37
Potential health effects of the presence of the construction workforce	39
Potential health effect of work and training opportunities created	43
Potential health effect of construction workers on health services	45
Potential construction health effects related to a changing climate	47
OPERATIONAL PHASE EFFECTS AT THE LONDON RESORT	51
Potential health effects associated with changes in noise and vibration	51
Potential health effects associated with changes in air quality	52
Potential health effects from a change in local traffic and active travel	53
Potential health effects associated with changes in electromagnetic field exposure	54
Potential health effect of increased flooding during operation	55
Potential health effects associated with the creation and disposal of hazardous waste	56
Potential health effect related to water contamination	57
Potential health effects related to changes to levels of neighbourhood amenity	57
Potential health effects associated with inclusive design, site access and facilities	58
Potential health effects relating to changes in access to work and skills	62
Potential health effects of provision of worker accommodation	63
Potential health effects of change in the demand for residential accommodation	64
Potential health effects from a change in the demand for health services	68

Potential health effects from a change in the demand for public services and community facilities.....69

Potential health effects associated with open space provision and amenity space69

Potential health effects from changes in community cohesion.....70

Potential health effects from changes in crime and community safety (including fear of crime)73

Potential health effects from changes to access to healthy and unhealthy food76

Potential health effects from the spread of communicable disease.....80

Potential health effects related to a changing climate82

INTRODUCTION

- 8.4.1 This health appendix reviews the literature on the links between health determinants and the potential effects on an individual's health, providing an evidence base which underpins the assessment provided in Chapter 8: *Human health* (document reference 6.1.8).
- 8.4.2 Whilst there is an abundance of available literature on determinants of health, this review focuses specifically on those potential effects identified within the health assessment scope (see Chapter 8: *Human health* ((document reference 6.1.8)).
- 8.4.3 Each section first presents information on the health effects of the above activities on the general population. This information is used to establish health pathways – in other words, to establish the relationship between the activities and potential effects of the London Resort and potential resulting health effects for the receptor population. This is the evidence base underpinning the assessment of the London Resort's health effects. The second part of each section assesses the potential impact on vulnerable groups in particular and is used to understand health inequalities and the extent to which the activities listed above may affect different groups in different ways. The potential impacts considered in the literature review are deliberately cautious, with a 'worst-case' view taken, meaning that potential impacts are considered even if they are deemed to be highly unlikely to occur.
- 8.4.4 Within this literature review, professional judgement is used to inform the importance of each possible determinant. Issues looked at here to inform this judgement include whether there is a sufficient amount of evidence linking the effect to health outcomes, and whether there any particular groups in the population that are affected disproportionately in regard to this effect. Evidence linking each effect and the associated human health outcomes is judged as either **weak**, **moderate**, or **strong**, with a definition for each provided in Table 8.4.1.

Table 8.4.1 Evaluation of the strength of evidence – ratings

Strength of evidence	Description
Strong	A wide range of peer-reviewed research has found an association between the determinant and health outcomes. There is consensus in the scientific community about the existence of the association.
Moderate	Several peer-reviewed studies have found an association between the determinant and health outcomes. There is broad agreement in the scientific community about the existence of the association, but there may be a number of dissenting voices about the particulars.
Weak	A few peer-reviewed or non-peer-reviewed research articles have found an association between the determinant and health outcomes. There is little consensus in the scientific community, or there are conflicting studies.

8.4.5 Where the strength of evidence related to a health determinant is judged to be “weak”, it is not considered evidence for the lack of a potential relationship between the project activities and health outcomes. It simply reflects gaps in the state of our (and, more generally, the scientific community’s) knowledge about the causal links involved. However, it does show that there is uncertainty in the assessment of the likely effect.

8.4.6 Table 8.4.2 presents a summary of the strength of evidence concluded for each effect assessed.

Table 8.4.2 Summary table of strength of evidence for health pathway and justification

Health effect	Strength of evidence for link to human health	Justification
Construction effects		
Potential health effect of displacement or change in access affecting public services and community facilities	Strong	There is clear evidence on the positive health impacts of social networks, with further evidence linking the loss of these networks to negative health outcomes through increased loneliness, social isolation and higher rates of disease. Public services and community facilities are commonly linked to the provision of social networks, and therefore changes in access will have direct implications on health outcomes.
Potential health effect of displacement or change in access to open spaces	Strong	Open spaces directly contribute to health outcomes through encouraging physical activity. Evidence shows that open spaces result in indirect health benefits, including better cognition and mental health outcomes. There also exists strong evidence on the negative outcomes associated with displacement of or a clear lack of access to open spaces, such as loneliness, increased crime, and mental health problems in children
Potential health effects from displacement of commercial uses	Moderate	Evidence routinely links income and employment-related factors, such as job satisfaction and stability, to health outcomes. Some vulnerable groups, such as low-income and single parents, are particularly vulnerable to changes in these factors. The displacement of commercial uses will cause relocation, which has the potential to create financial burdens for businesses and individuals. The strength of evidence for this effect is deemed moderate, not strong, as the evidence linking commercial relocation to health outcomes is less clear than that linking economic health determinants to health outcomes.
Potential health effects from displacement of residential dwellings	Moderate	There exist numerous theories on how housing-led regeneration projects and displacement may positively or negatively affect human health, such

Health effect	Strength of evidence for link to human health	Justification
		as through changes in living conditions or rents, but many studies varied in their findings and few long-term or definite results were found. Therefore, evidence linking residential relocation and health outcomes is deemed moderate.
Potential health effect of changes to local traffic and transport and changes in use of active travel modes	Strong	This is a reasonable body of evidence linking poor transport access to adverse health outcomes (such as isolation, depression, and stress) and also to riskier driving, but the evidence is particularly strong regarding the link between reduced active travel methods and positive health outcomes which aren't realised, such as increased physical activity
Potential health effect of construction resulting in changes in noise and vibration	Moderate	Although the evidence is strong with regard to increased levels of noise adversely affecting health with those living in quiet locations judged to have a better quality of life, a range of health problems refer to exposure to 'prolonged' or 'excessive' noise. As the construction phase may lead to temporary increases in exposure to noise, not permanent ones, the association between construction noise and health outcomes is weaker. Negative health outcomes that can arise as a result of increased noise exposure include sleep disturbance and psychological stress, with particular adverse effects on children, older people, and disabled people.
Potential health effect of construction resulting in changes in air quality	Strong	The evidence is clear that pollutants (principally PM and NOX) have negative health impacts on individuals, including coronary heart disease, lung cancer and annoyance. A range of health problems relating to air quality refer to the length/persistence of exposure.
Potential health effect of construction resulting in hazardous waste	Moderate	Links between landfill or waste disposal sites and adverse health outcomes are relatively strong, and an obvious link exists between hazardous waste and health, but less definite conclusions be drawn directly relating waste resulting from construction activities and human health in the literature.
Potential health effects of construction resulting in water contamination	Moderate	Links between water contamination and adverse health outcomes are strong, but research aimed at establishing a connection between construction activity and water contamination is not strong.
Potential health effects of construction related to changes to levels of neighbourhood amenity	Moderate	There is evidence linking the quality of physical spaces and other components of neighbourhood amenity to health and wellbeing, however the literature identifies that difficulties in defining neighbourhood amenity prevent strong conclusions to be drawn regarding human health.
Potential health effects of the presence of the construction workforce	Weak	The introduction of a construction workforce in an area does not have any direct effect on health, but could indirectly influence behaviour through

Health effect	Strength of evidence for link to human health	Justification
		feelings of intimidation due to a negative stereotype. The link between fear of construction workers and reduced physical activity and social isolation is highly speculative, however.
Potential health effect of work and training opportunities created	Strong	There is clear and strong evidence on the positive impact of employment generation, including within construction industries, in improving both physical and mental health outcomes. In addition, there exists strong and clear literature on the benefits of education and positive health outcomes, as individuals are more likely to have healthier lifestyles and behaviours.
Potential health effect of construction workers on health services	Moderate	Reduced access to health services may lead to the exacerbation of health outcomes, unmet health needs and place financial burdens upon vulnerable individuals. Those groups with pre-existing reduced access to healthcare and a relatively higher reliance upon health services would be the worst affected from changes in demand and access.
Potential construction health effects related to a changing climate	Moderate	A changing climate affects health through a number of pathways, both directly, such as through an increased incidence of heatwaves or severe weather events and indirectly through establishing vectors for vector-borne disease such as malaria. However, it is not clear from the literature whether the climate change impact of the London Resort would have a direct effect on the health of the receptor population in the study area.
Operational effects		
Any potential health effects associated with changes in noise and vibration	Strong	The evidence is clear that prolonged exposure to increased levels of noise can adversely affect health, with those living in quiet locations judged to have a better quality of life. Negative health outcomes that can arise as a result of increased noise exposure include sleep disturbance and psychological stress, with particular adverse effects on children, older people, and disabled people.
Potential health effects associated with changes in air quality	Strong	The evidence is clear that pollutants (principally PM and NOX) have negative health impacts on human health, inducing health issues such as coronary heart disease and lung cancer and annoyance.
Potential health effects from a change in local traffic and active travel	Strong	There is reasonable evidence linking better transport access to better health outcomes. By improving access to assets and opportunities associated with positive health outcomes, such as employment opportunities and open spaces, improvements in transport access indirectly

Health effect	Strength of evidence for link to human health	Justification
		improve health outcomes. Additionally, the encouragement of active travel methods is commonly referred to as playing a key role in encouraging physical activity in the general population, improving health outcomes.
Potential health effects associated with changes in electromagnetic field exposure	Weak	Literature exists on the health outcomes associated with exposure to EMF, such as headaches, anxiety, nausea and more serious conditions like cancers. The evidence is weak in proving a causal link and conclusions are often inconclusive with follow up studies unable to produce similar results. For communications infrastructure that will be placed at London Resort shall be in line with ICNIRP guidelines. No literature exists providing a causal link between EMF expose outside the ICNIRP guidance and health outcomes.
Potential health effect of increased flooding	Moderate	Some evidence has shown a link between flooding and mental health outcomes. Individuals from areas prone to flooding have been shown to experience relatively high levels of PTSD, depression and anxiety. However, literature does not establish a conclusive causal link between flooding and health outcomes.
Potential health effects associated with the creation and disposal of hazardous waste	Moderate	Links between individual landfill and waste disposal sites and adverse health outcomes are strong, and a clear link exists between hazardous waste and health, but less definite conclusions can be drawn relating waste and landfill sites in general and human health in the literature.
Potential health effects of construction resulting in water contamination	Moderate	Links between water contamination and adverse health outcomes are strong, but research aimed at establishing a connection between any water contamination that may arise as a result of the operation of leisure facilities is limited.
Potential health effects related to changes to levels of neighbourhood amenity	Moderate	There is evidence linking the quality of physical spaces and other components of neighbourhood amenity to health and wellbeing, however the literature identifies that difficulties in defining neighbourhood amenity prevent strong conclusions to be drawn regarding human health.
Potential health effects associated with the inclusive design, site access and facilities in and around the London Resort	Moderate	Links between general design and accessibility of the site and health are considered to be moderate, but strong evidence exists in the human health impacts on certain vulnerable groups, such as those with sensory impairments or movement-related disabilities. For all groups, first-aid points, suitable fire routes and evacuation procedures, and a communication system are important for good inclusive design and health outcomes on-site.

Health effect	Strength of evidence for link to human health	Justification
Potential health effects relating to changes in access to work and skills	Strong	There is clear and strong evidence on the positive impact of employment generation, in improving both physical and mental health outcomes. In addition, there exists strong and clear literature on the benefits of education and positive health outcomes, as individuals are more likely to have healthier lifestyles and behaviours.
Potential health effects of provision of worker accommodation	Strong	People spend on average over 70% of their time in the home environment, and poor quality or overcrowded housing can expose residents to cold, damp, accidents, inadequate sunlight and insecurity.
Potential health effects of change in the demand for residential accommodation	Moderate	A lack of quality, affordable housing can force households to reside in overcrowded and unsatisfactory housing conditions, exposing them to physical illness as well as affecting mental health outcomes, such as anxiety and wellbeing, but the evidence is often vague or speculative.
Potential health effects from a change in the demand for health services	Moderate	Reduced access to health services may lead to the exacerbation of health outcomes, unmet health needs and place financial burdens upon vulnerable individuals. Those groups with pre-existing reduced access to healthcare and a relatively higher reliance upon health services would be the worst affected from changes in demand and access.
Potential health effects from a change in the demand for public services and community facilities	Strong	There is clear evidence on the positive health impacts of social networks, with further evidence linking the loss of these networks to negative health outcomes through increased loneliness, social isolation and higher rates of disease.
Potential health effects associated with open space provision and amenity space	Strong	There is clear and strong evidence on the positive impact of the provision of open spaces for all groups, including increased physical activity, better cognition and better mental health outcomes.
Potential health effects from changes in community cohesion	Moderate	There is strong evidence on the positives associated with a more cohesive community, such as reduced mortality and mental health outcomes, but many of the benefits cannot be solely attributed to community cohesion and may reflect a range of alternative factors. Difficulties in defining and analysing community cohesion prevent a strong causal link being established within the literature.
Potential health effects from changes in crime and community safety (including fear of crime)	Strong	Theme parks and surrounding amenities and communities have been linked to higher occurrences of crime, in addition to the need for additional measures to ensure the safety of visitors. Crime and the fear of crime can lead to many adverse health outcomes, such as reduced physical activity and obesity, social isolation in

Health effect	Strength of evidence for link to human health	Justification
		older people, and more generally reduced feelings of safety causing mental distress for individuals.
Potential health effects from changes to access to healthy and unhealthy food	Strong	Nutritional intake is one of the main determinants of human health, and lack of access to healthy foods prevents healthy eating. There is also evidence that easy access to unhealthy food increases consumption and therefore reduces health outcomes.
Potential health effects from the spread of communicable diseases	Strong	Communicable diseases are a key source of morbidity in the UK, and as demonstrated through the lasting Covid-19 pandemic, their spread has the potential to affect health outcomes in far reaching pathways beyond direct impacts of disease contraction.
Potential health effects related to a changing climate	Moderate	A changing climate affects health through a number of pathways, both directly through an increased incidence of severe weather events and indirectly through establishing vectors for vector-borne disease such as malaria and affecting health determinants. However, it is not clear from the literature whether the climate change impact of the London Resort would have a direct effect on the health of the receptor population in the study area.

CONSTRUCTION PHASE EFFECTS AT THE LONDON RESORT

Potential health effect of displacement or change in access affecting public services and community facilities

8.4.7 Due to the land take and associated construction activities that would occur as part of the London Resort proposals, there may be some community facilities, e.g. educational facilities, community centres, places of worship, or public services (e.g. police stations, and fire stations) affected through displacement or change in access. This may cause a range of adverse health effects for the general population and some groups in particular who are prone to the effects of social isolation. The social impacts of health-related public services are captured within the **potential effects from a change in the demand for health services** (starting from paragraph 8.4.299) effect.

8.4.8 The literature focuses on the adverse health effects of the displacement of particular facilities to particular groups. For children and young people, this would include the loss of educational facilities; for older people, ethnic minority groups and those with a disability this might include community facilities with a specific function which is important to those groups of people; and for the low-income groups and the unemployed this would include job centres and other key public services.

Effects on the general population

- 8.4.9 There is a large body of evidence indicating that social networks have a positive impact upon individuals' health. Community facilities, such as educational facilities, community centres, and places of worship, bring communities together and create increased levels of social interaction. Generally, established social networks allow individuals to have their support needs met by their social contacts through helpful interaction.¹ Health is related to the availability of supportive ties we have with others, e.g. the frequency and contact with friends in these networks.² Positive health outcomes also arise as individuals with strong social support networks feel more in control of their environment, which leads to increased self-confidence and improved mental health outcomes.^{3,4}
- 8.4.10 Community facilities allow members of the community to come together to interact, and have an overall positive impact on individuals through the improvement of health and well-being.⁵ From forming social ties, individuals are more likely to engage in preventive health behaviour, reinforcing positive health attitudes such as better nutrition and exercise.⁶ A change in access to or displacement of these facilities may lead to changes in people's resistance to illness and disease. Syme (1975) hypothesized this finding as: "When people have uninterrupted ties with others, disease rates are low. When those ties are broken, disease rates increase."⁷ Several studies have shown that the risk of coronary heart disease, for example, increases with major changes in places of residence, occupation,⁸ or social situation,⁹ all of which might be brought about through displacement of community facilities.
- 8.4.11 When established social networks that arise from community facilities are displaced or made harder to access in the community, some individuals in society may be cut off from others and experience loneliness and social isolation, both of which can be damaging to physical and mental health.¹⁰ The loneliness brought on by reduced access to community facilities may increase the likelihood of premature mortality by up to 26%¹¹, showing the importance of social networks on health.
- 8.4.12 Public services directly contribute to the health of individuals in communities through the purpose for which they serve, for example security from the police or protection from the fire brigade. A loss of, or decrease in access to, vital public services can sometimes lead to negative health outcomes. For example, the existence of drug and

¹ Smith, K. and Christakis, N. 2008. Social networks and health.

² Alcalay, R. 1983. Health and social support networks: A case for improving interpersonal communication.

³ Ibid.

⁴ Welsh Health Impact Assessment Support Unit, 2020. Mental Well-being Impact Assessment.

⁵ Hertfordshire Council, 2015. Community facilities.

⁶ Alcalay, R. 1983. Health and social support networks: A case for improving interpersonal communication.

⁷ Syme, L., 1975. Social and psychological risk factors in coronary heart disease.

⁸ Cardiol, C. 2010. The Impact of Social Determinants on Cardiovascular Disease.

⁹ Havranek, E. et al. 2015. Social Determinants of Risk and Outcomes for Cardiovascular Disease.

¹⁰ Public Health England, 2018. Health matters: community-centred approaches for health and well-being.

¹¹ Ibid.

alcohol support services in communities has been linked to lower crime.¹² This affects the poorest communities the most, increasing the burden of health inequalities. There is also a wide amount of evidence on the link between reduced levels of police in an area and higher crime rates.¹³

- 8.4.13 The evidence linking the displacement of or change in access to public services and community facilities and negative health outcomes is judged to be **strong**. There is clear evidence on the positive impacts of social networks for all individuals, such as improved self-confidence and preventive health behaviours, with further evidence linking the loss of these networks to negative health outcomes through increased loneliness, social isolation and higher rates of disease.

Children and young people

- 8.4.14 The literature here focuses on the displacement of educational facilities and the corresponding effect on children. There is a strong body of research on the link between education and health. Low education levels are linked with poor health, more stress, and lower self-confidence in people.¹⁴ Education is beneficial for children and young people as it can lead to positive health outcomes throughout their working lives, including better wages and secure employment.¹⁵ Research explores the benefits that education can bring inter-generationally as well, concluding that “People with better qualifications are more likely to have healthier lifestyles, to be fitter and slimmer – and such health advantages can be transferred to the next generation at the earliest age. Children of better-educated mothers are less likely to be born prematurely or to have a low birth weight.” It goes on to illustrate powerful findings with regards to cancer prevention, life expectancy and health lifestyles.”¹⁶
- 8.4.15 Displacement may affect a child’s social life and academic progress. Events which result in ongoing community disruption create an extended period of time in which learning may be affected, and some children might fall behind academically as a result of the displacement.¹⁷ In this case, the ‘event’ in question refers to the period of construction, which may reduce access to community/educational facilities for children if they exist within the vicinity of the construction site.
- 8.4.16 Furthermore, displacement of educational facilities which results in moving children may cause small declines in social skills and emotional and behavioural problems.¹⁸ Moving schools has also been shown to be more detrimental to children’s cognitive development than residential relocation.¹⁹ Generally, reduced access to community facilities used by

¹² IPPR, 2019. Hitting the poorest worst? How public health cuts have been experienced in England’s most deprived communities.

¹³ Unison, (no date). Cut crime not police

¹⁴ World Health Organisation, 2017. Health Impact Assessment – The determinants of health

¹⁵ JRF, 2014. Reducing poverty in the UK: a collection of evidence reviews

¹⁶ Feinstein et al. 2008. The social and personal benefits of learning: a summary of key research findings

¹⁷ Ibid

¹⁸ MacArthur Foundation, (no date). Is moving during childhood harmful?

¹⁹ Ibid

children and young people may cause social isolation, leading to lower subsequent educational attainment and an increased tendency to be psychologically distressed in adulthood.²⁰

Older people

- 8.4.17 The change in access to community facilities that are regularly accessed by older people may cause negative health outcomes. It has been found that an important determinant of a 'good life' in old age is the value that older people attach to inter-dependence and being part of a cohesive community.²¹ Older people value inter-dependent lives and communities, attaching a high level of importance to local community facilities.
- 8.4.18 A loss of access to or displacement of community facilities may contribute towards social isolation in older people. NHS research finds that older people are more susceptible to social isolation due to being cut off from society.²² As older people get frailer and less mobile, their lives are increasingly affected by their immediate physical and social environments. Social isolation and loneliness in older people has been found to lead to a higher prevalence of adverse physical health outcomes such as high blood pressure, heart disease, obesity, as well as mental health outcomes such as anxiety, depression, and cognitive decline.²³ The importance of local communities for older people cannot be understated, and the loss of facilities that this group rely on may lead to negative health outcomes.

Ethnic minority groups

- 8.4.19 Ethnic minorities typically place a lot of value on community facilities in helping unite small communities. Certain groups disproportionately benefit from the use of community facilities and spaces, such as ethnic and religious groups.²⁴ Ethnic groups gain support and self-confidence from their community, leading to positive health outcomes.²⁵
- 8.4.20 A study into 150 BAME organisations in England found that more than half were at risk of closure in the future due to a range of factors including gentrification and the reluctance of councils to renew or extend leases²⁶, due to potentially not seeing them as worthwhile elements of the community. This highlights the potential disproportionate impacts associated with the loss of community facilities on ethnic minority groups. Ethnic groups generally feel they have more in common with those from the same ethnic background and feel more accepted as a result²⁷, hence leading them to feel that they

²⁰ Lacey et al., 2014. Social isolation in childhood and adult inflammation: evidence from the National Child Development Study

²¹ JRF, 2004. Building a good life for older people in local communities

²² NHS, 2018. Loneliness in older people

²³ National Institute on Aging, 2019. Social isolation, loneliness in older people pose health risks

²⁴ LBC, 2017. Community uses, leisure facilities and pubs

²⁵ Age UK, 2012. Fit as a fiddle – Engaging faith and BME communities in activities for wellbeing

²⁶ Third Sector, 2015. Minority groups fear the loss of community spaces

²⁷ Pew Research Center, 2015. Chapter 5: Race and social connections – friends, family and neighborhoods

have a better connection. A change in access to the facilities which enable these relationships may cause upset amongst this group through lower perceived levels of personal security²⁸, leading to adverse health outcomes.

Disability and long-term illness

- 8.4.21 Those living with disabilities may be disproportionately affected by the displacement of or access to community facilities, as communities play an important role in their lives. Some disabled people rely on their communities for physical and emotional support, as well as help in adapting to new ways of life.²⁹ Communities contained within community facilities help disabled people through the support systems and the encouragement they provide, as well as the services often accessed via these facilities.
- 8.4.22 A lack of appropriate services and support puts people with disabilities at risk and may have negative consequences on their ability to control their lives. This places additional pressure on this group and increases the risk of segregation and isolation from the community.³⁰ A change in access to these facilities may therefore cause a greater disturbance of equilibrium for those with disabilities, leading to negative health outcomes.
- 8.4.23 A decline in access to vital mental health services may hit those with pre-existing mental health issues the worst. 99% of GPs feared that young people with mental health problems will come to harm as a result of difficulties in accessing treatment.³¹ Facilities regularly used by individuals in addressing their mental health concerns that are displaced may cause disruption for members and a resultant worsening of their mental health outcomes.

Low-income groups and the unemployed

- 8.4.24 Low income groups may be hit worse by the loss or displacement of public services and community facilities. The loss of job centres may lead to lost contracts and lost jobs³², causing adverse health outcomes. Reduced access to jobcentres may in turn also lead to the increase in demand on the advice, welfare, and employment services provided by other councils or local providers.³³
- 8.4.25 Change in access to or displacement of key public services can affect the poorest members of society the most. Public services are disproportionately relied on by socio-economically deprived people who need most community-level support.³⁴

²⁸ Age UK, 2012. Fit as a fiddle – Engaging faith and BME communities in activities for wellbeing

²⁹ Livability, (no date). Why community is so important to disabled people and how it works for me

³⁰ Embracing Diversity, (no date). Support services to ensure the inclusion of persons with disabilities

³¹ The Guardian, 2018. Lack of NHS mental health services puts under-18s at risk, say GPs

³² The Conversation, 2018. Why are Britain's jobcentres disappearing?

³³ Ibid

³⁴ IPPR, 2019. Hitting the poorest worst? How public health cuts have been experienced in England's most deprived communities

Single-parent families

8.4.26 Divorce, separation or bereavement can result in attendant drops in income, as well as in access to community resources for facility members, affecting one of the key determinants of health and the ability of households to respond to environmental changes.³⁵ Displacement of existing community facilities may further cut off single-parent families from community resources and exacerbate their decline in social ties, advice, parenting resources, affecting both the parents themselves and their children.

Gypsies and Travellers

8.4.27 Gypsy, Roma, and Traveller populations face a number of disadvantages in terms of access to public services and community facilities. Education outcomes for Traveller populations, a key determinant of health outcomes, fall well behind the England average. In 2011 just 12% of Gypsy, Roma and Traveller pupils achieved five or more GCSEs grade A-C, compared with 58.2% of all pupils in the England.³⁶ There is also a lack of appropriate systems to support Travellers moving schools, meaning that being in the education system is often more laborious to reconcile with travelling lifestyles.³⁷ Where the construction activity associated with the London Resort results in reduced access to educational facilities, this will disproportionately affect Traveller populations due to their existing disadvantage in accessing these services.

Potential health effect of displacement or change in access to open spaces

8.4.28 Due to the proposed land take associated with the London Resort, there is the possibility for open spaces to be displaced, or there may be a change in the ease of access to the existing open spaces currently used by local residents and workers. Reduced access to open spaces may be associated with the loss of many health benefits that open spaces create, which may affect some groups in particular.

Effects on the general population

8.4.29 The link between access to open spaces and positive health outcomes has been evidenced for decades. The World Health Organisation (WHO) state that physical activity has significant health benefits and contributes to preventing non-communicable diseases.³⁸ Open spaces contribute to increased physical activity,³⁹ improved cognition,⁴⁰ and reduced obesity,⁴¹ all of which can lead to increased happiness and improved mental health outcomes throughout life.⁴²

³⁵ McLanaha, S., Sandefur, G., 1994. Growing Up with a Single Parent. What Hurts, What Helps.

³⁶ Ibid.

³⁷ Ibid.

³⁸ World Health Organisation, 2017. Physical activity

³⁹ O' Brien et al., 2010. Urban health and health inequalities and the role of urban forestry in Britain: a review

⁴⁰ Keijze et al., 2016. Long-term green space exposure and cognition across the life course: a systematic review

⁴¹ O' Brien et al., 2010. Urban health and health inequalities and the role of urban forestry in Britain: a review

⁴² Welsh Health Impact Assessment Support Unit, 2011. Mental Well-being Impact Assessment.

- 8.4.30 Shortages of and lack of access to green spaces has been associated with perception of loneliness and lack of social support,⁴³ both of which can lead to feelings of social isolation. Moreover, a lack of suitable amenities and open spaces in some communities can discourage physical activity and contribute to obesity.⁴⁴ In general, reduced access to open space or displacement of open space may lead to negative health outcomes, as a result of imposing constraints of individuals accessing the health benefits associated with green and open spaces.
- 8.4.31 In a study in Chicago, researchers found 52% fewer crimes were reported near buildings surrounded by trees and other vegetation. In New York, neighbourhoods with higher investment in public green space see an average of 213 fewer crimes per year.⁴⁵ Open spaces have been found, therefore, to reduce crime, and so displacement of open spaces may lead to the potential positive impacts on health outcomes for the general population not being realised.
- 8.4.32 Good access to parks and natural settings is associated with improved levels of mental health and reduced anxiety,⁴⁶ contributing to an overall better quality of life. The literature evidencing links between green/open space and mental health is extensive, with other benefits including protecting against mood disorders, depression, neurotic behaviour, and other stress-related issues. Also, those with longer exposures to green spaces have greater health benefits.⁴⁷
- 8.4.33 The evidence linking the displacement of or change in access to open spaces to health is considered to be **strong**. There is clear and strong evidence on the positive impacts of open spaces across all groups including increased physical activity, better cognition and better mental health outcomes. There also exists strong evidence on the negative outcomes associated with displacement of or a clear lack of access to open spaces, such as loneliness, increased crime, and mental health problems in children.

Children and young people

- 8.4.34 Access to open space particularly benefits children through improved cognition, educational attainment and school performance.⁴⁸ Access to open space also promotes competence, self-discipline, attention restoration, and memory in children⁴⁹, as well as encouraging physical activity and healthy weight.⁵⁰
- 8.4.35 A lack of access to open spaces or displacement of existing open spaces commonly used

⁴³ Braubach et al., 2017. Effects of urban green space on environmental health, equity and resilience

⁴⁴ Gascon et al., 2016. Residential green spaces and mortality: a systematic review

⁴⁵ The Conversation, 2019. Can parks help cities fight crime?

⁴⁶ McCormack et al., 2010. Characteristics of urban parks associated with park use and physical activity: a review of qualitative research

⁴⁷ NASA Earth Observatory, 2019. Green space is good for mental health

⁴⁸ Keijze et al., 2016. Long-term green space exposure and cognition across the life course: a systematic review

⁴⁹ McCormick, 2017. Does access to green space impact the mental well-being of children: a systematic review.

⁵⁰ McCormack et al., 2010. Characteristics of urban parks associated with park use and physical activity: a review of qualitative research.

by children may lead to negative health outcomes. Less open space may induce children to use smart phones more and increase their screen time, which could lead to less physical activity and possible addiction in the long run.⁵¹ A decline in physical activity is also one of the greatest contributors to childhood obesity, and a lack of open space could be just one of many determinants for this.

- 8.4.36 Furthermore, some studies have found that a lack of access to open spaces can be the cause of severe mental health issues in children. In one experiment, 54% of the child population sampled showed signs of mental health problems such as slow emotional development, anxiety, depression, and loss of attention and self-control due to a lack of outdoor play spaces.⁵² Thus, any displacement of open spaces causing children to have limited access to these spaces may lead to negative health outcomes.

Older people

- 8.4.37 Open space is particularly beneficial for older people as they are more bound to their direct home surroundings,⁵³ and are therefore more likely to benefit from the physical and mental health advantages associated with nearby green and open spaces. As older people place more of a reliance on their local community and surroundings, the displacement of open spaces may disproportionately affect this group.
- 8.4.38 One study investigating the relationship between older people's health and perceived neighbourhood environment found that neighbourhoods with good quality facilities (open spaces included) were associated with positive self-rated health and physical function, whereas poor neighbourhood perceptions were associated with poorer self-rated health.⁵⁴
- 8.4.39 Nearly half of people over the age of 60 are categorised as inactive based on the levels of physical activity they undertake each week. Difficulties in accessing physical activity have been reported as one of the key barriers to physical activity participation in older people.⁵⁵ A lack of physical activity (which may be brought about by a displacement of open space) can lead to an increased risk of fracturing bones when falling relative to those who are more physically active, obesity and reduced mental health,⁵⁶ including loneliness and social isolation, which are already prevalent issues amongst older people.

Disability and long-term illness

- 8.4.40 Open spaces can be particularly beneficial for disabled people, as they provide a safe, risk-managed environment aimed at those disadvantaged by physical and or mental

⁵¹ MBA Universe, (no date). Shortage of open spaces and playgrounds lead to negative tendencies in children.

⁵² Ibid.

⁵³ IS Global, 2019. Green spaces and healthy ageing.

⁵⁴ Bowling et al., 2006. Do perceptions of neighbourhood environment influence health?

⁵⁵ Franco et al., 2015. Older people's perspectives on participation in physical activity: a systematic review and thematic synthesis of qualitative literature.

⁵⁶ CDC, (no date). Older adults.

difficulties.⁵⁷ They can provide feelings of safety, relaxation, achievement and happiness, and increased self-esteem. Displacement of open spaces can lead to those living with disabilities not able to realise these benefits and could lead to adverse health outcomes.

- 8.4.41 Those with mental health issues may be particularly affected by the loss of, displacement of, or change in access to established open spaces due to the multitude of mental health benefits they serve. As detailed previously, good access to parks and natural settings is associated with improved levels of mental health and reduced anxiety. Furthermore, exercising in natural environments can lead to a greater improvement in mental wellbeing relative to indoor activity due to greater enjoyment.⁵⁸ The mental health benefits associated with open space mean that a reduction in the access to or displacement of open space would disproportionately affect those with mental health issues.

Low income groups and the unemployed

- 8.4.42 Individuals from lower income backgrounds suffer disproportionately from a lack of access to green spaces. A review conducted by Maas in 2006 found that there is a positive association between the proportion of green space in a residential area and the general health of residents (perceived by themselves), and that this relationship is strongest among lower socio-economic groups.⁵⁹ In areas where 90% of the environment around the home is green, 10% of the residents felt unhealthy, compared to where 10% of the environment is green and 16% of residents felt unhealthy.
- 8.4.43 Further literature exists evidencing this link, as studies have shown that socio-economically disadvantaged individuals tend to benefit the most from improved access to urban greenery.⁶⁰ This suggests that the displacement of open spaces has potential to be even worse for those from lower socio-economic backgrounds relative to the general population.

Potential health effects from displacement of commercial uses

- 8.4.44 As a result of the land take, there may be relocation of existing commercial businesses, which may lead to disturbances in the community for those who rely on them, job relocations, or job losses in extreme cases. This would cause disruptions and potentially unemployment in the area, which may hit some subsets of the general population harder than others.

Effects on the general population

- 8.4.45 A displacement of commercial uses may cause a loss of jobs and employment. In the short-run, any job losses caused by the displacement of commercial businesses are

⁵⁷ Lambeth Council, (no date). Value of green space.

⁵⁸ Public Health England, 2017. Spatial planning for health. An evidence resource for planning and designing healthier places.

⁵⁹ Maas et al., 2006. Green space, urbanity and health: how strong is the relation?

⁶⁰ Allen, J. and Balfour, R., 2014. Natural solutions for tackling health inequalities.

shown to have the potential to lead to depression, anxiety, and reduced physical activity for the workers impacted.⁶¹ In the long run, there is a risk of these problems being amplified, and displacement may lead to decreases in lifetime earnings, reduced job stability, and further negative impacts on health.⁶² The burden of disease associated with job losses also increases with the duration of unemployment.⁶³ The burden of disease (or disease burden) is a concept that describes the loss of health/impact of a health problem due to diseases, injuries and risk factors⁶⁴, describing the overall burden to health as a result of external factors.

8.4.46 There exists a strong amount of evidence on the link between employment and both physical and mental health and wellbeing.⁶⁵ It provides access to basic living standards and can expand an individual's social networks.⁶⁶ Within the WHO's list of health determinants, income and social status are included⁶⁷, both of which are influenced by employment opportunities. Greater economic status is typically associated with better health outcomes, whereas unemployment contributes to poorer health outcomes.⁶⁸ There are also large amounts of evidence on the link between employment and mental health, as being in a job gives individuals a purpose, an income, and promotes independence.⁶⁹ Unemployment can also lead to poorer self-rated levels of mental health.⁷⁰

8.4.47 By contrast, unemployment can lead to adverse health outcomes. Public Health England state that *"unemployed people have a greater risk of poor health than those in employment, contributing to health inequalities."*⁷¹ Studies have found that the anxiety and stress that comes from unemployment contributes towards negative health outcomes,⁷² as well as long-standing mental illnesses, psychological distress, and medical consulting for mental health issues.⁷³ Unemployment, amongst other factors, is also associated with higher rates severe mental illness and occurrences of suicide.⁷⁴

8.4.48 Commercial displacement may not cause jobs to be lost but relocated. Relocation impacts, and the financial burdens that come with them, are more of a concern for local

⁶¹ Schaller, J. and Stevens, A. 2015. Short-run effects of job loss on health conditions, health insurance, and health care utilization.

⁶² Ibid.

⁶³ Herbig et al., 2013. Health in the long-term unemployed.

⁶⁴ World Health Organisation, (no date). Burden of disease.

⁶⁵ See, for example, the summary provided within Welsh Health Impact Assessment Support Unit, 2011. Mental Well-being Impact Assessment.

⁶⁶ The Health Foundation, 2020. Will Covid-19 be a watershed moment for health inequalities?

⁶⁷ World Health Organisation, 2017. Health Impact Assessment – the determinants of health.

⁶⁸ Marmot et al., 2010. Fair society, Healthy Lives: strategic review of health.

⁶⁹ Mental Health Foundation, 2012. Employment is vital for maintaining good mental health.

⁷⁰ Kim, T. and Knesbeck, O. 2015. Is an insecure job better for health than no job at all? A systematic review of studies investigating the health-related risks of both job insecurity and unemployment.

⁷¹ Public Health England, 2014. Increasing employment opportunities and improving workplace health.

⁷² Urbanos-Garrido, R. and Lopez-Valcarecel, B. 2015. The influence of economic crisis on the association between unemployment and health: an empirical analysis for Spain.

⁷³ Goodman, 2015. The impact of employment on the health status and health care costs of working-age people with disabilities.

⁷⁴ NHS, 2015. Unemployment and job insecurity linked to increased risk of suicide

family-based businesses that cater to locals in the area.⁷⁵ Larger and more commercial entities are more suited to relocation due to national demand existing everywhere, whereas smaller businesses which rely on being part of a specific neighbourhood may experience greater difficulties in securing a move.⁷⁶

- 8.4.49 Similarly, the relocation of businesses may adversely affect the individuals who rely on these local entities. Relocation of businesses can remove essential facilities for some local residents, reduce the sense of community, and reduce the cohesiveness of the neighbourhood.⁷⁷ For employees working at these businesses, they may have to pay increased travel expenses to reach new locations, spend more time commuting, and may even lose employment if the business has financial troubles as a result of the relocation. For families, there is a greater chance that some would give up their careers when faced with the prospect of relocation, with other long-term impacts including family separation and increased financial difficulties.⁷⁸
- 8.4.50 The evidence linking the displacement of commercial uses to health is considered to be **moderate**. There is clear and strong evidence on the positive impacts of employment, such as income and social status, along with the adverse health outcomes that are associated with displacement of various commercial uses (causing unemployment), where some groups are affected more so than others. The impact of displacement may cause relocation which can lead to reduced cohesion in the community as well as financial burdens for smaller businesses. However, the evidence is less strong on the overall burden on health as a result of job relocation or the effect on the community as a result of lost commercial entities.

Children and young people

- 8.4.51 The effects of the displacement of commercial uses may be particularly felt by children and young people. Children may be indirectly affected if there are job losses when their parents/carers are displaced, leading to worse health outcomes for the child resulting from the knock-on impacts of a lower family income. Long-term impacts on older children include reductions in mental wellbeing and happiness.⁷⁹
- 8.4.52 Young adults with limited employment history may also be disproportionately affected by displacements that cause job losses. Unemployed young adults are more likely to experience negative health outcomes such as mental health problems, health risk

⁷⁵ Center for Urban Transportation Research, (no date). Chapter 9: Relocation and displacement

⁷⁶ Ibid

⁷⁷ Ibid

⁷⁸ JRF, 2003. The effects on families of job relocations

⁷⁹ Powdthavee and Veroff, 2013. Parental unemployment and children's happiness: a longitudinal study of young people's well-being in unemployed households

behaviours, and a general poorer quality of life.⁸⁰ Low-skilled and younger workers suffer the most from business redundancies (if they occurred from financial difficulties from relocation) as they are usually the first to be dismissed.⁸¹ Overall, young people displaced may find it harder to get back into the labour market, leading to the adverse health outcomes associated with unemployment.

- 8.4.53 Relocation might be particularly hard for children of parents who are forced to relocate due to the displacement of commercial businesses. Relocation may be coupled with moving residential locations, in which case the child's education may suffer⁸², having adverse health effects such as cognitive decline and decrease in mental wellbeing. Education is key as it improves access to good jobs, leads to higher wages, and leads to financial security.⁸³ For young adults who place a higher value on their support networks, they may not have the financial resources to relocate or commute longer distances.⁸⁴

Pregnant women

- 8.4.54 Discrimination of employment opportunities on the basis of pregnancy is illegal under UK law. In the USA, evidence shows that the occurrences of direct discrimination based on pregnancy is rising - complaints of workplace pregnancy discrimination to the United States' Equal Employment Opportunity Commission (EEOC) rose 46% between 1997 and 2011 - and trends may be similar in the UK.⁸⁵ Loss of employment for pregnant women as a result of commercial displacement may therefore result in longer spells of unemployment, and all the attendant negative health outcomes that brings.
- 8.4.55 At the same time, employment during pregnancy is not found to result in negative health outcomes for the women or children involved.⁸⁶

Older people

- 8.4.56 For those aged above 50, unemployment caused by job losses is associated with greater difficulties in regaining employment.⁸⁷ Older people sometimes find it harder to get back into the labour market due to age discrimination⁸⁸, and this worsens as age increases. Furthermore, only 1 in 10 of those older workers who experience an involuntary job loss (which could be caused by displacement) ever earn as much per week after the job loss.⁸⁹ As a consequence, this demographic is more likely to suffer from long-term negative health outcomes as a result of the displacement.

⁸⁰ Vancea, M. and Utzet, M. 2016. How unemployment and precarious employment affect the health of young people: A scoping study on social determinants

⁸¹ OECD, 2015. Back to work: Sweden – improving the re-employment prospects of displaced workers

⁸² JRF, 2003. The effects on families of job relocations

⁸³ The Health Foundation, 2020. Will Covid-19 be a watershed moment for health inequalities?

⁸⁴ Ibid

⁸⁵ Byron, R. A., Roscigno, V. J., 2014. Relational Power, Legitimation, and Pregnancy Discrimination

⁸⁶ Brown, M.A., 1987. Employment during pregnancy: Influences on women's health and social support

⁸⁷ Marmot et al., 2010. Fair society, healthy lives: strategic review of health inequalities in England post-2010

⁸⁸ Urban Institute, 2018. How secure is employment at older ages?

⁸⁹ Ibid

8.4.57 Job relocation may cause a need to relocate closer to the place of work, which can be particularly stressful for older people.⁹⁰ Relocation at older age has been linked to a decline in physical and cognitive functions, as well as the need for increased support from surrounding networks or family.⁹¹

Low-income groups and the unemployed

8.4.58 Individuals from disadvantaged socio-economic backgrounds on lower incomes are hit hardest in the event of commercial displacement and job losses. For example, in the coronavirus-related shutdown of the American economy, households under \$40,000 were disproportionately more affected by the associated job losses than households in higher income brackets.⁹² Individuals from low-income backgrounds are also less likely to have the money saved up to allow for an extended period of time out of work, and as a result may experience adverse health outcomes if commercial displacement were to occur.

8.4.59 A study on the association between job losses and unmet health care needs by income was conducted and showed that job loss was associated with the increased risk of unmet health care needs, adversely affecting the health of individuals.⁹³ The proportion with unmet needs was highest for the lowest-income unemployed, displaying the disproportionate impact of commercial displacement on those from the lowest income backgrounds. Also for the unemployed, commercial displacement would reduce the opportunities for employment, making them worse off.

8.4.60 As detailed previously, job relocation may cause financial difficulties in the form of increased costs to commute to the new location, lost time in the new commute, and potential for redundancies as businesses have to lay off staff. This would lead to the possibility of hitting those from the lower socio-economic backgrounds harder due to their difficulty in not being able to afford the new costs.

8.4.61 Commercial displacement may cause workers from more professional occupations to have to work remotely, much like was the case during the Covid-19 pandemic. Lower income, unskilled workers are usually less able to work from home, as only one in ten of lower half earners said they had the option of working from home during the global pandemic, compared to over half of the highest earners.⁹⁴ In this case, displacement is more likely to affect the incomes and likelihood of the lowest earners in society.

Ethnic minority groups

8.4.62 Evidence highlights that individuals from ethnic minority backgrounds may find it harder

⁹⁰ Schulz, R. and Brenner, G., 1977. Relocation of the aged: a review and theoretical analysis.

⁹¹ Wu et al., 2015. Relocation at older age: results from the cognitive function and ageing study.

⁹² Federal Reserve, 2020. Report on the economic well-being of U.S. Households in 2019, featuring supplemental data from April 2020.

⁹³ Huang et al. 2014. Job Loss and Unmet Health Care Needs in the Economic Recession: Different Associations by Family Income.

⁹⁴ The Health Foundation, 2020. Will Covid-19 be a watershed moment for health inequalities?

to gain access back into the workplace in the event of commercial displacement due to discrimination. There are large bodies of evidence on the clear ethnic minority penalty present in the labour market which has been persistent over time.⁹⁵ Unemployment rates for ethnic minorities are higher than they are for their white counterparts, and thus they are often under-represented in the labour market. Individuals from ethnic minorities who do lose jobs in the commercial displacement may therefore struggle to find another job, and suffer the adverse health effects associated with unemployment.

- 8.4.63 Traditionally, BME-owned enterprises tend to be concentrated within their own communities and focus on easily accessible markets.⁹⁶ Displacement is therefore a concern for the minority owned or ethnic businesses in the area which cater to a local client base. In this case, separation from their core client base may ‘jeopardize the existence of that business’.⁹⁷ In other words, some businesses owned by ethnic groups rely on the local community for the survival of their business, and relocation to another area might lead to the loss of business and unemployment.

Single-parent families

- 8.4.64 Research shows that stable parental employment in single-parent households has both positive and negative health effects on the child.⁹⁸ Parental employment leads to higher achievement and mental processing in the child with associated well-being benefits, but can result in behavioural problems in the child although this was not statistically significant.

Gypsies and Travellers

- 8.4.65 Gypsy, Roma and Travellers might, like other ethnic minorities, find it harder to gain access back into the workplace in the event of commercial displacement, due to discrimination. There exists continued discrimination in employment against these populations.⁹⁹ If individuals from the Gypsy, Roma or Traveller populations lost employment as a result of commercial displacement, they may find it harder to regain employment, and may suffer the adverse health effects associated with unemployment for longer.

Potential health effects from displacement of residential dwellings

- 8.4.66 As a result of the land take, there may be involuntary relocation of residents within the area, which may, similarly to the displacement of commercial uses, lead to disturbances in the community. This may cause negative health effects for some groups in particular, such as children and young people, and older people who are already established within

⁹⁵ JRF, 2015. Ethnic minority disadvantage in the labour market.

⁹⁶ LDA, 2005. Redefining London’s BME-owned businesses.

⁹⁷ Center for Urban Transportation Research, (no date). Chapter 9: Relocation and displacement.

⁹⁸ Younblut, J.M. et al., 2009. Effects of Maternal Employment and Prematurity on Child Outcomes in Single Parent Families.

⁹⁹ Committee D, British-Irish Parliamentary Assembly, 2014. Travellers, Gypsies and Roma: access to public services and community relations.

their community. However, relocation may also be associated with some positive health benefits in the form of better living conditions or lower rents.

Effects on the general population

- 8.4.67 Generally, involuntary residential relocation may cause adverse mental health outcomes due to loss of ties with the community, lost social ties with friends, or higher rents.¹⁰⁰ However, residential relocation has also been associated with positive physical health outcomes due to the possibility for better living conditions or better community ties in the new location, in addition to the possibility of lower rents.
- 8.4.68 The characteristics of an area can have impacts on the health of individuals. Residents relocating to less deprived areas may experience lower levels of crime and anti-social behaviour, which could lead to higher levels of confidence in their environment and overall happiness (mental health) within their community, in addition to reductions in obesity.¹⁰¹ In contrast, a move to a more deprived area may cause the reverse, and lead to increased levels of stress and fear for their safety, causing negative health outcomes.
- 8.4.69 A longitudinal study in Glasgow analysed how health outcomes were altered from residents of disadvantaged urban neighbourhoods due to largescale development projects causing neighbourhood demolition. Some participants described how the moves to new homes caused positive health outcomes and was beneficial to wellbeing, whereas some reaffirmed that the move led to negative health outcomes and experiences.¹⁰² Thus, the extent to which positive health outcomes might be realised depends on the scale of the improvements in living conditions for residents relative to the previous location.
- 8.4.70 Based on a review of the literature, the evidence linking the displacement of residents and health outcomes is considered to be **moderate**. There exist numerous theories on how housing-led regeneration projects and displacement may positively or negatively affect human health, such as through changes in living conditions or rents, but many studies varied in their findings and few long-term or definite results were found. Therefore, definitive links between health outcomes and residential relocation are moderate.

Children and young people

- 8.4.71 Residential displacement may adversely affect children, as previously described in **potential health effects from displacement of commercial uses** (from paragraph 8.4.51). It was found that relocation may cause the child's education to suffer,¹⁰³ having adverse health effects such as cognitive decline and decrease in mental wellbeing. Involuntary

¹⁰⁰ McCartney et al., 2017. Regeneration and health: a structured, rapid literature review.

¹⁰¹ Gibson et al., 2011. Housing and health inequalities: a synthesis of systematic reviews of interventions aimed at different pathways linking housing and health.

¹⁰² Egan et al., 2015. Neighbourhood demolition, relocation and health. A qualitative longitudinal study of housing-led urban regeneration in Glasgow, UK.

¹⁰³ JRF, 2003. The effects on families of job relocations.

relocation may cause disturbances in key social networks for children and young people, at a time when development of these social networks is key for cognitive development and personal growth.

- 8.4.72 One study into children from lower socio-economic backgrounds found that despite relocating to lower-poverty neighbourhoods, health outcomes were not drastically improved.¹⁰⁴ This was due to the continued pre-existing effects from growing up in a more deprived neighbourhood, coupled with the stress of relocation.

Older people

- 8.4.73 For older people, the evidence is less clear on the direct health effects from displacement. Older residents within the community are generally less mobile and have lived within their community longer than the average person.¹⁰⁵ Due to this, the social ties that older people may have with their community may cause a strong reluctance to leave the area and upset this group, causing negative mental health effects. Generally, the stronger the ties older people have with their local community, the more dissatisfied they are with their new neighbourhood, and the more severe is their grief reaction.¹⁰⁶

- 8.4.74 The loss of friends or ties can not only cause loneliness but may create insecurity as they rely on social networks they have formed in their neighbourhood in the event of an emergency. Older people have been found to be the most vulnerable to the adverse negative health effects associated with involuntary reaction.¹⁰⁷

Disability and long-term illness

- 8.4.75 Individuals living with dementia are more sensitive to the adverse health effects associated with a change in environment caused by involuntary relocation. Resulting effects from relocation for these individuals include declines in mental health caused by stress, and loss of important social and community ties. ‘Transfer trauma’ describes the stress that a person with dementia experiences when they change living environments, which can cause severe declines in mental health outcomes.¹⁰⁸

- 8.4.76 In general, those less mobile living with disabilities would find relocation harder for them, causing stress and adverse health outcomes. Those with disabilities face risks in the new areas they are relocated to relating to violence and abuse, as well as barriers to accessing assistance, healthcare, and other services.¹⁰⁹

Potential health effect of changes to local traffic and transport and changes in the use of active

¹⁰⁴ Byck et al., 2015. Effect of housing relocation and neighbourhood environment on adolescent mental and behavioral health

¹⁰⁵ Kasl, S., 1972. Physical and mental health effects of involuntary relocation and institutionalization on the elderly – a review

¹⁰⁶ Ibid

¹⁰⁷ Key, H., 1967. When people are forced to move.

¹⁰⁸ Crisis Prevention Institute, 2015. How to reduce transfer trauma for a person with dementia

¹⁰⁹ UNHCR, 2019. Working with persons with disabilities in forced displacement

travel modes

8.4.77 During the construction phase, there may be temporary changes in traffic and transport around the site (e.g. reduced access to roads), as well as changes in access to active travel modes through and around the site (e.g. removal of a pedestrian path). The Transport chapter will identify how the changes in traffic could impact upon traffic accidents and increases in delay, resulting in changes in stress for drivers following guidance set out within WebTag and the Design Manual for Roads and Bridges (DMRB).

Effects on the general population

8.4.78 Good transport allows the movement of people and goods between places, enabling better access to employment and other economic opportunities.¹¹⁰ Similarly, beneficial active travel modes for individuals can lead to positive health outcomes, such as improved mental health, more physical activity and decreased obesity.¹¹¹

8.4.79 The scale of the London Resort may lead to changes to routes and active travel modes in areas surrounding the site throughout the construction phase. This has the potential to disrupt lives and change how transport moves through the area, as well as change the use of active travel modes around the site. If access were disturbed to the extent where transport options were reduced, this could cause isolation in some extreme cases,¹¹² which may lead to depression, poor sleep quality, and poor cardiovascular function,¹¹³ amongst other adverse health outcomes.

8.4.80 It has also been found that transportation barriers created may lead to missed healthcare appointments or delayed care, which can cause poorer management of chronic illness and therefore adverse health outcomes.¹¹⁴ Additionally, poor transport can lead to mental health problems such as anxiety and decreased wellbeing.¹¹⁵ Driving for extended periods of time (due to delays) has been linked to physical effects such as joint stiffness and muscle tightness,¹¹⁶ as well as increased stress levels.¹¹⁷ Increased stress levels have been shown to further increase risk-taking behaviour when driving, increasing the potential for crashes and accidents.¹¹⁸

8.4.81 Good pedestrian and cyclist access around and through the site is important because of the significant evidence that links active travel methods with physical health benefits, as outlined in '**potential health effect of displacement or change in access to open spaces**' (from paragraph 8.4.29). As a result of the construction site, access for cyclists may be

¹¹⁰ Thomson et al. 2008. Assessing the unintended health impacts of road transport policies and interventions: translating research evidence for use in policy and practice.

¹¹¹ Vernon, 2014. Road safety and public health.

¹¹² Schalkwyk, M. and Mindell, J., 2018. Current issues in the impacts of transport on health.

¹¹³ American Psychological Association, 2019. The risks of social isolation.

¹¹⁴ Syed et al., 2013. Travelling towards disease: transportation barriers to health care access.

¹¹⁵ NatCen, 2019. Transport, health and wellbeing: an evidence review for the Department for Transport.

¹¹⁶ Chevin Fleet, 2019. Long hours behind the wheel of a vehicle can impact on the health of drivers.

¹¹⁷ Antoun et al., 2017. The acute physiological stress response to driving: a systematic review.

¹¹⁸ Zhang, T. and Chan, H., 2016. The association between driving anger and driving outcomes.

reduced, for example, which could lead to a reduction of physical activity, something which cycling routes encourage. Better pedestrian access around the site may encourage walking, which can lead to more physical activity amongst the population, as well as other health benefits such as reduced risk of heart disease, improved management of health conditions such as hypertension or high cholesterol, and better mental health.¹¹⁹ Studies have shown that walking for just 30 minutes per day enables the realisation of these benefits. Generally, active travel allows people the opportunity to be physically active as part of their daily routine, contributing to the prevention of many chronic and mental illnesses.¹²⁰

- 8.4.82 Other benefits of cycling such as improved cognitive function and reduced risks of mental health issues would be less likely to be realised given a reduced access to active travel modes.¹²¹ Conversely, adverse mental health outcomes may result due to poor transport or lack of suitable active travel due to social isolation. Refer to '**potential health effect of displacement or change in access affecting public services and community facilities**' (from paragraph 8.4.9) for the potential for adverse health effects associated with social isolation, such as damage to mental health, and increased likelihood of premature mortality.
- 8.4.83 Based on a review of the existing literature, the link between changes to local traffic and transport, as well as changes to the use of active travel modes, is judged to be **strong**. This is a reasonable body of evidence linking poor transport access to adverse health outcomes (such as isolation, depression, and stress) and also to riskier driving, but the evidence is particularly strong regarding the link between reduced active travel methods and positive health outcomes which aren't realised, such as increased physical activity.

Pregnant women

- 8.4.84 Travel during pregnancy may carry additional risks; of greatest concern is air travel, however, which may cause thromboembolism.¹²² On the other hand, healthy women with uncomplicated pregnancies do not necessarily need to curtail reasonable travel. The best time for travel is during the second trimester when the body has adjusted to the pregnancy but is not so bulky that moving about is difficult. The second trimester is also safer because the probability of miscarriage is less. After the sixth month, the risk of premature labour and other complications increases.¹²³
- 8.4.85 Little literature on the effects of general daily travel during pregnancy has been identified; however, the effects of shorter, day-to-day trips are likely to be similar in nature, if not in scale, to the effects of air travel.

Older people

¹¹⁹ Better Health, (no date). Walking for good health

¹²⁰ Kent County Council, 2016. Benefits of active travel

¹²¹ Gotschi et al., 2015. Cycling as a part of daily life: a review of health perspectives

¹²² Hezelgrave, N.L., Whitty, C.J.M., Shennan, A.H., Chappell, L.C., 2011, Advising on travel during pregnancy

¹²³ Rose, S.R., 1997. Pregnancy and Travel

8.4.86 Changes to routes and transport access has already been established to lead to social isolation, which can be particularly harmful for older people as they are more susceptible to social isolation due to being cut off from society.¹²⁴ The removal of established routes (transport and pedestrian) may cause issues for older people in the form of preventing them from accessing usual amenities, leading to the adverse health outcomes associated with social isolation (refer to the **potential health effect of displacement or change in access affecting public services and community facilities** (paragraphs 8.4.17 and 8.4.18)) and physical inactivity.¹²⁵

Disability and long-term illness

8.4.87 Poor planning and transport infrastructure (which may arise from the construction activity) may create an unsafe environment which would be particularly harmful for those with cognitive impairments, which could increase the risk of traffic-related injuries.¹²⁶

8.4.88 Those with mental health problems are more vulnerable to the mental health issues associated with social isolation caused by a lack of good transport access. Refer to the **potential health effect of displacement or change in access affecting public services and community facilities** (from paragraph 8.4.21) for the adverse health effects associated with social isolation, such as damage to mental health, and increased likelihood of premature mortality.

Low-income groups and the unemployed

8.4.89 Those from lower socio-economic backgrounds may be disproportionately affected by a reduction in access to transport routes due to a heavier reliance on public transport. Those on lower incomes take up to two times more bus trips than those on higher incomes.¹²⁷ Furthermore, those on low incomes are more likely to turn down jobs due to transport issues,¹²⁸ possibly brought about by the onset of connectivity problems in the construction phase of the London Resort.

Single-parent families

8.4.90 Parental choices and perceptions influence the travel mode of children. Walking levels to school for 10 to 11 year olds have fallen 70% in 1990 to 54% in 2000 in London, and use of the car is up.¹²⁹ This reduction is of concern as recent research also shows that reduced levels of physical activity among children are highly correlated with the increased incidence of health and social problems amongst children and their

¹²⁴ NHS, 2018. Loneliness in older people

¹²⁵ Webb et al., 2017. Crossing the road in time: inequalities in older people's walking speeds

¹²⁶ Schalkwyk, M. and Mindell, J. 2018. Current issues in the impacts of transport on health

¹²⁷ The Health Foundation, 2018. Transport and health

¹²⁸ NatCen, 2019. Transport, health and wellbeing: an evidence review for the Department for Transport

¹²⁹ Susilo, Y. O., 2015. The Influence of Parent's Perceptions and Residential Self-Selection to the Children's Travel Modes at Single Parent Households, in Attard, M., Shiftam, Y., 2015. Sustainable Urban Transport

households.¹³⁰ Research on single-parent households has shown that besides parents' daily activity-travel engagements, both parents' safety and public transport reliability perceptions and household residential self-selection play significant roles in influencing children daily travel mode shares.¹³¹ As some single-parent families have a lower flexibility to alter transport plans, changes in access to transport have the potential to result in greater effects as a result of this reliance.

Potential health effect of construction resulting in changes in noise and vibration

8.4.91 Increases in exposure to noise has been linked to adverse health outcomes. Through the large scale of construction activity needed to enable the London Resort, there arises the potential for changes in noise and vibration to affect health outcomes. Some groups are more affected by noise disturbance than others.

Effects on the general population

8.4.92 There is a significant amount of evidence linking higher levels of noise to adverse health outcomes. The WHO note that "excessive noise seriously harms human health and interferes with people's daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance and provoke annoyance responses and changes in social behaviour".¹³²

8.4.93 A publication from the European Commission in 2015 notes that "*living in a quiet area has a positive impact on health.*"¹³³ This study assessed the quality of life for people living in quiet and noisy locations and found that those who lived in quiet locations had a better quality of life. The report finds that long-term exposure to environmental noise can affect people's health in other ways too, notably how stress hormones are released, and sleep is disturbed.

8.4.94 Because of its role in sleep disturbance, some studies suggest that night-time noise has a greater impact on health than day-time noise,¹³⁴ which may be particularly harmful for residents at homes surrounding the London Resort. In accordance with the WHO, noise levels, both in the day and night, that exceed 55dBA increase the risk of adverse health effects occurring, and many people have to adapt their lives to cope with the noise at night.¹³⁵

8.4.95 Noise may be created during the construction phase through the movement of machinery, the operation of heavy goods vehicles, or the communication between construction workers. Any demolition works carried out would be expected to cause

¹³⁰ Susilo, Y. O., 2015. The Influence of Parent's Perceptions and Residential Self-Selection to the Children's Travel Modes at Single Parent Households, in Attard, M., Shiftam, Y., 2015. Sustainable Urban Transport.

¹³¹ Ibid.

¹³² World Health Organisation, 2017. Noise.

¹³³ European Commission, 2015. Noise impacts on health.

¹³⁴ Munzel et al., 2014. Cardiovascular effects of environmental noise exposure.

¹³⁵ World Health Organisation, 2011. Burden of disease from environmental noise.

temporary noise. The noises created as a result of construction activity have the potential to create physical or psychological stress for neighbouring residents or workers, contributing to reduced productivity and even workplace accidents and injuries due to not being able to hear possible warning signals.¹³⁶ However, any noise pollution created during the construction phase would be temporary in nature for the length of the construction period, and therefore noise exposure is not prolonged, which many of the identified adverse health effects relate to.

- 8.4.96 Based on the literature, the relationship between changes in the levels of noise and vibration during the construction phase and health outcomes is judged to be **moderate**. The evidence is strong with regard to increased levels of noise adversely affecting health, with those living in quiet locations judged to have a better quality of life, but a range of health problems refer to exposure to ‘prolonged’ or ‘excessive’ noise. The construction phase may lead to temporary increases in exposure to noise, but these aren’t permanent. Negative health outcomes that can arise as a result of increased noise exposure include sleep disturbance and psychological stress, with particular adverse effects on children, older people, and disabled people.

Children and young people

- 8.4.97 Children are one of the vulnerable groups disproportionately at risk from increased levels of noise. The most common health effects for children have been found to be annoyance, sleep disturbance, cardiovascular disease, and cognitive effects.¹³⁷ The effects on cognitive development are exacerbated as cognitive progression and educational attainment are significantly more important at earlier stages of life.
- 8.4.98 Children are particularly susceptible to construction noise impacts in the form of loud and constant noise. Those living near the site may be exposed to heavy goods vehicles and other construction-related noise on a regular basis, which may go on to affect their reading attention, problem-solving, and memory.¹³⁸ Studies have found that environmental noise may cause hearing loss, impacting a child’s speech development as well.¹³⁹ In extreme cases, noise may contribute to the prevalence of non-intentional lesions as well¹⁴⁰ (damage or abnormal change in tissue).

Older people

- 8.4.99 Older people may be more susceptible to the impact of noise pollution due to lower mental processing and sensory changes that take place throughout the ageing process.¹⁴¹ Older people who are living with onsets of dementia are particularly susceptible because of their inability to process their immediate environment and the

¹³⁶ US Occupational Safety and Health Administration, (no date). Occupational noise exposure

¹³⁷ Van Kamp, I. and Davies, H. 2013. Noise and health in vulnerable groups: a review

¹³⁸ UPMC, 2016. Limit noise to boost your child’s brain power

¹³⁹ Ibid

¹⁴⁰ World Health Organisation, (no date). Noise and children

¹⁴¹ Ageucate, 2018. Noise pollution and older adults – a real health hazard

risks posed by the noise exposure.

8.4.100 Studies have found that living in neighbourhoods with louder road traffic increased the risk of stroke in older people as well as decreasing life expectancy,¹⁴² which may be relevant in the construction phase due to the increased prevalence of heavy goods vehicles travelling to and from the site.

Disability and long-term illness

8.4.101 Changes in noise exposure can have disproportionate impacts on those living with epilepsy through acting as an additional trigger which may cause a seizure.¹⁴³ Some seizures for epileptic people are triggered by noise exposure which may have adverse effects on health such as loss of consciousness.¹⁴⁴

8.4.102 Loud and prolonged exposures to noises can be particularly harmful for those with mental health issues due to the increased levels of stress it brings about. Studies show that excessive noise can create mental fatigue that both impairs judgement and reduces morale.¹⁴⁵ Furthermore, those with anxiety may feel stress about the increased levels of noise pollution.

Potential health effect of construction resulting in changes in air quality

8.4.103 Changes in air quality can affect human health. The scale and nature of the construction activity required for the London Resort may lead to adverse effects on the general population, but would disproportionately affect certain groups, such as children, older people, and those with pre-existing medical conditions.

Effects on the general population

8.4.104 There exists an extensive range of literature on the link between worsening air quality and adverse health outcomes. The WHO recognises that outdoor air pollution is a major environmental health problem for all countries in the world.¹⁴⁶ Air Quality England defines outdoor air pollution as ‘a mixture of gases and particles that have been emitted into the atmosphere by man-made processes’ which can have a negative impact on human health.¹⁴⁷

8.4.105 The main pollutants causing adverse changes in air quality are particulate matter (PM) and nitrogen dioxide (NO₂). Both PM and NO₂ were found to be associated with adverse health effects at concentrations that were ‘at or below the current EU limit values’.¹⁴⁸ Air

¹⁴² Halonen et al., 2015. Road traffic noise is associated with increased cardiovascular morbidity and mortality and all-cause mortality in London

¹⁴³ The Catholic University of America, 2014. Seizure Disorders

¹⁴⁴ Genetics Home Reference, 2019. Autosomal dominant partial epilepsy with auditory features

¹⁴⁵ Health Assured, 2019. Noise levels at work & mental health

¹⁴⁶ WHO Topic Sheet, 2018. Ambient (outdoor) air quality and health

¹⁴⁷ Air Quality England, (no date). Air pollution

¹⁴⁸ European Commission, 2019. Air quality standards.

pollution causes an estimated 40,000 deaths a year, with the social and health costs of air pollution predicted to rise to £18.6bn by 2035.¹⁴⁹ The primary diseases that are associated with rises in air pollution are child asthma, coronary heart disease, strokes, and lung cancer,¹⁵⁰ highlighting the severity of the associated cardiovascular and respiratory effects.

- 8.4.106 The main pollutants which may cause decreases in air quality as a result of the construction phase of the London Resort would come from off-road machinery and static engines such as power generators, associated with activities such as demolition and earthworks.¹⁵¹ Adverse health outcomes could also be expected from heavy goods vehicles traveling to and from the site, as transport is a major cause of air pollution,¹⁵² making up 12% of PM emissions in the UK.¹⁵³ Air quality changes from the construction period may cause annoyance to residential dwellings surrounding the site, in addition to commercial premises that may have a particular sensitivity to dust impacts.¹⁵⁴
- 8.4.107 There is clear and repeated evidence linking air quality to lung cancer.¹⁵⁵ Both PM10 and PM2.5 particles have been connected to the disease. It is also noted that while an estimated 1 in 10 lung cancer cases in the UK are caused by air pollution, other risk factors such as smoking also impact upon the potential to develop the illness.
- 8.4.108 Based on the reviewed literature, the relationship between changes in air quality during the construction phase and human health outcomes is judged to be **strong**. The evidence is clear that pollutants (such as PM and NO₂) created from air quality changes have negative health impacts on individuals, such as coronary heart disease, lung cancer, and annoyance. As identified with noise impacts however (see paragraph 8.4.96), a range of health problems relating to air quality refer to the length / persistence of exposure. The construction phase may lead to temporary adverse air quality impacts, but these aren't permanent.

Children and young people

- 8.4.109 Children surrounding the construction site or passing by may be exposed to pollutants created in the construction and demolition phase. Changes in air quality may have a disproportionate impact on children because their lung function doesn't finish developing until they mature into adulthood. Children are therefore more sensitive to respiratory illness, as children are more vulnerable to breathing polluted air than adults

¹⁴⁹ UK Health Alliance on Climate Change, 2018. Moving beyond the air quality crisis – realizing the health benefits of acting on air pollution.

¹⁵⁰ World Health Organisation, (no date). Ambient air pollution: health impacts.

¹⁵¹ London Low Emission Construction Partnership, (no date). Health impacts from construction emissions: sources and health impacts of construction generated pollution.

¹⁵² UK Health Alliance on Climate Change, 2018. Moving beyond the air quality crisis – realizing the health benefits of acting on air pollution.

¹⁵³ DEFRA, 2018. Clean air strategy 2018.

¹⁵⁴ Institute of Air Quality Management, 2011. Guidance on the assessment of the impacts of construction on air quality and the determination of their significance.

¹⁵⁵ Cancer Research UK, (no date). How can air pollution cause cancer?

are,¹⁵⁶ as well as inhaling more air per unit of bodyweight than adults.¹⁵⁷

8.4.110 The WHO note that children are less able to metabolize, detoxify, and excrete the toxicants contained in air pollution.¹⁵⁸ Furthermore, children's brains are still in a process of development and therefore the neurotoxic compounds found in air pollution can be harmful to their cognitive development.¹⁵⁹

Pregnant women

8.4.111 One study of pregnancies in China study found an association between air pollution during pregnancy and low birth weight.¹⁶⁰ Total suspended particle (TSP) pollution and sulphur dioxide (SO₂) were measured, although the effect of other pollutants could not be excluded.

8.4.112 There is growing epidemiologic evidence of associations between maternal exposure to ambient air pollution and adverse birth outcomes, such as preterm birth (PTB). Recently, a few studies have also reported that exposure to ambient air pollution may also increase the risk of some common pregnancy complications, such as preeclampsia and gestational diabetes mellitus (GDM).¹⁶¹

Older people

8.4.113 Older people (especially those with pre-existing respiratory conditions) are likely to be particularly affected by changes in air quality. Guidance published by the Department for Environment, Food and Rural Affairs (DEFRA) states that older people are more likely to suffer from cardiovascular and respiratory conditions than the general population,¹⁶² making them more susceptible to poor air quality impacts. Similarly, people who have pre-existing health conditions may be at increased risk of becoming ill or needing treatment.¹⁶³

Disability and long-term illness

8.4.114 Individuals with pre-existing lung conditions would be disproportionately at risk from the increased levels of pollutants created by construction activities. Increasing levels of PM are damaging to those with lung problems and those whose lungs are not functioning at

¹⁵⁶ British Lung Foundation, 2016. How air pollution affects your children's lungs

¹⁵⁷ World Health Organisation, (no date). Children and air pollution

¹⁵⁸ Ibid

¹⁵⁹ Ibid

¹⁶⁰ Wang, X., et al., 1997. Association between air pollution and low birth weight: a community-based study

¹⁶¹ Wu, J., et al., 2016. Air Pollution and Adverse Reproductive Health Outcomes in Pregnant Women

¹⁶² DEFRA, 2013. Effects of air pollution

¹⁶³ Department for Environmental Food and Rural Affairs (DEFRA), 2013. Guide to UK air pollution information resources

a healthy capacity.¹⁶⁴

Potential health effect of construction resulting in hazardous waste

8.4.115 Waste disposal is a critical aspect of all construction activity. Certain storage methods could allow chemicals and other substances to leak into the environment, contaminating land and the water supply, with the potential to affect human health.

Effects on the general population

8.4.116 The large amounts of treated waste materials and the complex biological and physicochemical processes make the areas in the proximity of landfills vulnerable not only to emissions of potential toxic compounds but also to nuisance such as odour pollution. Exposure to hazardous waste can impact on physical health, while proximity to waste landfill sites can cause stress, nuisance and fear, leading to mental health complications.

8.4.117 Most of the human health problems come from the landfill gas, from its non-methanic volatile organic compounds and hazardous air pollutants. In addition several odorants are released during landfill operations and uncontrolled emissions.¹⁶⁵ A French study found that residents exposed to odour and emissions by volatile organic compounds at an industrial waste landfill were more likely than a control group to have developed nonspecific irritative respiratory conditions.¹⁶⁶ The symptoms appeared to be further related to the existence of long-lasting (prevalent) conditions.

8.4.118 A review of the epidemiologic literature on health effects in relation to residence near landfill sites found that increases in risk of adverse health effects, including low birth weight, birth defects, and certain types of cancers, have been reported near individual landfill sites, and in some multisite studies.¹⁶⁷ However, a general weakness of the literature is the lack of direct exposure measurement. An increased prevalence of self-reported health symptoms such as fatigue, sleepiness, and headaches among residents near waste sites has also consistently been reported, yet it is difficult to conclude whether these effects are a direct effect of exposure to toxic materials, or rather a factor of stress and fears related to the waste site, or an effect of reporting bias.

8.4.119 Solid waste from construction and demolition activities is often disposed in unlined landfills. Leachate from unlined landfills poses a potential risk to groundwater quality. An experiment found that the concentrations of several leachate constituents were

¹⁶⁴ London Low Emission Construction Partnership, (no date). Health impacts from construction emissions: sources and health impacts of construction generated pollution

¹⁶⁵ Palmiotto, M., Fattore, E., Paiano, V., Celeste, G., Colombo, A., Davoli, E., 2014. Influence of a municipal solid waste landfill in the surrounding environment: Toxicological risk and odor nuisance effects

¹⁶⁶ Zmirou, D. A., Tillier, D., Boucharlat, A., Bouti, H., 1995. Case-Control Assessment of the Short-Term Health Effects of an Industrial Toxic Waste Landfill

¹⁶⁷ Vrijheid, M., 2000. Health effects of residence near hazardous waste landfill sites: a review of epidemiologic literature

found to exceed water quality standards.¹⁶⁸ These constituents included aluminium, arsenic, copper, manganese, iron, sulphate, and total dissolved solids, but only Arsenic exceeded the primary water quality standard.

8.4.120 Based on a review of the existing literature, the link between construction activity, hazardous waste, and health outcomes is judged **moderate**. Links between particular landfill or waste disposal sites and adverse health outcomes are strong, but no definite conclusion about landfill sites in general and human health can be drawn from the literature.

Children and young people

8.4.121 Environmental toxins can affect children even before birth as low-molecular-weight toxins, including carbon monoxide and lead, readily cross the placenta. The developing brain is particularly sensitive to environmental contaminants. Relatively low blood lead levels and prenatal exposures have been shown to lead to reductions in intellectual function and behaviour disorders.¹⁶⁹ After birth, the physiology and behaviours of children increase their exposures to environmental toxins. Children consume more food and water per unit of body weight, they have higher inhalation rates per unit of body weight, and they have higher surface area to volume ratios than adults, all factors that result in higher doses of environmental pollutants in the body. After exposure occurs, the rapid development in children makes them more susceptible to damage from absorbed pollutants.

8.4.122 A study of children residing near a municipal solid waste landfill in Northern China found that children in non-exposure areas had significantly higher lung capacity, and higher levels of lysozyme, and secretory immunoglobulin A (SIgA).¹⁷⁰ The results suggested that exposure was negatively associated with more lung function parameters in boys than in girls. Children living adjacent to landfill sites were more likely to have deficient non-specific immunity and impaired lung function.

Older people

8.4.123 Older people are generally more vulnerable to exposure to toxic substances and are thus at higher risk from exposure to hazardous waste materials. Lead is commonly used in building materials, and according to research older people are more susceptible to its effects, in part because lead exposure is associated with an increased risk of cardiovascular and cerebrovascular morbidity and mortality—health endpoints for which older people are at increased risk.¹⁷¹ Older people are an at-risk group for the effects of environmental toxicants upon changes in the eye and possible interactions with toxic

¹⁶⁸ Weber, W. J., Jang, Y. C., Townsend, T. G., Laux, S., 2002. Leachate from Land Disposed Residential Construction Waste.

¹⁶⁹ Rosenfeld, P. E., Feng, L. G. H., 2011. Risks of Hazardous Wastes, pp. 237-238.

¹⁷⁰ Yu, Y., Yu, Z., Sun, P., Lin, B., Li, L., Wang, Z., Ma, R., Xiang, M., Li, H., Guo, S., 2018. Effects of ambient air pollution from municipal solid waste landfill on children's non-specific immunity and respiratory health.

¹⁷¹ Healey, N., 2009. Lead toxicity, vulnerable subpopulations and emergency preparedness.

substances present in the environment.¹⁷²

Disability and long-term illness

8.4.124 As mentioned above,¹⁷³ emissions from a French industrial waste landfill site appeared to result in nonspecific irritative respiratory symptoms in exposed subjects with prevalent long-term conditions. Individuals with reduced immune system function as a result of illness are also less able to overcome the effects of exposure to toxins released from hazardous waste.

Potential health effect of construction resulting in water contamination

8.4.125 The possibility exists that construction of the London Resort would result in the ground disturbance of historical contamination or in new spills. This has the potential to affect groundwater sources and the local water supply and create a range of health effects for nearby communities.

Effects on the general population

8.4.126 The safety of water supplies is of paramount public health importance. Although microbiological contamination is the largest contribution to waterborne disease and mortality at a global scale, chemical contaminants in water supplies also can cause disease, sometimes after long periods of exposure. Water supplies often include mixtures of chemical contaminants that vary in time and space. However, drinking water quality is regulated and monitoring conducted routinely.

8.4.127 As construction disturbs the ground existing contamination may be released to surrounding waters. The possibility of spills poses further dangers. Cyanobacteria are a group of photosynthetic bacteria that live in a wide variety of moist soils and water. Water contaminated with cyanotoxins (produced by cyanobacteria) that is used for drinking or haemodialysis poses a particularly serious risk. Recreational exposure to natural toxins by skin contact, accidental swallowing of water or inhalation can also cause a wide range of acute or chronic illnesses.¹⁷⁴ Cyanotoxins could be transmitted through the food chain posing indirect risks to humans; a study noted evidence of risky exposure for fish and shell consumers, and consumers of blue-green algae supplements, but no definite conclusions could be drawn for the general population.

8.4.128 Given the widely held belief that aquifers represent a pristine source of drinking water due to natural attenuation, the contamination of groundwater could result in more extreme health effects as contaminated groundwater could slip under the radar and be consumed in large quantities before detection. Consumption of contaminated water can

¹⁷² Harbin, T. J., 1991. Environmental Toxicology and the Aging Visual System. In: Armstrong D., Marmor M.F., Ordy J.M. (eds). The Effects of Aging and Environment on Vision

¹⁷³ Zmirou, D. A., Tillier, D., Boucharlat, A., Bouti, H., 1995. Case-Control Assessment of the Short-Term Health Effects of an Industrial Toxic Waste Landfill

¹⁷⁴ Koreiviene, J., Anne, O., Kasperoviciene, J. & Burskyte, V., 2014. Cyanotoxin management and human health risk mitigation in recreational waters

also have implications in terms of enteric disease for humans.¹⁷⁵ A study analysed water contamination during excavation works at a university-affiliated hospital. There was widespread contamination of potable water with *Legionella pneumophila* during a period of major construction; cooling towers were without growth of *Legionella*. The study postulates an association between legionnaires' disease and construction activity.¹⁷⁶

8.4.129 Man-made organic chemicals have been found in drinking water for many years. The identified chemicals comprise 10% to 20% of the total organic matter present. These are volatile or low molecular weight compounds which are easily identified, and many of them are carcinogenic or mutagenic.

8.4.130 Based on a review of the existing literature, the link between construction activity, water contamination, and health outcomes is judged **moderate**. Links between water contamination and adverse health outcomes are strong, but research aimed at establishing a connection between construction activity and water contamination is not strong.

Children and young people

8.4.131 A US study evaluated the effects of public drinking water contamination on birth outcomes in an area of northern New Jersey. It found possible association between contaminated drinking water and central nervous system defects, oral cleft defects, major cardiac defects, very low birth weight and a range of other conditions.¹⁷⁷

8.4.132 Intensive human activity can result in the contamination of groundwater quality. In an area of intensive agricultural and industrial activity in Mid-West China the total water hardness, NO_3^- , NO_2^- , TDS, SO_4^{2-} , and F^- were found to be the main contaminants affecting water suitability for drinking purpose. Children were found to be at higher health risk than adults as a result of the contaminated water, and oral ingestion was the dominant pathway.¹⁷⁸

Older people

8.4.133 Research conducted in Philadelphia in the US, has found an association between hospital admissions of the 65+ population for gastrointestinal disease and water quality 9 to 11 days before the hospital visit. The association is stronger for the 75+ population.¹⁷⁹ This

¹⁷⁵ Andrade, L., O'Dwyer, J., O'Neill, E., Hynds, P., 2018. Surface water flooding, groundwater contamination, and enteric disease in developed countries: A scoping review of connections and consequences.

¹⁷⁶ Mermel, L. A., Josephson, S. L., Giorgio, C. H., Dempsey, J., 2015. Association of Legionnaires Disease with Construction: Contamination of Potable Water?

¹⁷⁷ Bove, F. J., Fulcomer, M. C., Klotz, J. B., Esmart, J., Dufficy, E. M., Savrin, J. E., 1995. Public Drinking Water Contamination and Birth Outcomes.

¹⁷⁸ Wu, J., Sun, Z., 2015. Evaluation of Shallow Groundwater Contamination and Associated Human Health Risk in an Alluvial Plain Impacted by Agricultural and Industrial Activities, Mid-west China.

¹⁷⁹ Schwartz, J., Levin, R., Goldstein, R., 2000. Drinking water turbidity and gastrointestinal illness in the elderly of Philadelphia.

suggests that current standard water treatment practices are not sufficient to eliminate the risk of waterborne disease for the elderly.

Disability and long-term illness

8.4.134 Individuals with weaker immune systems are at a greater risk of morbidity from insufficiently treated or contaminated water. A Chinese study found that the annual diarrhoea morbidity caused by *Cryptosporidium* in drinking water was estimated to be 2701 cases per 100,000 immunodeficient persons and 148 cases per 100,000 immunocompetent persons.¹⁸⁰ Where individual long-term illness or disability affects the response of immune systems, the health outcomes individuals within this vulnerable group are more sensitive to changes in hazardous waste and therefore will be disproportionately affected.

Low-income groups and the unemployed

8.4.135 The urban and rural poor have been shown to be vulnerable to exposure to hazardous waste as a result of difficulties in comprehension and barriers in access to information, meaning that authorities often cannot effectively communicate with them in a water contamination event.¹⁸¹ As such, these population may not receive the necessary public health messages and may be more at risk in the event of water being contaminated.

Potential health effects of construction related to changes to levels of neighbourhood amenity

8.4.136 Neighbourhood amenity refers to the overall quality of the physical environment, both private and public. As a large construction project spanning the Swanscombe Peninsula, the London Resort would alter the physical, visual and lighting environment in the area, with potential impacts on neighbourhood amenity. Impacts on neighbourhood amenity are assessed as a combination of traffic, noise and vibration, air quality and visual amenity and light effects, as defined within NHS London Healthy Urban Development Unit (2019).¹⁸²

Effects on the general population

8.4.137 There is evidence of links between the quality of places and health and wellbeing. The Landscape Institute found that health and wellbeing could be influenced by factors such as the attractiveness, noise, air pollution, transport accessibility, and the perceived safety of an environment.¹⁸³ Individuals of more scenic environments report better health across urban, rural, and suburban areas, even when taking socio-economic indicators of deprivation into account, such as income, employment and access to

¹⁸⁰ Xiao, S., An, W., Chen, Z., Zhang, D., Yu, J., Yang, M., 2012. The burden of drinking water-associated cryptosporidiosis in China: The large contribution of the immunodeficient population identified by quantitative microbial risk assessment.

¹⁸¹ Nsiah-Kumi, P. A., 2008. Communicating effectively with vulnerable populations during water contamination events.

¹⁸² NHS London HUDU, 2019, Rapid Health Impact Assessment Tool: 3rd Edition.

¹⁸³ Landscape Institute, 2013, Public Health and Landscape – Creating healthy places.

services.¹⁸⁴

- 8.4.138 Road safety is one aspect of neighbourhood amenity. Road safety has a much wider impact on health than just preventing injuries', because some forms of travel (e.g. walking and cycling) bring more health benefits for individuals and society than others, and people in environments with better road safety walk and cycle more. Increased life expectancy is one of the outcomes from an increase in road safety and consequently active travel.
- 8.4.139 Air quality is assessed as a component of neighbourhood amenity. Changes in air quality and increases in air pollution (caused by PM and NO₂) can lead to negative human health outcomes, such as lung cancer, coronary heart disease, and disturbances in cognitive development.
- 8.4.140 As discussed under the literature review for noise and vibration effects, noise and vibration can lead to annoyance, as well as to disturbed sleep patterns, which can negatively impact health.
- 8.4.141 Obtrusive light, whether it keeps someone awake through a bedroom window or impedes the view of the night sky, is a form of pollution. Sky glow (the brightening of the night sky), glare (the uncomfortable brightness of a light source when viewed against a darker background), and light intrusion (trespass, the spilling of light beyond the boundary of the property or area being lit) are all forms of obtrusive light which may cause nuisance to others. Selective (Rayleigh) scattering makes sky glow more intense for light richer in shorter wavelengths, such as blue light or white light with a higher blue content.
- 8.4.142 The evidence linking changes to neighbourhood amenity to health is considered to be **moderate**. There is evidence for links between the quality of physical spaces and health and wellbeing. There is also evidence for links between some components of neighbourhood amenity and human health individually, although the strength of this evidence varies with the component.

Children and young people

- 8.4.143 Noise and air quality are assessed as components of neighbourhood amenity. Children are one of the vulnerable groups disproportionately at risk from increased levels of noise. The most common health effects for children have been found to be annoyance, sleep disturbance, cardiovascular disease, and cognitive effects. Changes in air quality may have a disproportionate impact on children because their lung function doesn't finish developing until they mature into adulthood.

Pregnant women

- 8.4.144 Pregnant women may face some measure of increased risk if travelling during pregnancy,

¹⁸⁴ Seresinhe, C., Preis, T. & Moat, H., 2015, Quantifying the Impacts of Scenic Environments on Health, Scientific Reports

although healthy expectant mothers with uncomplicated pregnancies are not thought to be strongly affected. Exposure to air pollution during pregnancy has been linked to low birth weight, preterm birth, and complications during pregnancy.

Older people

8.4.145 As discussed earlier, the removal of established routes (transport and pedestrian) may cause issues for older people in the form of preventing them from accessing usual amenities, leading to the adverse health outcomes associated with social isolation. Older people may be more susceptible to the impact of noise pollution due to lower mental processing and sensory changes that take place throughout the ageing process. Older people (especially those with pre-existing respiratory conditions) are likely to be particularly affected by changes in air quality.

Disability and long-term illness

8.4.146 As discussed earlier those with mental health problems are more vulnerable to the mental health issues associated with social isolation caused by a lack of good transport access. Changes in noise exposure can have disproportionate impacts on those living with epilepsy through acting as an additional trigger which may cause a seizure. Loud and prolonged exposures to noises can be particularly harmful for those with mental health issues due to the increased levels of stress it brings about. Individuals with pre-existing lung conditions would be disproportionately at risk from the increased levels of pollutants.

Low-income groups and the unemployed

8.4.147 The quality of the living environment can have an impact on self-esteem and well-being, as the public realm quality acts as a signal of maintenance or disuse; the Scottish Household Survey¹⁸⁵ found social renters reported antisocial behaviour two to three times more often than owner-occupiers.

8.4.148 Families with low incomes tend disproportionately live in areas with lower environmental quality.¹⁸⁶

8.4.149 As discussed earlier those from lower socio-economic backgrounds may be disproportionately affected by a reduction in access to transport routes due to a heavier reliance on public transport.

Potential health effects of the presence of the construction workforce

8.4.150 The scale of construction required for the London Resort means that there will be an immediate and large increase in the amount of construction workers in and around the

¹⁸⁵ Ellaway, A., Macdonald, L. and Kearns, A., 2016. Are housing tenure and car access still associated with health? A cross-sectional study of UK adults over a 13 year period, *British Medical Journal*

¹⁸⁶ WHO, 2012, Addressing the social determinants of health: the urban dimension and the role of local government

site. This has the potential to cause a range of health effects on the surrounding communities. Many of these relate to perception and can be negated by better construction management processes.

Effects on the general population

- 8.4.151 The presence of a large number of new construction workers in an area may not always be welcomed by local residents, sometimes causing them to feel unsettled, particularly those located closer to the construction site. Angel (2014) looks at ways in which transitory workers are portrayed in North America.¹⁸⁷ The construction worker stereotype is one of workers who are young and consume large amounts of alcohol and drugs, whilst also contributing to increased levels of sexual assault. Angel finds that in fact construction workers are family-oriented and hardworking and contrast the stereotype. Some groups and individuals may yet believe the stereotype, creating feelings of intimidation due to the presence of such a workforce.
- 8.4.152 Many groups of society may associate a construction workforce with anti-social behaviour, as per the somewhat unproven stereotype mentioned above. Antisocial behaviour may deter individuals from travelling past the site due to increased feelings of intimidation. Intimidation of particular groups may in turn lead to social isolation/exclusion and possibly a reduction in physical activity.
- 8.4.153 A large construction project with valuable construction materials lying on site may also enable crime in an area or invite a fear of crime. The most common forms of crime in the construction industry are theft, vandalism, and health and safety neglect, although crimes are plausibly perpetrated by criminals operating in the area rather than construction workers. The construction industry is also susceptible to attack from organised crime (extortion, human trafficking), which can have a very severe effect on those targeted.¹⁸⁸
- 8.4.154 There is a moderate body of evidence linking the fear of crime to human health outcomes. One study identified that those with a higher fear of crime would be restricted from leaving their homes, consequently reducing the number of opportunities that the individual has to form social ties and participate in social activities.¹⁸⁹ Refer to **potential health effect of displacement or change in access affecting public services and community facilities** (from paragraph 8.4.9) for the benefits of social interaction.
- 8.4.155 Increases in crime have also been associated with mental distress and adverse mental health outcomes for residents in the local vicinity.¹⁹⁰ Effects have been found to be strongest for females, and the effects tend to revolve around depression and anxiety. Another study found that an individual suffered a decrease in mental wellbeing in the

¹⁸⁷ Angel, C. 2014. Beyond the 'roughneck' stereotype: revealing the actual face of mobile workers in the Alberta Oil Sands and North Dakota's Bakken Oil Region and why it matters to health

¹⁸⁸ Chartered Institute of Building, 2009. Crime in the construction industry

¹⁸⁹ Stafford et al., 2007. Association between fear of crime and mental health and physical functioning

¹⁹⁰ Dustmann, C. and Fasani, F., 2016. The effect of local area crime on mental health

immediate three months after violent crime victimization.¹⁹¹ Areas with a higher prevalence of crime also lead to lower self-reported quality of life amongst residents in the area.¹⁹²

8.4.156 Overall, the evidence linking the presence of a construction workforce and human health outcomes is judged to be **weak**. The introduction of a construction workforce in an area does not have any direct effect on health, but could indirectly influence behaviour through feelings of intimidation due to a negative stereotype. The link between fear of construction workers and reduced physical activity and social isolation is highly speculative, however.

Children and young people

8.4.157 Children have been found to be less physically active when they were in an environment not judged as safe, leading to higher levels of childhood obesity.¹⁹³ Children that have been exposed to violent or traumatic acts may become fearful of further crime, restricting their behaviour.¹⁹⁴ Children that have been exposed to violent acts may also be caught up in the ‘cycle of violence’ whereby they learn to resolve their own personal conflicts with violence in the future.¹⁹⁵

8.4.158 In a report by the Children’s Society, 40% of 10-17-year olds worry about crime, and particularly fear theft or assault¹⁹⁶, showing the disproportionate impact that fear of crime has on this demographic.

Older people

8.4.159 Older residents in the area may be disproportionately affected by the presence of a large construction workforce due to the drastic change in the make-up of people in the area. Older people could opt to use community facilities less due to possible feelings of intimidation and may generally be reluctant to travel past the site during construction hours. NHS research finds that older people are more susceptible to social isolation due to being cut off from society,¹⁹⁷ an issue that may be exacerbated with the presence of a construction workforce.

8.4.160 One review found that higher levels of safety caused higher levels of physical activity amongst older people,¹⁹⁸ something that would be worsened with a higher fear of construction workers. Safety was also associated with better mental health and more walking, as individuals were more assured of their safety when going outdoors.

¹⁹¹ Cornaglia et al., 2014. Crime and mental wellbeing

¹⁹² Cohen, M., 2008. The effect of crime on life satisfaction

¹⁹³ An et al., 2017. Influence of neighbourhood safety on childhood obesity

¹⁹⁴ Health Children, 2016. Childhood exposure to violence

¹⁹⁵ Ibid

¹⁹⁶ Children’s Society, 2017. The Good Childhood Report

¹⁹⁷ NHS, 2018. Loneliness in older people

¹⁹⁸ Won et al., 2016. Neighbourhood safety factors associated with older adults’ health-related outcomes: a systematic literature review

8.4.161 The issue of crime is amplified for older people whose participation in society is lower, and loneliness and lack of participation in social life has been shown to have a strong relationship with fear of crime.¹⁹⁹ In the American population, older people are more anxious and fearful of crime than any other age group,²⁰⁰ and this causes undesirable changes in behaviour which may lead to social isolation.

Disability and long-term illness

8.4.162 Disabled people are more susceptible to poorer levels of mental and/or physical health, and so they may be disproportionately affected by the immediate introduction of a large construction workforce because of a change in the make-up of an area. This is because the presence of the workforce may modify how those with disabilities interact with their community and may go as far as affecting their wellbeing and their access to social networks.

8.4.163 Disabled people have also been found to experience social isolation more, and so the introduction of a construction workforce could mean they are disproportionately impacted further. It has also been found that over half of disabled people report feeling lonely²⁰¹, and if the introduction of the workforce deters those with disabilities from travelling around or past the site, this may lead to adverse mental health outcomes.

Ethnic minority groups

8.4.164 One in 5 individuals from BAME backgrounds were found to be victims of crime in a recent study (compared to 15% for those from a white background), while black people were found to be three times more likely to be arrested than their white counterparts²⁰², highlighting the disproportionate impact of crime on those from ethnic minorities, which can be partly attributed to racial profiling.

LGBTQ+

8.4.165 Individuals from LGBTQ+ backgrounds may experience more crime relative to the general population. A recent report has highlighted that one in five (21%) of LGBTQ+ people have experienced hate crime due to their sexual orientation/gender identity in the 12 months leading up to the survey,²⁰³ highlighting the disproportionate impact of crime on this group. This figure rises to 41% for transgender people. Furthermore, some 17% of LGBTQ+ people who visited a café, restaurant, bar, or nightclub in the 12 months preceding the survey were discriminated against because of their sexual orientation or gender identity.

8.4.166 Another report shows similar findings, in that 4 in 5 LGBT people have experienced hate

¹⁹⁹ De Donder et al., 2005. Fear of crime and elderly people: key factors that determine fear of crime among elderly people in West Flanders

²⁰⁰ Skogan, W., 1978. The fear of crime among the elderly

²⁰¹ Jo Cox Commission on Loneliness, 2017. Combatting loneliness one conversation at a time

²⁰² Independent, 2017. Ethnic minorities most likely to be both victims and suspects of crime, UK race report finds

²⁰³ Stonewall, 2017. LGBT in Britain – Hate Crime.

crime related to their gender identity or sexual orientation in their lifetime (79%).²⁰⁴ Construction News's LGBT survey²⁰⁵ has revealed that 71% of LGBT respondents felt they could not be open about their sexuality on-site in 2016 (up from 69% a year ago). Over half (51%) felt that their sexuality hindered their career progression, and over 70% have heard 'gay' used as an insult in the year before.

Single-parent families

8.4.167 Research on single-parent families who live in high-crime neighbourhoods (in the USA) has found that while single-parents meet or exceed the population average for physical health, their mental health outcomes are significantly worse.²⁰⁶ One reason provided for this link is the relationship between neighbourhood characteristics and child health.

Potential health effect of work and training opportunities created

8.4.168 The work and training opportunities provided by the London Resort are expected to bring positive health benefits to the local population. A number of positions at the London Resort will be filled locally, as well as opportunities for upskilling and training.

Effects on the general population

8.4.169 Benefits of employment on health outcomes have been outlined in **potential health effects from displacement of commercial uses** (from paragraph 8.4.45) and include links to better physical and mental health outcomes. Other benefits include better social status and a sense of achievement, as well as material outcomes such as increased incomes and the benefits that accrue from this.²⁰⁷

8.4.170 The construction of the London Resort will create training and upskilling opportunities for many local residents. The link between education and health outcomes is strong, as those with better qualifications are more likely to have healthy lifestyles, to be fitter, and to be a healthy body weight.²⁰⁸ More evidence by the VCU Centre on Society and Health found that education creates opportunities for better health through increased income, healthy behaviours, healthier neighbourhoods and psychological benefits.²⁰⁹

8.4.171 The evidence linking the creation of work and training opportunities to positive health outcomes is considered to be **strong**. There is clear and strong evidence on the positive impact of employment, including better physical health outcomes (such as more money available to provide better services for individuals and healthcare) and better mental health outcomes (such as increased sense of purpose and confidence). In addition, there exists strong and clear literature on the benefits of education and positive health

²⁰⁴ Galop, 2016. The Hate Crime Report.

²⁰⁵ Construction News, 2016. LGBT: 71% 'can't be open about their sexuality' on site.

²⁰⁶ Jacoby, S.F. et al., 2016. The health status and well-being of low-resource, housing-unstable, single-parent families living in violent neighbourhoods in Philadelphia, Pennsylvania.

²⁰⁷ Olesen et al., 2013. Mental health affects future employment.

²⁰⁸ Feinstein et al., 2008. The social and personal benefits of learning

²⁰⁹ VCU Centre on Society and Health, 2015. Why education matters to health: exploring the causes

outcomes, as individuals are likelier to have healthier lifestyles and behaviours.

Children and young people

8.4.172 Indirect benefits are created for children arising from parental employment from jobs created in the construction phase of the London Resort. Long periods of work from a child's father when the child is around the age of 3 or 4 were found to reduce the child's risk of unemployment later in life (and the associated adverse health outcomes that come with unemployment as outlined in **potential health effects from displacement of commercial uses** (from paragraph 8.4.51)), and reduce the child's risk of experiencing psychological distresses in young adulthood.²¹⁰ Naturally, parental employment also generates a larger disposable family income, which could be associated with a plethora of health benefits created for the child.

8.4.173 Young people with limited employment history could be particularly benefitted from the construction phase. Apprenticeships allow young adults entering the labour market to earn money alongside educational studies, which may lead to better employment opportunities and better health outcomes in the future.

Pregnant women

8.4.174 As discussed under the **potential health effects from displacement of commercial uses**, (paragraph 8.4.54) employment discrimination against pregnant women is likely widespread.

Low-income groups and the unemployed

8.4.175 The unemployed would disproportionately benefit from additional employment and training opportunities through the health benefits associated with employment. Refer to **potential health effects from displacement of commercial uses** (from paragraph 8.4.58) for these health benefits. These include more income (and hence increased access to better living standards) and better mental health outcomes.

8.4.176 Individuals both unemployed and from lower socio-economic backgrounds would benefit from training programmes created in the construction phase. Those with limited skillsets or employment history can benefit from the training offered, improving their careers and employment outcomes later in life which may lead to many positive health benefits.

8.4.177 Additionally, children from low income backgrounds reported a health gap relative to teenagers in wealthier and poorer households. A study found that children from lower socio-economic backgrounds reported lower levels of physical activity and higher levels of bodily aches and pains relative to more advanced teenagers.²¹¹

Ethnic minority groups

²¹⁰ JRF, 2001. The effect of parents' employment on outcomes for children

²¹¹ Wapner, J., 2015. Money is driving a wedge in teen health.

8.4.178 Ethnic minority groups are under-represented in the labour market, as outlined in **potential health effects from displacement of commercial uses** (paragraphs 8.4.62 and 8.4.63).

Single-parent families

8.4.179 As discussed under **potential health effects from displacement of commercial uses**, (paragraph 8.4.64) research has addressed both positive and negative links between parental employment in single-parent families and the health outcomes of children. Stable parental employment has been shown to lead to higher achievement and mental processing in children of single-parent families.²¹² Limited research has discussed a potential link between greater workloads placed on single-parents and behavioural problems in children, but no conclusive relationship can be drawn on this evidence.²¹³

Gypsies and Travellers

8.4.180 As discussed under the **potential health effects from displacement of commercial uses** (paragraph 8.4.65) Gypsy, Roma and Traveller populations may find it harder to regain employment if made redundant as a result of the displacement of commercial uses on site.

Potential health effect of construction workers on health services

8.4.181 The influx in the number of construction workers on-site during the construction phase is likely to increase the demand for health services locally. As a result of the existing constraints faced by these healthcare services, the additional demand has the potential to impact upon local residents' access to health services. Consultation has been undertaken with key stakeholders for the delivery of local health services to inform the evidence base and pathways through which the London Resort will affect access to health service during both the construction and operational phase.

Effects on the general population

8.4.182 The scale of the construction workforce moving into the area to work on the London Resort may lead to an increase in the demand for health services, which may reduce the access to health services for the general population. The demand for healthcare could be increased as a result of the magnitude of workers on-site, especially those who are resident on-site. Reduced access to healthcare may have a disproportionate impact on some groups in particular, such as older people, those with disabilities and pre-existing medical conditions, and those from ethnic minority backgrounds (this group historically has poorer health outcomes and experiences systemic barriers to accessing healthcare

²¹² Younblut, J.M. et al., 2009. Effects of Maternal Employment and Prematurity on Child Outcomes in Single Parent Families.

²¹³ Youngblut, J.M. et al., 2009. Maternal Employment and Parent-Child Relationships in Single-Parent Families of Low-Birth-Weight Preschoolers.

services).

- 8.4.183 Good accessibility and availability are important determinants in primary healthcare systems, and adverse health outcomes are typically associated with longer wait times, leaving some patients to rely on urgent care.²¹⁴ It has been found that when wait times are too long, patients' adverse health outcomes may be exacerbated. In addition to decreased satisfaction from increased wait times,²¹⁵ longer wait times are 'significantly associated' with a deterioration in patient outcomes for those with wait times that span over a few months (effects are strongest when waiting times are longer than 3 months).²¹⁶
- 8.4.184 In general, barriers to accessing health services in a timely manner have the potential to result in unmet health needs, delays in receiving appropriate care (in which time the condition may deteriorate), financial burdens (which may lead to further adverse health outcomes), and the inability to get suitable preventive services.²¹⁷
- 8.4.185 Based on a review of the existing literature, the link between human health outcomes and the accessibility of healthcare services is judged to be **moderate**. Reduced access may lead to the exacerbation of health outcomes, unmet health needs, and financial burdens. Those groups with pre-existing reduced access to healthcare would be the worst affected from an increase in demand for health care services.

Older people

- 8.4.186 Older people currently face barriers to accessing healthcare due to a lack of mobility, reduced access to knowledge of available services, and relatively greater reliance upon existing services. As people get older, they typically develop more long-term health conditions and require more health care.²¹⁸ Due to an increased reliance on healthcare, an increase in demand for local health services may reduce older people's access to healthcare, leaving to the adverse health outcomes associated with longer waiting times.

Disability and long-term illness

- 8.4.187 Individuals with disabilities and chronic conditions have a greater reliance on and use of healthcare services.²¹⁹ In general, barriers that those with disabilities face are ignorance from healthcare services towards those with learning disabilities, poor communication and poor continuity of care.²²⁰ Additionally, those who have hearing problems have

²¹⁴ Ansell et al., 2017. Interventions to reduce wait times for primary care appointments: a systematic review

²¹⁵ Alrasheedi et al., 2019. The association between wait times and patient satisfaction: findings from primary health centres in the Kingdom of Saudi Arabia

²¹⁶ Reichert, A. and Jacobs, R., 2018. The impact of waiting time on patient outcomes: evidence from early intervention in psychosis services in England

²¹⁷ Healthy People, 2020. Access to health services

²¹⁸ NHS, (no date). Improving care for older people

²¹⁹ World Health Organisation, (no date). Disability and health

²²⁰ Council for Healthcare and Regulatory Excellence, 2009. Healthcare for people with disabilities

many difficulties in communicating with GPs and making appointments.²²¹ Those with long-term illnesses may also need to frequent health services more often, an issue that would be worsened with increased demand for health care.

Ethnic minority groups

8.4.188 Ethnic minority groups have historically had poorer health and barriers to accessing healthcare services. Some barriers that influence ethnic minorities' access to healthcare include cultural differences, such as religion that may affect access to services or other cultural factors that mean people cannot access services without sufficient support, or differences in language where accurate diagnoses cannot be made.²²² Other extrinsic factors may include differential needs, or ignorance as to services available.

8.4.189 Discrimination that is deep-rooted in England has created systemic barriers to the conditions needed to live a healthy life for ethnic minorities.²²³ Those from these backgrounds suffer from poorer health outcomes as a result, and a reduction in access to healthcare would therefore disproportionately affect ethnic minorities.

Gypsies and Travellers

8.4.190 The 2010 All Ireland Traveller Health study showed that health outcomes among Travellers and Gypsies were worse than for the rest of the population, and that this situation was deteriorating.²²⁴ Gypsy, Roma and Traveller people represent the most disadvantaged minority groups in Europe, having the poorest health outcomes. A systematic review²²⁵ addressed the question of how Gypsy, Roma and Traveller people access healthcare and what are the best ways to enhance their engagement with health services. Evidence is provided that Gypsy, Roma and Traveller populations across Europe struggle to exercise their right to healthcare on account of multiple barriers; and related to other determinants of disadvantage such as low literacy levels and experiences of discrimination. Data collection about the health needs of Gypsy, Roma and Traveller populations is also often patchy, making targeted interventions more difficult.²²⁶

Potential construction health effects related to a changing climate

8.4.191 The London Resort, as any construction activity, has the potential to contribute to climate change. Climate change is frequently discussed within literature as a key future determinant of human health, and therefore the construction activity has the potential

²²¹ Ibid

²²² Szczepura, A., 2005. Access to health care for ethnic minority populations

²²³ The Health Foundation, 2020. Will Covid-19 be a watershed moment for health inequalities?

²²⁴ Committee D, British-Irish Parliamentary Assembly, 2014. Travellers, Gypsies and Roma: access to public services and community relations

²²⁵ McFadden, A., et al., 2018. Gypsy, Roma and Traveller access to and engagement with health services: a systematic review

²²⁶ Committee D, British-Irish Parliamentary Assembly, 2014. Travellers, Gypsies and Roma: access to public services and community relations

to contribute to reduce health outcomes through climate change.

Effects on the general population

- 8.4.192 Climate change, together with other natural and human-made health stressors, influences human health and disease in numerous ways. Some existing health threats will intensify and new health threats will emerge. Climate change presents a global public health problem, with serious health impacts predicted to manifest in varying ways in different parts of the world. Disruptions can occur in physical, biological, and ecological systems. Health effects of these disruptions include increased respiratory and cardiovascular disease, injuries and premature deaths related to extreme weather events, changes in the prevalence and geographical distribution of food- and waterborne- illnesses and other infectious diseases, and threats to mental health.²²⁷
- 8.4.193 Heatwaves are likely to become more frequent in the future in the UK. At present, the health burden due to low temperature exceeds that of high temperature. However, heat-related mortality, which is currently around 2,000 premature deaths per year, is projected to increase steeply in the UK throughout the 21st century, from around a 70% increase in the 2020s to around 540% in the 2080s.²²⁸ Southern, central and eastern England appear to be most vulnerable to current and future effects of hot weather compared with other UK regions.
- 8.4.194 Effects of climate change in the indoor environment should not be overlooked, as the population of the UK typically spends 90% of their time indoors. Climate change may exacerbate health risks associated with building overheating, indoor air pollution, flood damage and water and biological contamination of buildings. Hospitals, health centres and care homes may be adversely affected by high temperatures during heatwaves and flooding.²²⁹
- 8.4.195 Climate change may influence ambient levels of Ultraviolet (UV) radiation in the UK, but human exposure to UV radiation is also strongly influenced by lifestyle and behaviour. For example, increases in the number of extreme warm weather events in the UK may increase population exposure to UV radiation due to increased time spent outdoors. This could increase health risks associated with UV including some skin cancers. Climate change is also thought to be delaying the recovery of the stratospheric ozone layer, which affects the amount of UV radiation reaching the surface of the Earth.²³⁰
- 8.4.196 Vector-borne diseases are influenced in complex ways by the climate, land use changes and human activities, and as such it is difficult to make quantitative predictions of future changes due to climate change. However, it is likely that the range, activity and vector potential of many ticks and mosquitoes will increase across the UK by the 2080s. There is also the potential for introduction of exotic species and pathogens. Potential drivers

²²⁷ Luber, G., et al. 2014. Human Health. Climate Change Impacts in the United States: The Third National Climate Assessment.

²²⁸ Health Protection Agency, 2012. Health Effects of Climate Change in the UK 2012.

²²⁹ Ibid.

²³⁰ Health Protection Agency, 2012. Health Effects of Climate Change in the UK 2012

of these changes include milder winters and warmer summers. Climate change adaptation strategies such as those to mitigate flooding and sea level rise may have more effect on vector-borne disease exposure than the direct effects of climate change.

- 8.4.197 Climate change can influence the incidence of certain water and food-borne diseases, which show seasonal variation. Climate change is also likely to affect the risk from water and food-borne disease through changes in human behaviour associated, for example, with food hygiene. Increased temperature will allow pathogens such as Salmonella to grow more readily in food. However, interventions to prevent this are likely to have more of an effect in reducing numbers of cases than climate change will have on increasing them. Climate change may also lead to reductions in the availability of certain food groups, which may lead to reductions in the nutritional quality of dietary intake in some population groups.
- 8.4.198 Based on a review of the existing literature, the link between climate change and health outcomes is judged **moderate**. A changing climate affects health through a number of pathways, both directly through an increased incidence of severe weather events and indirectly, such as through establishing vectors for vector-borne disease such as malaria. However, it is not clear from the literature whether the climate change impact of the London Resort would have a direct effect on the health of the receptor population in the study area.

Children and young people

- 8.4.199 Climate change will potentially affect the distribution and the fungal spore levels commonly observed in the environment and medical conditions, e.g. provoking or exacerbating asthma attacks in children, which result from exposure to fungal spores.²³¹ One in 11 children and 1 in 12 adults in the UK suffer from asthma.²³²
- 8.4.200 Age at exposure may be important when considering retinal damage due to the increased transmission of UV-A through the lens of eyes in children compared to adults.²³³ The extent to which UVR (UV-A or UV-B) exposure is an important risk factor for cataracts in the general population that does not receive chronic exposure to high levels of UVR is unclear, as is its relation to eye melanoma, however. At the same time, Vitamin D is produced as a result of exposure of the skin to UVR (mainly UV-B) and through dietary intake. Vitamin D is important for bone health: deficiency results in rickets in children and osteomalacia in children and adults.
- 8.4.201 Climate change increases the risk of flooding; mortality risk is highest for flash floods. Fast moving shallow water is very dangerous, especially for children.²³⁴

Older people

²³¹ Atkinson, R.W., 2006. Temporal associations between daily counts of fungal spores and asthma exacerbations

²³² COMEAP, 2010. Does outdoor air pollution cause asthma? Committee on the Medical Effects of Air Pollutants

²³³ Health Protection Agency, 2012. Health Effects of Climate Change in the UK 2012

²³⁴ Health Protection Agency, 2012. Health Effects of Climate Change in the UK 2012

8.4.202 The Health Protection Agency writes that the elderly are more vulnerable to extreme heat and cold than younger people, and therefore future health burdens are likely to be amplified by an ageing population.²³⁵ Physiological changes in renal function which develop with increasing age could be related to the excess mortality observed in older age population groups during extremely hot weather periods. Older people have a lower threshold for the development of renal failure, and diminished renal conservation of sodium and water during periods of dehydration.

Disability and long-term illness

8.4.203 It is thought that changes in seasonality, temperature and weather patterns in the UK, related to climate change may have an effect on human exposure to pollen grains, as well as affecting the potency of aeroallergens. Existing allergy sufferers may suffer from longer pollen seasons and more rapid symptom development. There is also likely to be a longer-term indirect effect on the UK population through changes in plant and fungal distributions.

8.4.204 Studies have identified that, in high-income settings, people with pre-existing respiratory and cardiovascular problems may be particularly vulnerable to temperature-related mortality and morbidity.^{236,237,238} Additionally, heat risk may be heightened in those with renal disease, diabetes, and neurological disorders.²³⁹ In general, illnesses that compromise thermoregulation, mobility, awareness, and behaviour (including dementia and Parkinson's disease) increase the risk of heat related death.²⁴⁰ People with depression, cardiovascular and cerebrovascular conditions, renal disease and diabetes all need to take extra precaution in hot weather, and therefore may be effected to a greater extent by extreme weather occurrences.²⁴¹

8.4.205 Medications, including psychotropic medication, that interfere with thermoregulation or suppress thirst may predispose patients to heat related illness and death.^{242,243} Furthermore, medication efficacy can be compromised if manufactured drugs (generally licensed for storage at temperatures up to 25°C) are exposed to high temperatures during storage or transit in hot weather.²⁴⁴

²³⁵ Health Protection Agency, 2012. Health Effects of Climate Change in the UK 2012

²³⁶ Basu, R., Samet, J.M., 2002. Relation between elevated ambient temperature and mortality: A review of the epidemiologic evidence

²³⁷ Vandentorren, S., et al., 2006. August 2003 heat wave in France: risk factors for death of elderly people living at home

²³⁸ Wilkinson, P., et al. 2004. Vulnerability to winter mortality in elderly people in Britain: population based study

²³⁹ Hajat, S., et al. 2010. Health effects of hot weather: from awareness of risk factors to effective health protection

²⁴⁰ Kovats, R.S., Hajat, S., 2008. Heat stress and public health: A critical review

²⁴¹ Hajat, S., et al., 2010. Health effects of hot weather: from awareness of risk factors to effective health protection

²⁴² Hess, J.J. et al., 2009. Climate Change and Emergency Medicine: Impacts and Opportunities

²⁴³ Stoellberger, C., et al., 2009. Heat-related side-effects of neurological and nonneurological medication may increase heatwave fatalities

²⁴⁴ Crichton, B., 2004. Keep in a cool place: exposure of medicines to high temperatures in general practice during a British heatwave.

OPERATIONAL PHASE EFFECTS AT THE LONDON RESORT

Potential health effects associated with changes in noise and vibration

8.4.206 As outlined within the discussion of the **potential health effect of construction resulting in changes in noise and vibration**, (from paragraph 8.4.92) a strong body of evidence was found linking increases in noise exposure to adverse health outcomes. As a result of the operation of the London Resort, there is potential for increases to the noise levels in and around the site.

Effects on the general population

8.4.207 As outlined previously, an increase in noise levels can lead to various negative human health outcomes, such as cardiovascular effects, increased stress, and changes in social behaviour. Refer to **potential health effect of construction resulting in changes in noise and vibration** starting paragraph 8.4.92 for the health effects on the general population of increased exposure to noise, such as sleep disturbance, psychophysiological effects, and annoyance.

8.4.208 During the operational phase, increases in the noise levels would be expected due to increases in activity in the area. Increases in noise and vibration may arise from rides (e.g. rail noise interactions, hydraulics, screams from people on the rides), operation of the mechanical services plant, and background/theme music played around the site.²⁴⁵ These noises would be created in the operational phase and hence be long-term/permanent in nature. Long-term exposure to these noises over time, if significant, may lead to the adverse health outcomes outlined previously.

8.4.209 A study into the impact of increased noise levels on amusement ride operators in the US found that 18% of rides that were measured had projected noise levels greater than recommendations.²⁴⁶ This led on the evidence that these operators would be at risk for noise induced hearing loss and would eventually require a hearing conservation programme. Hazardous noise generated by the audio and music systems present in amusement parks has been identified to be a health and safety problem, which can lead to permanent or irreversible hearing loss or damage, e.g. tinnitus.²⁴⁷

8.4.210 Noise increases from rides and amusements in theme parks is an issue that needs addressing due to the high concentration of sounds in small areas, creating complex conditions for exposure to noise.²⁴⁸ Considerations would have to be in place to ensure that workers are not exposed to prolonged and elevated levels of noise generated by amusements, to avoid these adverse health effects.

²⁴⁵ Mackenzie et al., 2016. Noise and vibration design aspects for an indoor theme park.

²⁴⁶ Gilbertson et al., 2017. Noise levels of amusement ride operators.

²⁴⁷ Government of New South Wales, (no date). Controlling hazardous noise in the amusement device industry – fact sheet.

²⁴⁸ Ibid

8.4.211 Based on the literature, the relationship between changes in the levels of noise and vibration during the operation of the London Resort and health outcomes is judged to be **strong**. The evidence is clear that prolonged exposure to increased levels of noise can adversely affect health, with those living in quiet locations judged to have a better quality of life. Negative health outcomes that can arise as a result of increased noise exposure include sleep disturbance and psychological stress, with particular adverse effects on children, older people, and disabled people.

Effects on vulnerable groups

8.4.212 The vulnerable groups affected by this effect are unchanged from the description of the effect during the construction phase. These are children and young people, older people, and individuals with a long-term health condition or disability.

Potential health effects associated with changes in air quality

8.4.213 As outlined within the discussion of the **potential health effect of construction resulting in changes in air quality**, (from paragraph 8.4.104) a robust body of evidence was given linking air pollution and changes in air quality to adverse human health outcomes. As a result of the operation of the London Resort, there may be additional changes in the air quality of the area surrounding the site.

Effects on the general population

8.4.214 As mentioned previously, detrimental changes in air quality and increases in air pollution (caused by PM and NO₂) can lead to negative human health outcomes, such as lung cancer, coronary heart disease, and disturbances in cognitive development. Refer to **potential health effect of construction resulting in changes in air quality** starting paragraph 8.4.104 for the health effects on the general population of increased air pollution, such as coronary heart disease and stroke.

8.4.215 During the operation of the London Resort, further changes to the air quality may create adverse human health outcomes. Air pollution could potentially be generated in theme parks by the energy usage needed for the scale of such a development, including to run all the rides, illuminate the entire park, and heat all buildings and areas of the park.²⁴⁹ The pollutants created from these activities contribute to the adverse health outcomes experienced by both the general population and particular groups in society.

8.4.216 Based on the reviewed literature, the relationship between changes in air quality during the operation of the London Resort and human health outcomes is judged to be **strong**. The evidence is clear that pollutants (such as PM and NO₂) created from air quality changes have negative health impacts on individuals, such as coronary heart disease, lung cancer, and annoyance.

Effects on vulnerable groups

²⁴⁹ Bizfluent, 2017. What environmental problems come with making a theme park?

8.4.217 The vulnerable groups affected by this effect are unchanged from the description of the effect during the construction phase. These are children and young people, pregnant women, older people, and individuals with a long-term health condition or disability.

Potential health effects from a change in local traffic and active travel

8.4.218 In the operational phase of the London Resort, there may be effects on human health resulting from increases in local traffic and changes to active travel options, including new pathways through the development, a new road built to serve the development, and a general increased accessibility of the area. The Transport chapter will identify how the changes in traffic could impact upon traffic accidents and increases in delay, resulting in changes in stress for drivers.

Effects on the general population

8.4.219 As discussed previously, good transport enables better access to employment, whilst beneficial active travel modes can lead individuals to more positive health outcomes. Refer to **potential health effect of changes to local traffic and transport and changes in the use of active travel modes** (from paragraph 8.4.78) for some of the benefits of good transport and active travel modes, which include better access to employment and physical health benefits.

8.4.220 Better transport routes brought about by the London Resort (e.g. the addition of new roads) during the operational phase could create access to employment opportunities and community facilities for people.²⁵⁰ For example, residents in the area may find it easier to travel to the site of the London Resort, leading to employment opportunities and the associated positive health outcomes with employment. Better transport may also lead to improved access to social and economic facilities, leading to the positive health outcomes such as happiness and self-confidence.

8.4.221 New active travel modes around the site (e.g. new pedestrian paths or cycle paths) could encourage more cycling or walking. There is a strong body of evidence linking positive health outcomes to cycling, such as improved cardiovascular function, increased mental wellbeing and a reduction of stress, and more physical activity along with reduced obesity.²⁵¹ New pedestrian paths, improving the amenity offering of the area, may encourage more walking to, around, and from the site.

8.4.222 Based on a review of the existing literature, the link between improvements in local traffic, transport, and active travel modes is judged to be **strong**. This is reasonable evidence linking better transport access to better health outcomes, such as access to employment opportunities (and associated health benefits) and increased happiness, but the evidence is particularly strong regarding the link between an increase in active

²⁵⁰ UNDP, 2010. Benefits of improved road access

²⁵¹ Oja et al., 2011. Health benefits of cycling: a systematic review

travel methods and human health outcomes, such as increased physical activity.

Effects on vulnerable groups

8.4.223 The vulnerable groups affected by this effect are unchanged from the description of the effect during the construction phase. These are pregnant women, older people, individuals with a long-term health condition or disability, and single-parent families.

Potential health effects associated with changes in electromagnetic field exposure

8.4.224 The scale of the London Resort introduces considerations for the changes in exposure to electromagnetic fields. The London Resort may result in changes in electrical currents in the area, as well as exposure of the general population to large amounts of industrial equipment. Increased exposure to electromagnetic fields can affect certain groups more than others.

Effects on the general population

8.4.225 Electromagnetic field exposure (EMF exposure) refers to an increased exposure to low-frequency electricity fields that are generated by many things individuals interact with in everyday life, e.g. mobile phones, home appliances, and industrial equipment. Low-frequency electric fields have a small influence on the human body. Exposure at higher frequencies and power levels that go beyond ICNIRP guidelines²⁵² can cause the stimulation of nerves and muscles in the body, or alter other biological processes.²⁵³

8.4.226 The main effect from increased exposure to electromagnetic fields (EMF) is a feeling of warmth on the affected area, comparable to that of infrared and ultraviolet radiation from the sun. EMF sources for communication infrastructure are non-ionizing and therefore do not carry the same risk as exposure to x-ray and ultraviolet sources.²⁵⁴

8.4.227 There are a substantial number of primary sources that consider the effects of exposure of EMF sources and there remains no proven causal effect link to ill health from exposure that is within the ICNIRP guidelines. The World Health Organisation (WHO) investigates agents that might potentially cause cancer and classifies them into five different groups. But the WHO itself stresses that its research is only about the question whether or not a certain substance causes cancer, but not to what extent. Currently EMF exposure is set within Group 2B, possibly carcinogenic to humans. It should be noted that this is a lower classification than that of smoking, red meat acrylamide and open chimneys.²⁵⁵

8.4.228 Based on a review of the existing literature, the link between EMF and adverse human health outcomes is judged to be **weak**. A large body of literature exists on the health outcomes associated with exposure to EMF and has been researched for many years, such as headaches, anxiety, nausea and more serious conditions like cancers. The

²⁵² ICNIRP, (2020). Guidelines for limiting exposure to electromagnetic fields (100 khz to 300 ghz) 2020.

²⁵³ World Health Organisation, (no date). Electromagnetic fields.

²⁵⁴ Ibid.

²⁵⁵ IARC, (no date). Monographs on the identification of carcinogenic hazards to humans.

evidence is weak in proving a causal link and conclusions are often inconclusive with follow up studies unable to produce similar results. For communications infrastructure that will be placed at London Resort shall be in line with ICNIRP guidelines and will cause no known health risks from typical EMF exposure.

Children and young people

8.4.229 There has been EMF research to determine if there is a link to childhood leukaemia.²⁵⁶ Evidence proving the link is weak. Other studies have looked into the link between electrical appliance use and various childhood cancers,²⁵⁷ but these studies have not proved any consistent patterns.

Disability and long-term illness

8.4.230 Increased infrastructure that will increase exposure to EMF, this may be harmful for those with mental health issues brought on by the perception that EMF can affect things such as sleep and mood.^{258,259} Those with existing mental health issues may therefore perceive that they will be affected by a large increase in exposure from the London Resort, leading to further adverse health effects to their mental health.

Potential health effect of increased flooding during operation

8.4.231 The operation of the London Resort has the potential to contribute to risks of flooding through changes in land use affecting the river and groundwater environment, which can in turn lead to multiple adverse human health effects on affected groups.

Effects on the general population

8.4.232 Due to the scale of the London Resort, there is potential to be an increased risk of the occurrence of flooding in areas surrounding the site. The prevalence of flooding has the potential to affect both people's physical and mental health through increased stress levels (which persist even after the flooding has receded), disease, and increased risk of drowning or injury.²⁶⁰ In extreme cases, carbon monoxide poisoning can occur throughout the process of flood clear-ups, leading to death.

8.4.233 In areas facing flooding, individuals have been found to experience higher levels of mental health disorders such as post-traumatic stress disorder (PTSD), depression, and anxiety disorders.²⁶¹ Furthermore, drinking water supplies from both surface water and

²⁵⁶ Gye, M. and Park, C., 2012. Effect of electromagnetic field exposure on the reproductive system

²⁵⁷ Feychting et al., 2005. EMF and health

²⁵⁸ Heathline, 2018. Should you be worried about EMF exposure?

²⁵⁹ Stacy Elititi Denise Wallace Riccardo Russo Elaine Fox 2018 Symptom Presentation in Idiopathic Environmental Intolerance With Attribution to Electromagnetic Fields: Evidence for a Nocebo Effect Based on Data Re-Analyzed From Two Previous Provocation Studies

²⁶⁰ UK Public Health Register, 2016. Health impacts of flooding

²⁶¹ Fernandez et al. 2015. Flooding and mental health: a systematic mapping review

ground water sources are at risk of being contaminated as a result of flooding events.²⁶²

8.4.234 Based on the reviewed literature, the causal relationship between the increased risk of flooding and health is judged to be **moderate**. There only exists limited evidence surrounding the health adversities of flooding, but evidence that does exist is particularly strong with regard to adverse mental health outcomes, such as individuals from areas of flooding being found to experience higher levels of PTSD, depression and anxiety disorders.

Older people

8.4.235 Older people are disproportionately affected by the occurrence of flooding due to decreased levels of mobility, particularly those with dementia or those who are seriously unwell who would find it hard to navigate and understand the seriousness of flooding should it occur.²⁶³ Additionally, there are indications that older people suffer PTSD after flooding at a greater prevalence than adults of working age.²⁶⁴

Disability and long-term illness

8.4.236 Due to the mental health problems posed by an increase in the risk of flooding, those with existing mental health problems would therefore be at greater risk of deterioration should flooding occur. Poor mental health status or existing physical health problems in disabled people before the flood is also associated with reduced post-flood mental health.²⁶⁵

8.4.237 Those with poorer self-rated levels of mental health who suffer financial losses as a consequence of flooding are at greater risk of adverse health outcomes due to a higher level of disruption to daily routines.²⁶⁶

Potential health effects associated with the creation and disposal of hazardous waste

8.4.238 Waste disposal would be an important aspect of the operation of the London Resort. Certain storage methods could allow chemicals and other substances to leak into the environment, contaminating land and the water supply. This has the potential to affect human health.

Effects on the general population

8.4.239 As discussed under the construction phase effect, **potential health effect of construction resulting in hazardous waste** (from paragraph 8.4.116), the large amounts of treated waste materials and the complex biological and physicochemical processes make the

²⁶² Andrade et al. 2018. Surface water flooding, groundwater contamination, and enteric disease in developed countries

²⁶³ Age UK, 2019. Floods and safeguarding older people during crises

²⁶⁴ Stanke et al. 2012. The effects of flooding on mental health

²⁶⁵ Fernandez et al. 2015. Flooding and mental health: a systematic mapping review

²⁶⁶ Ibid

areas in the proximity of landfills vulnerable not only to emissions of potential toxic compounds but also to nuisance such as odour pollution.

8.4.240 The link between the storage and disposal of hazardous waste and health outcomes is judged **moderate**. Links between individual landfill and waste disposal sites and adverse health outcomes are strong, but no definite conclusion about landfill sites in general and human health can be drawn from the literature.

Effects on vulnerable groups

8.4.241 The vulnerable groups affected by this effect are unchanged from the description of the effect during the construction phase. These are children and young people, older people, and individuals with a long-term health condition or disability.

Potential health effect related to water contamination

8.4.242 The possibility exists that the operation of the London Resort would affect groundwater sources and the local water supply and create a range of health effects for nearby communities.

Effects on the general population

8.4.243 As discussed under the review of literature within the effect during the construction phase, the link between water contamination and health outcomes is judged **moderate**. Links between water contamination and adverse health outcomes are strong, but research aimed at establishing a connection between the operational activities of leisure facilities such as a theme park and water contamination is limited. Refer to the evidence base outlined from paragraph 8.4.125 for further information.

Effects on vulnerable groups

8.4.244 The vulnerable groups affected by this effect are unchanged from the description of the effect during the construction phase. These are children and young people, older people, individuals with a long-term health condition or disability, and low-income households.

Potential health effects related to changes to levels of neighbourhood amenity

8.4.245 Neighbourhood amenity refers to the overall quality of the physical environment, both private and public. As a large development spanning the Swanscombe Peninsula the London Resort would alter the visual and physical environment in the area, with potential impacts on neighbourhood amenity. Impacts on neighbourhood amenity are assessed as a combination of effects upon transport and travel, noise and vibration, air quality, visual amenity and light, and open spaces. Although these effects are assessed separately, the effect on neighbourhood amenity resulting from changes in these conditions may not be determined when considering these effects individually and therefore literature here deals within these effects in-combination.

Effects on the general population

8.4.246 As discussed under **potential health effects of construction related to changes to levels of neighbourhood amenity** (paragraph 8.4.142) the evidence linking changes to neighbourhood amenity to health is considered to be **moderate**. There is evidence for links between the quality of physical spaces and health and wellbeing. There is also evidence for links between some components of neighbourhood amenity and human health individually, although the strength of this evidence varies with the component. Refer to the evidence base outlined from paragraph 8.4.136 for further information.

Effects on vulnerable groups

8.4.247 The vulnerable groups affected by this effect are unchanged from the description of the effect during the construction phase. These are children and young people, pregnant women, older people, individuals with a long-term health condition or disability, and low-income households.

Potential health effects associated with inclusive design, site access and facilities

8.4.248 The way in which the London Resort is designed, including how the site is accessed and specific facilities it contains, may influence health outcomes of particular groups. There are many design factors that must be considered in order to effectively minimise the burden of adverse health outcomes on visitors to the theme park, as well as workers and residents on-site.

Effects on the general population

8.4.249 Our physical and social environment contributes over 50% to the state of our health.²⁶⁷ The evidence is strong surrounding the influence that the physical environment has on our health, with one factor being the 'built environment' with which we surround ourselves, e.g. land use mix, the connectivity, and transportation systems.²⁶⁸ The way in which things are designed may exclude some groups in society if not designed properly, leading to the adverse health effects associated with social isolation. Refer to **potential health effect of displacement or change in access affecting public services and community facilities** (from paragraph 8.4.9) for the negative health effects associated with social isolation.

8.4.250 For good health outcomes, people require well-designed public locations that are insulated, dry and warm, as well as being sufficiently spacious.²⁶⁹ Several considerations of the design of buildings can negatively influence physical and mental health, such as the air quality in buildings, lighting, noise, and housing design.²⁷⁰ Due to the scale of the development, there are many locations and aspects which could present a risk of injury

²⁶⁷ Facilities Net, 2019. How the physical environment affects health and wellness.

²⁶⁸ Woolf, H. and Aron, L., 2013. U.S. Health in International Perspective: Shorter Lives, Poorer Health.

²⁶⁹ Glasgow Centre for Population Health, 2013. The built environment and health: an evidence review.

²⁷⁰ Macdonald, C., and Thompson, H., 2003. Housing improvement and health.

to guests and workers on-site, and so suitably situated first-aid points can help reduce the impacts of injuries when they occur.²⁷¹

- 8.4.251 The London Resort should also have suitable emergency procedures/exits on rides or attractions in place should accidents occur or operation of the rides go wrong, ensuring that visitors have the best possible health outcomes in the event of emergencies/breakdowns.²⁷² The scale of some amusements may mean that guests get lost if they were to breakdown half way through. Similarly, there should be evacuation/fire exit routes situated around the Resort in the event of emergencies, e.g. fire, terrorist attacks. Emergency routes should also come hand in hand with the addition of speaker systems, which allow safety messages to be relayed around the site and to all guests with ease. Signage is also an important consideration in ensuring navigation around the site is easier.
- 8.4.252 Given the size of the Resort, travel distances to and through the Resort will be long. Designated rest points are therefore important considerations in amusement parks as they allow visitors to get away from the loud noises and big crowds to take some time out and recover. This is particularly applicable to older and disabled people but would also benefit parents of small children.
- 8.4.253 Based on a review of the existing literature, the link between inclusive design features, site access, and facilities on-site and health outcomes is judged as **moderate**. Links between general design and accessibility of the site and health are considered to be moderate, but strong evidence exists in the human health impacts on particular groups of lack of accessibility and design considerations, such as those with sensory impairments. For all groups, first-aid points, suitable fire routes and evacuation procedures, and a communication system are important for good inclusive design.

Children and young people

- 8.4.254 Considerations for young children are important in ensuring accessibility and safety on-site. For rides such as largescale rollercoasters, park rules and restrictions must be in place to protect the safety of children and ensure they don't get injured.²⁷³ Design considerations for amusements around the park are important for children, such as height requirements and suitable safety equipment (e.g. restraints and seatbelts), as poor design may lead to serious injury, and in extreme cases, death.²⁷⁴
- 8.4.255 The chances of overcrowding are very strong in a theme park, and so considerations that account for access to families with small children would lead to positive health outcomes. Children are at particular risk of overcrowding and being within a large crowd due to the potential for being separated from their family or in case they lose their direction.²⁷⁵ Due to being underdeveloped, children are also at risk of being crushed within a large crowd.

²⁷¹ RPA, 2005. Assessment of best practices in fairgrounds and amusement parks in relation to safety of consumers

²⁷² Ibid

²⁷³ Firstcry Parenting, 2018. 10 tips to keep your kids safe at the amusement park

²⁷⁴ Time, 2017. A growing list of accidents is putting safety at amusement parks under the spotlight

²⁷⁵ HSE, 1996. Managing crowds safely

Considerations must be made for wide enough paths and access around the site in order to mitigate the adverse overcrowding effects associated with some groups, such as children.

- 8.4.256 Changing tables for parents of babies and small children is also important in ensuring that families can enjoy their visit to London Resort. These should be suitably located and easily findable on a map of the amusement park in order to reduce stress-related health outcomes for babies and small children, as well as the parents.
- 8.4.257 Children and younger people who may have limited employment history may be priced out of entering the London Resort, causing social isolation. This problem may be remedied by a tiered pricing system which offers a reduced entrance price to children and students, improving access.

Pregnant women

- 8.4.258 Pregnant women are people with special needs and different motion capabilities. Pregnant women, the elderly and disabled people were considered to be among those most in need of special services in a Taiwanese opinion poll.²⁷⁶
- 8.4.259 As pregnancy progresses a significant linear trend for increase in step width and a significant linear trend for decrease in stride length can be observed.²⁷⁷ Concurrently there is a significant linear trend for decrease in the range of motion of the pelvic segment and thoracolumbar spine about a vertical axis (side to side rotation), and the pelvic segment range of motion around an antero-posterior axis (side tilt). The different motion capabilities and types of pregnant women could render areas with non-inclusive or poor design inaccessible, and therefore the inclusion of design measures to account for individuals without full range of motion have the potential to create disproportionate health benefits for this group.

Older people

- 8.4.260 Good accessibility to and around the site is important for older people to reduce the adverse health effects that are associated with travelling, such as stress or the potential for physical accidents. A lack of step-free access around the site, for example, can lead to negative customer experiences, which may lead to physical health concerns or stress and anxiety. Thus, those who are older and have mobility issues are at increased risk of injury.²⁷⁸
- 8.4.261 The rest points previously mentioned would be particularly applicable to older people who may require more rest than the general population. Furthermore, older people may be disproportionately affected by entrance prices for the London Resort, pricing them

²⁷⁶ Wu, K., 2017. A case for inclusive design: Analyzing the needs of those who frequent Taiwan's urban parks.

²⁷⁷ Gilieard, W., 2013. Trunk motion and gait characteristics of pregnant women when walking: report of a longitudinal study with a control group.

²⁷⁸ Waterson et al., 2015. Probing deeper into the risks of slips, trips and falls for an ageing rail passenger population: applying a systems approach.

out and causing social isolation. This may be remedied by a tiered pricing system which accounts for seniors and offers a reduced price as a result.

Disability and long-term illness

- 8.4.262 Good accessibility for a leisure destination such as a theme park is an important issue for disabled people, as they may encounter additional challenges in the normal process of booking tickets for and accessing the park.²⁷⁹ One such issue is allowing those with disabilities to access the site comfortably, including the use of blue badge parking spaces and quiet areas/entrances which won't cause disabled people to feel overwhelmed.²⁸⁰ Accessing such a large scale theme park with lots of other people may serve to be overwhelming for those living with disabilities, so important consideration must be taken to prevent additional stress. Another issue is designing the park in such a way that those in wheelchairs can access a variety of attractions and amusements, increasing inclusivity. The resting points situated around the Resort would also be useful for those with disabilities in helping them move away from the loudness of the attractions and find a quiet retreat.
- 8.4.263 Another issue for those with disabilities is suitably located accessible disabled toilets, as well as Changing Places facilities. Maps used at theme parks should also note the locations of rest points, disabled toilets, and changing places facilities so that those with disabilities can readily access them.²⁸¹
- 8.4.264 Another barrier to entry which may cause social isolation in particular for disabled people is entrance prices.²⁸² Pricing suitably for those with disabilities (and of course their carers, family members, and/or personal assistants) would improve the accessibility of the park for this group, reducing the potential for social isolation. This may involve separate prices for disabled people within a tiered price system. Other theme park specific considerations include ride access and navigation around the park. Important considerations must be taken in accessing specific rides, such as dedicated disabled and accessible (for those with wheelchairs) entrances, in order to make the experience easier and less overwhelming for those with disabilities.
- 8.4.265 Bluetooth Low Energy Beacon Systems (BLEBs) could be used for blind or partially sighted people, helping them to gain confidence when navigating unfamiliar areas.²⁸³ These work by emitting a medium range, medium intensity Bluetooth signal that can be detected by a smartphone app, helping disabled people to navigate the park, leading to better health outcomes. QR codes may also be used with mobile phones in helping direct disabled people around the London Resort. These help individuals access information both quickly and easily.²⁸⁴

²⁷⁹ Woodcock, K., 2018. Disability and participation in amusement attractions.

²⁸⁰ Enable Magazine, 2018. Access the thrill: theme park tips for disabled people.

²⁸¹ Ibid.

²⁸² Ibid.

²⁸³ Tech Crunch, 2014. Can iBeacons be used to help the visually impaired navigate public transport?

²⁸⁴ Disabled World, 2016. QR Codes: uses and accessibility for persons with disabilities.

- 8.4.266 Individuals with sensory disorders may not be able to partake in all of the events that the theme park has to offer, causing social isolation. Those hard of hearing may not be able to get the full experience with certain attractions and may be excluded. Also, those with an aversion or sensitivity to sounds (e.g. someone who might have hyperacusis) might find it painful or uncomfortable to tolerate certain pitches of sounds²⁸⁵, which may influence their overall experience. Therefore, it should be a consideration to have a selection and wide choice of amusements accessible to all groups in order to improve accessibility and inclusivity for disabled people. A small selection of attractions that won't cause any sensory overloads allows those with disabilities to feel more included.
- 8.4.267 Another solution to help towards accessibility for those with disabilities is information points for deaf and disabled people in order to fully enjoy the attractions.²⁸⁶ Readily available information is important in guiding those with disabilities around the Resort, ensuring they receive the best possible experience. Just as important as on-site information is information offered to disabled people before they travel to the London Resort, including elements of the park they should be aware of and specific considerations which would improve their overall experience.
- 8.4.268 In addition to this, those hard of hearing will require a suitable communication system as speaker systems in use around the London Resort may not be effective. In this instance, audio-visual aids and sign-language support should be readily available around the park in order to provide assistance to this group and lessen the potential for the occurrence of adverse health outcomes as much as possible.^{287,288}

Potential health effects relating to changes in access to work and skills

- 8.4.269 Through operation of the London Resort, employment and skills opportunities will be created. As a key determinant of health outcomes, changes in employment and skills opportunities will result in health benefits for individuals with the potential to access them.

Effects on the general population

- 8.4.270 As highlighted within the discussion of the **potential health effect of work and training opportunities created** (from paragraph 8.4.170) during the construction phase, a large body of evidence links improved access to employment and upskilling opportunities to positive health outcomes. This includes better physical health outcomes (such as more money available to provide better services for individuals and healthcare) and better mental health outcomes (such as increased sense of purpose and confidence). The link between changes in access to work and skills and human health effects is therefore judged to be **strong**. Refer to the discussion of this evidence base starting paragraph

²⁸⁵ Tinnitus.org, 2019. Hyperacusis.

²⁸⁶ Arts Professional, 2016. How to... make a festival disability-friendly.

²⁸⁷ LA Times, 1997. Disney agrees to better meet needs of deaf.

²⁸⁸ Walt Disney World Resort, no data. Services for Guests with Hearing Disabilities [accessible at: <https://www.disneyworld.co.uk/guest-services/hearing-disabilities-services/>; accessed on 08.12.2020]

8.4.169 for further information.

Effects on vulnerable groups

8.4.271 The vulnerable groups affected by this effect are unchanged from the description of the effect during the construction phase. These are children and young people, pregnant women, low-income groups, ethnic minority groups, single-parent families and gypsy and traveller populations.

Potential health effects of provision of worker accommodation

8.4.272 The operation of the London Resort will require a large workforce. A provision of accommodation on-site will be provided for approximately 2,000 workers. The provision of quality accommodation for resident workers on-site will not only mitigate some of the impacts on the demand for residential accommodation in the area local to the Project Site, but will have a number of direct physical and mental health benefits for the workers resident at the accommodation.

Effects on the general population

8.4.273 There has been a range of evidence presented for the effects of housing quality and design on health. A systematic review of housing interventions concluded that high quality, well designed housing and improvements to the quality and design of housing can lead to health benefits.²⁸⁹

8.4.274 The WHO has found that “poor housing and indoor environments cause or contribute to many preventable diseases and injuries, such as respiratory, nervous system and cardiovascular diseases and cancer”.²⁹⁰ Because of the large amount of time individuals spend in the home environment – approximately 70% according to a review by the WHO²⁹¹ – health risks associated with poor quality housing are important determinants of health outcomes. This number is even higher when considering vulnerable groups such as the elderly, small children or the disabled.

8.4.275 There are also issues with quality of housing in the private rented sector (PRS).²⁹² The PRS has high levels of poor housing conditions, with 25% of homes not meeting the Decent Homes Standard, and 14% containing at least one category one hazard.²⁹³ The provision of accommodation on-site would ensure that workers are not subject to the negative health outcomes associated with poor quality housing, potentially resulting in health benefits for resident workers.

8.4.276 Based on a review of the existing literature, the link between the quality of worker

²⁸⁹ Thomson, H., Thomas, S., and Sellstrom, E., 2009. The health impacts of housing improvement: a systematic review of intervention studies from 1887 to 2007 *Journal of Public Health* 99 pp. 681–692.

²⁹⁰ World Health Organization, 2017. Housing and health.

²⁹¹ World Health Organisation, 2018. Housing and health guidelines.

²⁹² Public Health England, 2015. Bringing together housing and public health.

²⁹³ MHCLG, 2019. The English Private Landlord Survey 2018.

accommodation and health outcomes is judged **strong**. People spend on average over 70% of their time in the home environment, and poor quality or overcrowded housing can expose residents to cold, damp, accidents, inadequate sunlight, and insecurity.

Older people

8.4.277 Because they spend longer in the home environment, older people are more vulnerable to the effects of poor housing conditions. The cold and accidents are major risks for older people, and unsafe homes exacerbate these risks. Having sufficient daylight has been found to decrease anxiety and insomnia for older people.²⁹⁴

8.4.278 Involuntary residential relocation can have a negative impact on wellbeing, a risk to which the elderly are particularly exposed.^{295,296}

Disability and long-term illness

8.4.279 People with long-term illness and disabilities spend a larger share of their life at home and are thus more vulnerable to the effects of poor housing conditions. At the same time there is a high level of unmet housing need amongst disabled people, in relation to both adaptations and more appropriate housing.²⁹⁷

Low income groups and the unemployed

8.4.280 There is evidence that tenure can affect health: a study has found that people in social housing experience higher levels of depression than owner-occupiers, an effect linked to environmental quality in the local area – social housing areas typically suffer from lower quality environments.²⁹⁸

8.4.281 Secure housing provides stability both financially and socially. Secure home ownership has the potential to improve feelings of security, and thereby health.²⁹⁹ In areas without affordable housing options, low income groups and the unemployed have to spend more on housing costs, straining their finances and reducing their ability to finance their other health needs.³⁰⁰

Potential health effects of change in the demand for residential accommodation

8.4.282 The operation of the London Resort will induce demand in local residential

²⁹⁴ Karami, Z. et al. 2013. Effect of daylight in subjective general health factors in elderly

²⁹⁵ Saito, T., Lee, H. and Kai, I., 2007. Health and motivation of elderly relocating to a suburban area in Japan, Archives of Gerontology and Geriatrics

²⁹⁶ Wu, Y., Prina, A., Barnes, L., Matthews, F. and Brayne, C., 2015. Relocation at older age: results from the cognitive function and aging study, Journal of Public Health

²⁹⁷ Nocon, A., Pleace, N., 2002. The housing needs of disabled people

²⁹⁸ Ellaway, A., Macdonald, L. and Kearns, A., 2016. Are housing tenure and car access still associated with health? A cross-sectional study of UK adults over a 13 year period, British Medical Journal.

²⁹⁹ Thomson, H. and Petticrew, M., 2005. Is housing improvement a potential health improvement strategy, World Health Organisation Europe.

³⁰⁰ NHS London Healthy Urban Development Unit, 2019. Rapid Health Impact Assessment Tool: 3rd Edition.

accommodation from both the workers at and visitors to the Project Site. Although there are four hotels contained within the London Resort when operational, with capacity to serve a large number of overnight visitors, there will be a number of visitors choosing to stay off-site, inducing demand for accommodation options in the local area. The existing constraints of the housing stock imply that further demand has the potential to reduce affordability and increase overcrowding, thereby affecting health outcomes.

Effects on the general population

- 8.4.283 There is some limited evidence that a lack of affordability of housing has the potential to impact health outcomes. A lack of affordable housing affects families' ability to meet other essential expenses, with the potential to result in financial strain and affecting mental health. Where a lack of affordable housing results in financial strain, households face reduced physical health outcomes through having to reduce spending in other areas, making them less able to eat healthily and maintain healthy lifestyles.
- 8.4.284 Studies report housing affordability's impact on unspecified mental health issues³⁰¹ and on unspecified mental and physical health issues.³⁰²
- 8.4.285 Academic studies have highlighted the impact on both physical and mental health of renters from increases in the price of accommodation.³⁰³ The evidence base also highlights the important role played by housing foreclosure in determining health outcomes, with this effect exacerbated by constraints in the housing market and high house prices.^{304,305}
- 8.4.286 Unaffordable housing also risks causing social isolation, as households try to cut their spending, or ultimately decide to move out of their area and communities.³⁰⁶
- 8.4.287 Indirectly, high house prices can result in residents forced into poorer quality or overcrowded housing conditions. As discussed above under **potential health effects of provision of worker accommodation**, (from paragraph 8.4.273) there has been a range of evidence presented for the effects of housing quality and design on health. A systematic review of housing interventions³⁰⁷ concluded that high quality, well designed housing and improvements to the quality and design of housing can lead to health benefits. The pressure placed on the local supply of housing by workers and visitors to the London Resort has the potential to decrease the quality of housing and thereby affect

³⁰¹ Bentley, R., et al, 2011. Association Between Housing Affordability and Mental Health: A Longitudinal Analysis of a Nationally Representative Household Survey in Australia

³⁰² Yat-Nork-Chung, R., et al., 2020. Housing affordability effects on physical and mental health: household survey in a population with the world's greatest housing affordability stress

³⁰³ Atalay, K. et al., 2017. Effects of House Prices on health: New evidence from Australia.

³⁰⁴ Cannuscio C., 2020. Housing strain, mortgage foreclosure, and health. Nursing Outlook.

³⁰⁵ Pollack C., 2009. Health status of people undergoing foreclosure in the Philadelphia region.

³⁰⁶ Australian Family Relationship Clearinghouse, 2008. Housing stress and the mental health and wellbeing of families

³⁰⁷ Thomson, H., Thomas, S., Sellstrom, E., 2009. The health impacts of housing improvement: a systematic review of intervention studies from 1887 to 2007 Journal of Public Health 99 pp. 681–692.

associated mental and physical health outcomes.

- 8.4.288 Individuals spend a large amount of time in the home environment so health risks associated with poor quality housing are important determinants of health outcomes. Across the UK, 1 in 5 houses don't meet the Health Foundation standard for healthy homes.³⁰⁸ In general, poorer and less safe housing are experienced in the PRS than in other tenure types.³⁰⁹
- 8.4.289 Based on a review of the existing literature, the link between the constraints on housing availability and health outcomes is judged **moderate**. A lack of quality, affordable housing can force households to reside in overcrowded and unsatisfactory housing conditions, exposing them to physical illness as well as affecting mental health outcomes such as anxiety and wellbeing, but the evidence is often vague or speculative.

Children and young people

- 8.4.290 An Australian study that the stresses common to renters and recent purchasers associated with a lack of money and financial hardship could result in children missing out on school activities and on adequate healthcare.³¹⁰
- 8.4.291 Children are more generally sensitive to changes in accommodation conditions than the general population due to their stage of bodily development and a relatively larger time spent within households.³¹¹ Poor housing conditions can slow physical growth and delay cognitive development in children. They are also liable to cause respiratory problems, and mental health issues.³¹² Academic evidence has found that children in areas with higher rates of unaffordable housing tended to have worse health, more behavioural problems and lower school performance.³¹³

Older people

- 8.4.292 Any change in demand for housing displacing older people may also disproportionately affect them through severance of existing community ties. As explained within '**potential health effects arising from changes in access to community facilities**', (from paragraph 8.4.17) older people have stronger community ties than the general population, but find it harder to rebuild them if disrupted. Were an increase in house prices to result in older people not being able to continue to afford to live in an area in which they hold community ties, both their mental and physical health outcomes would be

³⁰⁸ The Health Foundation, 2017. Healthy Homes Infographic.

³⁰⁹ Public Health England, 2015. Bringing together housing and public health.

³¹⁰ Yates, J., Milligan, V., 2007. Housing affordability: a 21st century problem

³¹¹ Greater London Authority, 2005. 'Review of the London Health Strategy High Level Indicators', London Health Commission.

³¹² Harker L., 2006. Chance of a lifetime: The impact of housing on children's lives.

³¹³ Harkness and Newman, 2010. Housing affordability and children's well-being.

disproportionately affected.^{314,315}

8.4.293 As a result of spending relatively longer period of time in the home environment as they age, older people are more vulnerable to the effects of poor housing conditions.³¹⁶ Cold and accidents are major risks for older people, and unsafe homes exacerbate these risks. Having sufficient daylight has been found to decrease anxiety and insomnia for older people.³¹⁷

Disability and long-term illness

8.4.294 Individuals with a long-term illness or disability are widely regarded to find securing appropriate accommodation more difficult than the general population. As a result of financial constraints and specific design requirements for housing (such as wheelchair accessibility), reducing the affordability of housing available to this group has the potential to create significantly large impacts upon mental health.³¹⁸

8.4.295 People with long-term illness and disabilities spend a larger share of their life at home and are thus more vulnerable to the effects of poor housing conditions. In a similar manner to older people, individuals within this vulnerable group face relatively stronger community ties, and therefore would suffer disproportionate impacts should they be required to relocate to alternative accommodation.

Low income groups

8.4.296 Low-income groups are widely considered to be disproportionately affected by a lack of access to quality, affordable housing. The reduced financial resources of households within this group results in a reduced capacity to respond to changes in affordability, magnifying changes in health outcomes.

8.4.297 The evidence base finds a connection between a lack of housing affordability and reduced health outcomes for individuals within this vulnerable group. High housing-related costs has been shown to place a particular economic burden on low-income families, forcing trade-offs between housing and meeting other basic needs such as food and heating and thereby affecting health outcomes.³¹⁹ One study concludes that low-income people with difficulty paying rent, mortgage or utility bills were less likely to have a usual source of medical care, and are more likely to both postpone treatment and use A&E services when needed.³²⁰

³¹⁴ Saito, T., Lee, H. and Kai, I., 2007. Health and motivation of elderly relocating to a suburban area in Japan, Archives of Gerontology and Geriatrics

³¹⁵ Wu, Y., Prina, A., Barnes, L., Matthews, F. and Brayne, C., 2015. Relocation at older age: results from the cognitive function and aging study, Journal of Public Health

³¹⁶ Mulliner, E. et al. 2020. Older People's Preferences for Housing and Environment Characteristics

³¹⁷ Karami, Z. et al. 2013. Effect of daylight in subjective general health factors in elderly.

³¹⁸ Nocon, A., Pleace, N., 2002. The housing needs of disabled people.

³¹⁹ Pollack, C. et al., 2010. Housing Affordability and Health Among Homeowners and Renters.

³²⁰ Harkness and Newman, 2010. Housing affordability and children's well-being.

Potential health effects from a change in the demand for health services

8.4.298 The increase number of workers, residents and visitors to the London Resort once operational is likely to result in an increased demand for local health services, as considered within the equivalent effect during the construction phase. This demand has the potential to reduce access to local healthcare services for existing local residents, thereby affecting health outcomes.

Effects on the general population

8.4.299 The scale of the London Resort may lead to an increase in the demand for health services, which may reduce the access to health services for the general population. The demand for healthcare could be increased as a result of the magnitude of visitors to the site, the increased number of workers on-site, and those resident on-site. Reduced access to healthcare may have a disproportionate impact on some groups in particular, such as older people, those with disabilities and pre-existing medical conditions, and those from ethnic minority backgrounds (this group historically has poorer health outcomes and experiences systemic barriers to accessing healthcare services).³²¹

8.4.300 Good accessibility and availability are important determinants in primary healthcare systems, and adverse health outcomes are typically associated with longer wait times, leaving some patients to rely on urgent care.³²² It has been found that when wait times are too long, patients' adverse health outcomes may be exacerbated. In addition to decreased satisfaction from increased wait times³²³, longer wait times are 'significantly associated' with a deterioration in patient outcomes for those with wait times that span over a few months (effects are strongest when waiting times are longer than 3 months).³²⁴

8.4.301 In general, barriers to accessing health services in a timely manner have the potential to result in unmet health needs, delays in receiving appropriate care (in which time the condition may deteriorate), financial burdens (which may lead to further adverse health outcomes), and the inability to get suitable preventive services.³²⁵

8.4.302 Based on a review of the existing literature, the link between human health outcomes and the accessibility of healthcare services is judged to be **moderate**. Reduced access may lead to the exacerbation of health outcomes, unmet health needs, and financial burdens. Those groups with pre-existing reduced access to healthcare would be the worst affected from an increase in demand for health care services.

Effects on vulnerable groups

³²¹ Szczepura, A., 2005. Access to health care for ethnic minority populations

³²² Ansell et al., 2017. Interventions to reduce wait times for primary care appointments: a systematic review.

³²³ Alrasheedi et al., 2019. The association between wait times and patient satisfaction: findings from primary health centres in the Kingdom of Saudi Arabia.

³²⁴ Reichert, A. and Jacobs, R., 2018. The impact of waiting time on patient outcomes: evidence from early intervention in psychosis services in England.

³²⁵ Healthy People, 2020. Access to health services.

8.4.303 The vulnerable groups affected by this effect are unchanged from the description of the effect during the construction phase. These are older people, individuals with a long-term health condition or disability, ethnic minority groups, and gypsy and traveller populations.

Potential health effects from a change in the demand for public services and community facilities

8.4.304 As a result of the increased number of residents, visitors, and workers in the area, demand for public services and various community facilities is likely to increase during the operation of the London Resort.

Effects on the general population

8.4.305 As discussed within the context of the **potential health effects of displacement or change in access affecting public services and community facilities**, (from paragraph 8.4.9) public services and community facilities bring communities together and contribute significantly to social networks within those communities. Refer to the discussion of the role played by public services and community facilities in encouraging social networks starting paragraph 8.4.7, resulting in positive health outcomes, for further information.

8.4.306 The evidence linking public services and community facilities to positive health outcomes is considered to be **strong**. There is robust evidence on the benefits of social networks and interactions on health for all individuals (as a result of access to these community facilities), in particular children, older people, and ethnic minorities.

Effects on vulnerable groups

8.4.307 As a result of the same health pathway applying as under the '**potential health effects of displacement or change in access affecting public services and community facilities**', (from paragraph 8.4.14) the population groups vulnerable to this effect are equivalent to those presented within the consideration of that effect. These are: children and young people, older people, ethnic minority groups, individuals with a long-term illness or disability, single parent families, and gypsy and traveller populations. Further information can be found starting paragraph 8.4.7.

Potential health effects associated with open space provision and amenity space

8.4.308 One operational, the London Resort will increase the access to and quality of the amenity and open space offering in the area, creating spaces for individuals to use and enjoy. In turn, this creates many positive health benefits.

Effects on the general population

8.4.309 There exists an extensive range of literature linking the benefits of open space to positive

human health outcomes. Refer to **potential health effect of displacement or change in access to open spaces** (from paragraph 8.4.29) for the benefits discussed of open space. These include increased physical activity, better cognition, and reduced obesity, all of which lead to increased happiness. Additional health benefits associated with the provision of open space include psychological and mental health benefits, reduced stress and increased quality of life, and better self-perception of general health.³²⁶

8.4.310 The evidence linking the provision of open spaces to health outcomes is considered to be **strong**. There is clear and strong evidence on the positive impact of the provision of open spaces for all groups, including increased physical activity, better cognition and better mental health outcomes.

Effects on vulnerable groups

8.4.311 The vulnerable groups affected by this effect are unchanged from the description of the effect during the construction phase. These are children and young people, older people, and individuals with a long-term health condition or disability.

Potential health effects from changes in community cohesion

8.4.312 There are likely to be changes in the community in the area due to the scale of the Development and the relatively underdeveloped nature of the area. A development of this scale which greatly increases traffic to the area, as well as residents and workers in the area, has the potential to change the cohesiveness of the community and associated changes in health. This also needs to be considered alongside the major change planned for the area through the Ebbsfleet Garden City (i.e. cumulative impact).

Effects on the general population

8.4.313 There are likely to be many positive health benefits of a more cohesive community, as discussed previously. Refer to '**potential health effect of displacement or change in access affecting public services and community facilities**' (from paragraph 8.4.9) for the health benefits associated with social networks and community cohesion. The London Resort will be located in a relatively underdeveloped area with low rates of traffic and activity. The scale of the development has potential to therefore reinvigorate the community for some individuals, establishing better social connections between workers and residents and increasing footfall to the area and its surroundings.

8.4.314 Community settings have been found to influence health outcomes. The increasing quality of an individual's social networks has been associated with lower rates of coronary heart disease³²⁷, lower rates of cancer, and lower rates of stress-related ill-health.³²⁸ Generally, it is thought that a higher level of social integration within a

³²⁶ Lee, A. and Maheswaran, R., 2010. The health benefits of urban green spaces: a review of the evidence

³²⁷ Compare et al., 2013. Social support, depression, and heart disease: a ten-year literature review

³²⁸ Egan et al., 2008. Psychosocial risk factors in home and community settings and their associations with population health and health inequalities: a systematic meta-review

community is linked to reduced mortality.³²⁹

- 8.4.315 Collective efficacy describes ‘a community’s ability to create change and exercise informal social control’.³³⁰ This leads to better self-rated health amongst the community, lower rates of violence, and better access to health-enhancing resources. A more cohesive community spreads positive social capital, and individuals are more likely to receive positive social support, improving mental health outcomes.³³¹
- 8.4.316 Conversely, the introduction of the London Resort may disturb or disrupt the cohesiveness of the current community, and some individuals may be opposed to the change to a relatively underdeveloped area. It is important that large developments consider the changes they will make to the communal make-up of an area so they can put appropriate measures in place to deal with the negative impacts.³³² Possible adverse impacts may include disruption to locals who have resided in the area for many years, who appreciate the relatively quiet nature of the community or residents upset about the London Resort attracting a large amount of tourists and visitors to an area, potentially bringing (or being perceived to bring) increases in crime and anti-social behaviour. Large scale land acquisitions (LSLA) in Africa were found to have benefits such as employment creation, but these were offset by inadequate compensations to residents and communities, land conflicts, and environmental degradation³³³, all of which can affect the livelihood of communities.
- 8.4.317 Based on a review of the evidence, the causal link between increases in community cohesion and health outcomes is judged to be **moderate**. There is strong evidence on the positives associated with a more cohesive community, such as reduced mortality and mental health outcomes, but many of the benefits cannot be solely attributed to community cohesion, and may reflect a range of alternative factors. Generally, however, a more cohesive community has positive health benefits on its members.

Children and young people

- 8.4.318 Children have the potential to be disproportionately affected by a more cohesive community as a result of the increased social interaction. Refer to ‘**potential health effects from a change in the demand for public services and community facilities**’ (from paragraph 8.4.15) for the health benefits for children associated with increased social interaction.
- 8.4.319 A stronger sense of community in young people is associated with feelings of happiness, better educational attainment, and better mental health.³³⁴ There is also evidence that

³²⁹ Mindell, J. and Karlsen, S., 2012. Community severance and health

³³⁰ Healthy People, 2020. Social cohesion

³³¹ Berkman, L. and Glass, T., 2000. Social integration, social networks, social support and health

³³² Tetteh, K., 2011. Assessing The Socio-Economic Impact of Large-Scale Projects: An Illustrative Case Study of Jumbo Glacier Resort, East Kootenay Regional District, British Columbia, Canada

³³³ Hufe, P., and Heuermann, D., 2014. The local impacts of large-scale land acquisitions: a review of case study evidence from Sub-Saharan Africa

³³⁴ Fabian Society, 2016. How do we engage more young people in their local communities?

if a young person feels more engaged in the community, they are less likely to be involved with crime as they grow up.³³⁵

Older people

8.4.320 Older people live more inter-dependent lives and place higher value of the importance of the local community. Refer to **potential health effect of displacement or change in access affecting public services and community facilities** (from paragraph 8.4.9) for some of the health benefits associated with community cohesion.

8.4.321 Social interaction (as a result of a more cohesive community) in older adults leads to a lower risk of cardiovascular problems, some cancers, osteoporosis and arthritis.³³⁶ It also leads to a lower risk of Alzheimer's disease, lower blood pressure, and better overall mental health. Older people living in the current relatively quiet area may see more people and interact with the community more given the scale of the development, leading to these positive health outcomes. The more social community would also alleviate the risks associated with social isolation and a lack of community interaction, outlined in **potential health effect of displacement or change in access affecting public services and community facilities** (from paragraph 8.4.9).

8.4.322 Conversely, older people who have resided in the area for many years may feel negatively about the influx of tourists, visitors, infrastructure and (actual or perceived) crime that comes with the addition of a large-scale tourist destination. Some older people may feel intimidation (and hence social isolation) due to the change in the make-up of the area, leading to adverse health outcomes.

Ethnic minority groups

8.4.323 As discussed in **potential health effect of displacement or change in access affecting public services and community facilities** (from paragraph 8.4.9), ethnic minorities place a high value of importance on their community and support systems with others of the same backgrounds. Ethnic minorities (as described in **potential health effect of construction workers on health health services** (from paragraph 8.4.188)) face systemic barriers to the conditions needed to live a healthy life, and therefore a large influx of tourists and visitors to the area may causes community changes which disturb the cohesiveness of their community, on which they place a high value.

Disability and long-term illness

8.4.324 A strong community is important for those living with disabilities, as outlined in **potential effect of displacement or change in access affecting public services and community facilities** (from paragraph 8.4.21).

8.4.325 Those living with mental health issues, such as anxiety and depression, who may suffer

³³⁵ Ibid

³³⁶ St Joseph Health, (no date). Older adults and the importance of social interaction

from social isolation may be particularly benefitted from a more inclusive community due to the associated mental health benefits from interacting with the community.

Potential health effects from changes in crime and community safety (including fear of crime)

8.4.326 The increase in activity as a result of the London Resort may change crime levels in and around the Project Site. Changes in crime and fear of crime can result in adverse health outcomes.

Effects on the general population

8.4.327 There is a moderate body of evidence linking the fear of crime to human health outcomes. One study identified that those with a higher fear of crime would be restricted from leaving their homes, consequently reducing the number of opportunities that the individual has to form social ties and participate in social activities.³³⁷ Refer to **potential health effect of displacement or change in access affecting public services and community facilities** (from paragraph 8.4.9) for the benefits of social interaction.

8.4.328 Crime and fear of crime has a significant indirect impact on health, and is influenced by environmental factors, e.g. poor design or quality may increase crime, affecting wellbeing.³³⁸ Areas with a higher prevalence of crime also lead to lower self-reported quality of life amongst residents in the area.³³⁹

8.4.329 Increases in crime have also been associated with mental distress and adverse mental health outcomes for residents in the local vicinity.³⁴⁰ Effects have been found to be strongest for females, and the effects tend to revolve around depression and anxiety. Another study found that an individual suffered a decrease in mental wellbeing in the immediate three months after violent crime victimization.³⁴¹

8.4.330 In some cases, theme parks have also been linked to increased risks of crime. According to findings in 2019, crime rates are likely to be higher in neighbourhoods near theme parks which are major tourist attractions³⁴², putting the local residential areas at risk of higher crime. Offence rates were found to be 198% higher in neighbourhoods within a mile of the theme park in question, Universal Studios in Florida. Security is an important issue in the leisure industry due to the 'continuous and unrestricted flow of people in and out of a facility', highlighting the need for increased surveillance and access control (restricted areas where only authorised personnel may enter).³⁴³ This finding highlights the need for a Security Strategy as part of the operation and management of a major

³³⁷ Stafford et al., 2007. Association between fear of crime and mental health and physical functioning.

³³⁸ Lorenc et al., 2012. Crime, fear of crime, environment, and mental health and wellbeing.

³³⁹ Cohen, M., 2008. The effect of crime on life satisfaction.

³⁴⁰ Dustmann, C. and Fasani, F., 2016. The effect of local area crime on mental health.

³⁴¹ Cornaglia et al., 2014. Crime and mental wellbeing.

³⁴² Han, S. et al., 2019. Crime Risks Increase in Areas Proximate to Theme Parks: A Case Study of Crime Concentration in Orlando

³⁴³ IFSEC Global, 2016. Sector spotlight: running security in the leisure/hospitality industries

theme park, in order to mitigate this possible adverse impact.

- 8.4.331 The study also highlights a need for ‘more active policing strategies’ for tourists and residents in order to combat the adverse crime impacts that are associated with theme parks. Other recommendations included within the report include reducing the number of places near to theme parks that attract crime, such as hotels, and extending the policing strategies to nearby neighbourhoods that are ‘under the influence of the theme park’. Links have been made in other studies on crime rates at establishments such as hotels near theme parks, as thieves target those on holiday and who might be taking less precaution with their safety and belongings. Theme parks, without appropriate mitigation measures in place, are sometimes considered ‘attractors’ of crime, as crime rates can be up to 19% higher in surrounding areas.
- 8.4.332 Due to the link between theme parks and higher levels of crime in some of the existing evidence, routine bag checking and searching should take place upon entry to the site to prevent anyone entering the park with weapons.
- 8.4.333 In ensuring the safety of guests visiting the park, crowd control is important to ensure no injuries occur. Ensuring there is no more than the maximum allowed visitors to a park is important in controlling the flow.³⁴⁴ Video analytics tools may also be used for this, with intelligent video analysis, that can be used to gather crowd information and park operators can be informed in real-time when crowds in particular areas of the park are too large.³⁴⁵ This is important in preventing visitor injuries and protecting the safety of groups such as children, older and disabled people.
- 8.4.334 Based on a review of the existing literature, the causal relationship between changes in the levels of crime and safety and health outcomes is judged to be **strong**. Theme parks and surrounding amenities and communities have been linked to higher occurrences of crime, in addition to the need for additional measures to ensure the safety of visitors. Crime and the fear of crime can lead to many adverse health outcomes, such as reduced physical activity and obesity, social isolation in older people, and more generally reduced feelings of safety causing mental distress for individuals.

Children and young people

- 8.4.335 Children have been found to be less physically active when they were in an environment not judged as safe, leading to higher levels of childhood obesity.³⁴⁶ Children that have been exposed to violent or traumatic acts may become fearful of further crime, restricting their behaviour.³⁴⁷ Children that have been exposed to violent acts may also be caught up in the ‘cycle of violence’ whereby they learn to resolve their own personal conflicts with violence in the future.³⁴⁸

³⁴⁴ Asmag, 2018. Turning security into useful management tools at amusement parks

³⁴⁵ Ibid

³⁴⁶ An et al., 2017. Influence of neighbourhood safety on childhood obesity.

³⁴⁷ Health Children, 2016. Childhood exposure to violence.

³⁴⁸ Ibid.

- 8.4.336 In a report by the Children’s Society, 40% of 10-17-year olds worry about crime, and particularly fear theft or assault,³⁴⁹ showing the disproportionate impact that fear of crime has on this demographic.
- 8.4.337 In terms of community safety, disproportionate impacts of overcrowding would be felt by children and young people. Refer to **potential health effects associated with inclusive design, site access, and facilities of the London Resort** (from paragraph 8.4.255) for the adverse health effects associated with overcrowding. Crowd control procedures must be in place to control the flow of pedestrians and reduce the prevalence of injury.³⁵⁰
- 8.4.338 Children are also at a high risk of getting lost in such a large-scale theme park. A study found that 1 in 5 parents don’t talk to their kids about safety issues such as this, and no procedure is in place if it were to happen.³⁵¹ Considerations to counter this may include speaker systems throughout the park in order to direct those lost to secure points, training ride operators to be aware of lost children and offer assistance where they can, and reminding parents and carers who visit the park to establish a back-up plan if this were to occur. In one study, 87% of parents said it was both the parents and ride operator’s responsibility to ensure the safety of children³⁵², highlighting the importance of ride operators and theme park staff in ensuring child safety.

Older people

- 8.4.339 Older people are at greater risk of crime and fear of crime due to a higher prevalence of social isolation. One review found that higher levels of safety caused higher levels of physical activity amongst older people³⁵³, something that would be worsened with a higher fear of crime. Crime-related safety was also associated with better mental health and more walking, as individuals were more assured of their safety when going outdoors.
- 8.4.340 The issue of crime is amplified for older people whose participation in society is lower, and loneliness and lack of participation in social life has been shown to have a strong relationship with fear of crime.³⁵⁴ In the American population, older people are more anxious and fearful of crime than any other age group³⁵⁵, and this causes undesirable changes in behaviour which may lead to social isolation.

Ethnic minority groups

- 8.4.341 1 in 5 individuals from BAME backgrounds were found to be victims of crime in a recent study (compared to 15% for those from a white background), while black people were

³⁴⁹ Children’s Society, 2017. The Good Childhood Report.

³⁵⁰ ISSM, (no date). Amusement parks emphasize private security: top 6 reasons why.

³⁵¹ Reuters, 2018. Parents often lack amusement-park safety plans.

³⁵² Ibid.

³⁵³ Won et al., 2016. Neighbourhood safety factors associated with older adults’ health-related outcomes: a systematic literature review

³⁵⁴ De Donder et al., 2005. Fear of crime and elderly people: key factors that determine fear of crime among elderly people in West Flanders

³⁵⁵ Skogan, W., 1978. The fear of crime among the elderly

found to be three times more likely to be arrested than their white counterparts³⁵⁶, highlighting the disproportionate impact of crime on those from ethnic minorities, which can be partly attributed to racial profiling.

LGBTQ+

8.4.342 Individuals from LGBTQ+ backgrounds may experience more crime relative to the general population. A recent report has highlighted that one in five (21%) LGBTQ+ people have experienced hate crime due to their sexual orientation/gender identity in the 12 months leading up to the survey,³⁵⁷ highlighting the disproportionate impact of crime on this group. This figure rises to 41% for transgender people. Furthermore, some 17% of LGBTQ+ people who visited a café, restaurant, bar or nightclub in the 12 months preceding the survey were discriminated against because of their sexual orientation or gender identity.

8.4.343 Another report shows similar findings, in that 4 in 5 LGBT people have experienced hate crime related to their gender identity or sexual orientation in their lifetime (79%).³⁵⁸

Single-parent families

8.4.344 Research on single-parent families who live in violent neighbourhoods (in the USA) has found that while single-parents meet or exceed the population average for physical health, their mental health outcomes are significantly worse.³⁵⁹ One reason provided for this link is the relationship between neighbourhood characteristics and child health.

Potential health effects from changes to access to healthy and unhealthy food

8.4.345 The London Resort would include provision of food and beverage floorspace. These provide visitors, workers and local residents access to a variety of different foods. Food and nutrition intake is known to be associated with health outcomes.

Effects on the general population

8.4.346 Eating a healthy, balanced diet plays an essential role in maintaining a healthy weight, which is an important part of overall good health. Being either overweight or underweight can lead to increased prevalence of some health conditions such as type 2 diabetes, certain cancers, heart disease and stroke.³⁶⁰

8.4.347 A study by researchers at the University of Cambridge has found that increased exposure to fast food outlets, particularly around work, is associated with increased fast-food

³⁵⁶ Independent, 2017. Ethnic minorities most likely to be both victims and suspects of crime, UK race report finds

³⁵⁷ Stonewall, 2017. LGBT in Britain – Hate Crime

³⁵⁸ Galop, 2016. The Hate Crime Report

³⁵⁹ Jacoby, S.F. et al., 2016. The health status and well-being of low-resource, housing-unstable, single-parent families living in violent neighbourhoods in Philadelphia, Pennsylvania

³⁶⁰ NHS, 2019. 8 tips for eating healthy [accessible at: <https://www.nhs.uk/live-well/eat-well/eight-tips-for-healthy-eating/>]

consumption and marginally increased BMI.³⁶¹ People most exposed to takeaway food outlets at work consumed an additional 5.3g per day of takeaway food compared to those least exposed. At home people in the most exposed areas ate 4.9g per day more than those least exposed. The research controlled for possible confounders, including age, sex, household income, educational level, car ownership daily energy intake and smoking status.

- 8.4.348 A review of studies has found that fast food consumption and out-of-home eating behaviour is a main risk factor for lower diet quality, higher calorie and fat intake and lower micronutrients density of diet.³⁶² Frequent consumption of fast foods was accompanied with overweight and abdominal fat gain, impaired insulin and glucose homeostasis, lipid and lipoprotein disorders, induction of systemic inflammation and oxidative stress. Higher fast-food consumption also increases the risk of developmental diabetes, metabolic syndrome, and cardiovascular disease.³⁶³
- 8.4.349 Based on a review of the existing literature, the link between access to healthy food and health outcomes is judged **strong**. Nutritional intake is one of the main determinants of human health, and lack of access to healthy foods prevents healthy eating. There is also evidence that easy access to unhealthy food increases consumption of it.

Children and young people

- 8.4.350 A very large number of UK children are overweight or obese, and exposure to healthy or unhealthy foods can play a large role in weight gain or loss. Of the three different methods of developing healthy food preferences in children, taste exposure, sensory (e.g. visual) learning, and nutrition education, the first two show the most promise.³⁶⁴ Television ads featuring fast-food and other unhealthy foodstuffs use the sensory learning strategy to develop children's food preferences; results suggest that soft drink and fast food television advertising is associated with increased consumption of soft drinks and fast food among elementary school children (Grade 5). Exposure to 100 incremental TV ads for sugar-sweetened carbonated soft drinks during 2002–2004 was associated with a 9.4% rise in children's consumption of soft drinks in 2004. The same increase in exposure to fast food advertising was associated with a 1.1% rise in children's consumption of fast food.³⁶⁵

Older people

³⁶¹ Bourgoine, Forouhi, Griffin, Wareham & Monsivais, 2014. Associations between exposure to takeaway food outlets, takeaway food consumption, and body weight in Cambridgeshire, UK: population based, cross sectional study, *British Medical Journal*

³⁶² Bahadoran, M., & Bahadoran, A., 2015. Fast food pattern and Cardiometabolic Disorders: A Review of Current Studies, *Health Promot Respect* 5(4), 231-240

³⁶³ Bahadoran, M., & Bahadoran, A., 2015. Fast food pattern and Cardiometabolic Disorders: A Review of Current Studies, *Health Promot Respect* 5(4), 231-240

³⁶⁴ Nekitsing, C., Hetherington, M. M., Blundell-Birtill, P., 2018. Developing Healthy Food Preferences in Preschool Children Through Taste Exposure, Sensory Learning, and Nutrition Education

³⁶⁵ Andreyeva, T., Kelly, I. R., Harris, J. L., 2011. Exposure to food advertising on television: Associations with children's fast food and soft drink consumption and obesity

- 8.4.351 Nutrition is an important element of health in the older population and affects the aging process. The prevalence of malnutrition is increasing in this population and is associated with a decline in functional status, impaired muscle function, decreased bone mass, immune dysfunction, anaemia, reduced cognitive function, poor wound healing, delayed recovery from surgery, higher hospital readmission rates and mortality.³⁶⁶
- 8.4.352 There are substantial numbers of older people whose ability to chew foods is compromised by their oral health status, either because they have few or no natural teeth.³⁶⁷ This alteration results in individuals selecting a diet that they can chew in comfort. Such diets are low in fruits and vegetables intake with associated reduction in both non-starch polysaccharide and micronutrient intakes. There is also a trend for reduced dietary intake in older individuals overall.³⁶⁸
- 8.4.353 Decentralisation of many food retailers to edge-of-town and out-of-town locations has resulted in some older people experiencing difficulty in accessing food shops and those experiencing the greatest difficulties in food shopping are considered to be at the greatest nutritional risk. Neither usage of particular food shops, nor basic accessibility variables, are found to have a direct effect on dietary variety.³⁶⁹ Yet, coping strategies employed by older consumers to obtain food are revealed to be important.

Ethnic minority groups

- 8.4.354 A US study undertaken by Block et al. has found an association between the density of fast-food outlets and an area's population belonging to an ethnic minority.³⁷⁰ In the UK population studies have shown that some minority ethnic groups are more likely to experience poorer health outcomes compared with the mainstream population. These include higher rates of cardiovascular disease (CVD), type 2 diabetes and obesity. Possible reasons for the differences in health outcomes include diet and other health behaviours, genetic predisposition and developmental programming, as well as poorer access and use of health care.³⁷¹

Disability and long-term illness

- 8.4.355 Evidence suggests that children with chronic conditions may be predisposed to overweight and obesity. One study found that the prevalence of obesity among children 10–17 years of age without a chronic condition was 12.2%; the prevalence of obesity for children with asthma was 19.7%; with a hearing/vision condition was 18.4%; with learning disability was 19.3%; with autism was 23.4%; and with attention-

³⁶⁶ Ahmed, T., Haboubi, N., 2010. Assessment and management of nutrition in older people and its importance to health

³⁶⁷ Walls, A. G., Steele J. G., 2004. The relationship between oral health and nutrition in older people

³⁶⁸ Ibid.

³⁶⁹ Wilson, L.C., Alexander, A., Lumbers, M., 2004. Food access and dietary variety among older people

³⁷⁰ Block, J. P., Scribner, R. A., DeSalvo, K. B., 2004. Fast food, race/ethnicity, and income: A geographic analysis

³⁷¹ Leung, G., Stanner, S., 2011. Diets of minority ethnic groups in the UK: influence on chronic disease risk and implications for prevention

deficit/hyperactivity disorder was 18.9%.³⁷²

8.4.356 Children with Autism Spectrum Disorder are at a higher risk for developing overweight or obesity than children with typical development. Obesity has been associated with adverse health outcomes, including insulin resistance, diabetes, heart disease, and certain cancers.³⁷³

Low-income groups and the unemployed

8.4.357 About 17% of all households surveyed in a study indicated that groceries put a strain on their finances.³⁷⁴ Food is a key component of household budgets and low income has been linked to the lack of a nutritious, healthy diet.³⁷⁵

8.4.358 The Block et al. (2004) study mentioned above has found an association between the density of fast-food outlets and the prevalence of low-income groups within an area.³⁷⁶ In a different study,³⁷⁷ fast-food consumption was related to fast food availability among low-income respondents, particularly within 1.00 to 2.99 km of home among men. Greater supermarket availability was generally unrelated to diet quality and fruit and vegetable intake, and relationships between grocery store availability and diet outcomes were mixed.

Single-parent families

8.4.359 Research comparing the food intake of members of single-parent households and two-parent households found that children in female-headed households consumed more energy than children in male- and female-headed households (1,642 kcal vs. 1,577 kcal).³⁷⁸

8.4.360 The three indicators of food-security status were strikingly different between the two household types.³⁷⁹ While 74% of children in two-parent households had enough of the kinds of foods they wanted to eat, only 56% of children in female-headed households were food secure. Compared with children in two-parent households, children in female-headed households tended not to have the kinds of food they wanted to eat (37% vs. 24%) and not enough food to eat (7% vs. 2%). Female-headed households spent less money, per person, on monthly groceries, compared with two-parent households (\$87 vs. \$92). In addition, these households spent less money on foods purchased and eaten

³⁷² Chen, A. Y., Kim, S. E., Houtrow, A. J., Newacheck, P. W., 2012. Prevalence of Obesity Among Children With Chronic Conditions

³⁷³ Dhaliwal, K. K., Orsso, C. E., Richard, C., Haqq, A. M., Zwaigenbaum, L., 2019. Risk Factors for Unhealthy Weight Gain and Obesity among Children with Autism Spectrum Disorder

³⁷⁴ Corfe, S., 2018. What are the barriers to eating healthily in the UK?

³⁷⁵ Ibid.

³⁷⁶ Block, J. P., Scribner, R. A., DeSalvo, K. B., 2004. Fast food, race/ethnicity, and income: A geographic analysis

³⁷⁷ Boone-Heinonen, J., Gordon-Larsen, P., Kiefe, C. I., 2011. Fast Food Restaurants and Food Stores Longitudinal Associations With Diet in Young to Middle-aged Adults: The CARDIA Study

³⁷⁸ Bowman, S.A., Harris, E.W., 2003. Food Security, Dietary Choices, and Television-Viewing Status of Preschool-Aged Children Living in Single-Parent or Two-Parent Households

³⁷⁹ Ibid.

away from home, including food from fast-food places and restaurants (\$17 per person vs. \$26 per person). The amount of money spent on fast-food or carryout food brought into the house was not different (\$14 per person for both household groups).³⁸⁰

Potential health effects from the spread of communicable disease

8.4.361 The London Resort would serve millions of visitors each year, many of them international. The concentration of a large number of people in a single location renders the spread of communicable disease more likely, and the different prevalent disease maps of visitors' origin and destination countries could introduce new infections to both the UK and the home countries of the visitors.

Effects on the general population

8.4.362 Factors that determine the effectiveness of the spread of infectious diseases include the types of infections that are endemic to the host country, the infections that are endemic to the home countries of the visitors, and the way in which the populations mix. These factors are further compounded by the rapid spread of infections associated with international travel and subsequent dissemination in the home population.

8.4.363 Generally, respiratory transmission requires living in close proximity and is therefore most common at mass gatherings with overcrowded accommodation.³⁸¹ The worker accommodation to be provided for non-home based workers could pose a risk in the spread of respiratory diseases.

8.4.364 Vector-borne diseases can cause outbreaks even in countries where they are not endemic if a traveller is infected and an appropriate vector is present. Local health-care staff might not recognise a disease that has been eliminated from their country.³⁸² These risks should be considered when planning significant population gatherings to ensure that susceptible participants from non-endemic countries are protected from vector-borne diseases such as malaria, dengue, West Nile encephalitis, and yellow fever. As the most dangerous vectors such as the tropical *aedes aegypti* are absent from the UK (although could potentially establish as a result of climate change),³⁸³ the London Resort is not likely to pose a major risk for the spread of vector-borne diseases.

8.4.365 Zoonotic transmission are infections that are transmitted from animals to people.³⁸⁴ Zoonotic infections can be spread through direct contact or contaminated food and water. Visitors and workers of the London Resort are not envisaged to come into contact with large numbers of animals, nor their natural habitats, and this form of transmission is not likely to be a major risk factor.

8.4.366 Mass gatherings are characterized by the concentration of people temporally and

³⁸⁰ Ibid.

³⁸¹ Ibid.

³⁸² Ibid.

³⁸³ Dallimore, T. et al. 2017. Discovery of a single male *Aedes aegypti* (L.) in Merseyside, England

³⁸⁴ Abubakar, I. et al., 2012. Global perspectives for prevention of infectious diseases associated with mass gatherings

spatially, and may lead to the emergence of infectious diseases due to enhanced transmission between attendees.³⁸⁵ Outbreaks have sometimes occurred at Muslim, Christian, and Hindu religious events, at sports events, and at large-scale open air festivals. The review found that the most common outbreaks at these mass gatherings involved vaccine preventable diseases, mainly measles and influenza, but also mumps and hepatitis A. Meningococcal disease has rarely been recorded.

- 8.4.367 The infections that are likely to arise are also partly determined by the type of mass gathering — e.g., those with overcrowded accommodation will be more susceptible to outbreaks of respiratory infections, whereas those with excessive consumption of recreational drugs and alcohol could increase the risk of sexually transmitted infections.
- 8.4.368 As the London Resort would have a varied food and drinks offering, and draw international visitors it could be vulnerable to outbreaks of communicable gastrointestinal disease.
- 8.4.369 Based on a review of the existing literature, the link between the spread of communicable disease and health outcomes is judged **strong**. Communicable diseases are an important source of morbidity, and their spread has the potential to affect health outcomes in far reaching ways.

Children and young people

- 8.4.370 Whenever children are together, there is a chance of spreading infections. This is especially true among infants and toddlers who are likely to use their hands to wipe their noses or rub their eyes and then handle toys or touch other children. According to a study, of 92 long day care centres in Western Sydney, 80.4% reported at least one outbreak of communicable disease.³⁸⁶ As children mix with a large number of other children and are less health-conscious than most adults, the risk of the spread of communicable disease is higher amongst them.

Older people

- 8.4.371 Infectious intestinal diseases cause substantial morbidity and mortality in older people.³⁸⁷ Transmission of gastrointestinal disease could therefore cause undue risk to older people. One study found that elderly dengue patients present atypically and are at higher risk of dengue haemorrhagic fever, severe dengue, and hospital acquired infections.³⁸⁸ Aside from dengue severity, age, co-morbidity and hospital acquired infections were associated with longer hospital stay. Older people are more susceptible to outbreaks of other communicable disease too; the mortality rate from COVID-19 of

³⁸⁵ Ibid.

³⁸⁶ Jorm, L.R., Capon, A.G., 1994. Communicable disease outbreaks in long day care centres in western Sydney: Occurrence and risk factors

³⁸⁷ Djuretic T., Ryan, M.J., Fleming, M.D., Wall, P.G., 1996. Infectious intestinal disease in elderly people

³⁸⁸ Rowe, E.K., Leo, Y.S., Wong, J.G.X., Thein, T.L., Gan, V.C., Kee, L.K., Lye, D.C. 2014. Challenges in Dengue Fever in the Elderly: Atypical Presentation and Risk of Severe Dengue and Hospital-Acquired Infection

those over 65 has been significantly higher than that of younger generations.

Disability and long-term illness

8.4.372 Those with disability or long-term illness on average spend a longer time in hospitals. Researchers have found a correlation between the length of hospital stay and the risk of developing hospital acquired infections.³⁸⁹ Hospital outbreaks of communicable disease are common, and one study finds that between 1992 and 2000, 26.6% of all general outbreaks of infectious intestinal disease reported to the Public Health Laboratory Service (PHLS) Communicable Disease Surveillance Centre (CDSC) occurred in hospitals.³⁹⁰ The mortality risk was higher than for outbreaks in other settings. People with long-term illness or disabilities are at greater risk of communicable disease infections.

Potential health effects related to a changing climate

8.4.373 The London Resort's energy and resource use has the potential to contribute to climate change. Climate change is understood to have important implications for human health, both beneficial and adverse.

Effects on the general population

8.4.374 As mentioned under the **potential construction health effects related to a changing climate** (from paragraph 8.4.192), climate change, together with other natural and human-made health stressors, influences human health and disease in numerous ways. As stated within the consideration of the health impact of climate change, the link between climate change and health outcomes is judged **moderate**. Refer to paragraph 8.4.191 for further information on this effect.

Effects on vulnerable groups

8.4.375 The vulnerable groups affected by this effect are unchanged from the description of the effect during the construction phase. These are children and young people, older people, and individuals with a long-term health condition or disability.

³⁸⁹ Tess, B.H., Glenister, H.M., Rodrigues, L.C., Wagner, M.B., 1993. Incidence of hospital-acquired infection and length of hospital stay

³⁹⁰ Meakins, S.M., Adak, G.K., Lopman, B.A., O'Brien, S.J., 2003. General outbreaks of infectious intestinal disease (IID) in hospitals, England and Wales, 1992–2000