

12. Population and Human Health

Introduction

- 12.1 A summary of the health-related document submissions which have supported the planning application process thus far relating to the proposed development are provided below:
- in keeping with best practice, a Health Impact Assessment (HIA), which was a voluntary process at the time, was completed in 2014 to support the original planning application;
 - a Statement of Case and associated Rebuttal was provided in 2016 to inform the hearing before the Planning Appeals Commission (PAC);
 - a HIA Addendum was submitted in March 2019 which tested the conclusions of the original 2014 HIA; and
 - a response to third party representations received which raised concerns in relation to impact on human health was provided in October 2020.
- 12.2 The above subsequent submissions test and reinforce that the key findings of the original HIA remained valid and were not affected by factors which were identified to have changed since 2014.
- 12.3 Since submission of the original 2014 HIA, the Planning (Environmental Impact Assessment) Regulations 2017 have been introduced to include detailed consideration of 'population and human health' as a topic within Environmental Impact Assessment (EIA). In response to this, while this planning application is not bound by the 2017 EIA Regulations, the inclusion of this population and human health ES Addendum chapter which embeds the methods and principles of HIA has been provided in place of an integrated HIA. The process, scope, focus outputs and rigour remains the same, the only difference is that Population and Health now forms a specific topic within the regulatory EIA process, and not a voluntary, non-regulatory requirement addressed through HIA.

Statement of Authority

- 12.4 The Director of the Savills Health and Social Impact team, Dr Andrew Buroni, previously of RPS, has been involved in the proposed development since the project's inception.
- 12.5 The delivery of this report has been overseen by Dr Andrew Buroni who holds a Biological/Biomedical Science degree with honours, a Masters in Environmental Impact Assessment (EIA) and a PhD on International Health Impact Assessment (HIA) Methods and Best Practice. He has received formal training in Environmental Health Impact Assessment (EHIA) at the Caribbean Environmental Health Institute by the Pan American Health Organisation and Health Canada, and at the International Health Impact Assessment Consortium (IMPACT) at the University of Liverpool.
- 12.6 Dr Buroni is an internationally recognised expert in health and social impact assessment with over 23 years of experience. He has designed, led and given health and equality evidence at public inquiry and issue-specific hearings, and has a substantial catalogue of project experience

ranging in scale from local planning to Developments of National Significance (Wales) (or Nationally Significant Infrastructure Projects in England).

- 12.7 Dr Buroni and his team sits on the Institute of Environmental Management and Assessment (IEMA) Health in EIA Working Group, further embedding the consideration of health within EIA; support regional HIA training for the Office for Health Improvement and Disparities; and are technical advisors and accredited authors for the World Health Organisation on waste and the circular economy.

Methodology

Relevant Guidance

Guidelines on the Information to be contained in EIAR

- 12.8 The Environmental Protection Agency's Guidelines on the Information to be contained in EIAR (Environmental Protection Agency, 2022), highlights the amendments to Article 3(1) of the amended European Union (EU) Environmental Impact Assessment (EIA) Directive which states that:

“The environmental impact assessment shall identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of a project on the following factors: a) population and human health; [...].”

- 12.9 Moreover, Annex IV(4) of the amended Directive requires an EIAR to contain:

“A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health [...].”

Institute of Public Health Impact Assessment Technical Guidance

- 12.10 The Institute of Public Health (IPH) launched the fourth edition of HIA Guidance for Ireland and Northern Ireland, incorporating the most recent developments and best practice in the field (Institute of Public Health, 2021). The guidance is split into the following key themes:

- Screening – to determine whether an impact assessment is required.
- Scoping – identifying the determinants of health and the populations to be assessed, as well as the methods by which they will be assessed; health effects that are considered to be 'likely' and 'potentially significant' require further analysis and they are scoped in.
- Analysis – evidence of potential health effects is gathered and considered when conclusions are drawn on the significance of effects.
- Reporting – to document the judgements made on health, with reference to the evidence that informed those judgements;
- Implementation – whereby to be effective, assessment findings must be followed through when implementing the proposal.

- Monitoring – involves data collection and analysis after the assessment report has been issued, however, is resource intensive so it should be used in a proportionate and time-limited manner.
- Evaluation – of process, impact or outcome.

12.11 The approach adopted in the original HIA complies with all HIA guidance that has been published since.

Scope of the Assessment

12.12 As detailed in the IPH HIA guidance, health effects that are considered to be ‘likely’ and ‘potentially significant’ require further analysis and are scoped in. A health effect is considered ‘likely’ when, based on the scientific literature, there is a plausible theoretical link between source-pathway-receptor. A health effect is considered ‘potentially significant’ when they are important (a positive or negative effect), highly desirable (a positive effect) or unacceptable (a negative effect) for population health.

12.13 The original 2014 HIA methodology followed a source-pathway-receptor model to identify and assess population and human health effects that are plausible and directly attributable to the proposed development.

12.14 This same methodology remains appropriate and is outlined in Table 12.1, whereby a hazard source itself does not constitute a health risk. It is only when there is a hazard source, a receptor and a pathway of exposure that there is any potential risk to human health. The same is true for potential health benefits, where a positive influence must be present alongside a pathway of exposure and a receptor for there to be a potential health improvement.

12.15 Where a source-pathway-receptor linkage exists, it is then the nature of the specific hazard source or positive influence; the magnitude of impact via the pathway of exposure; and the sensitivity of the receptor that will determine what level of health risk or benefit is predicted, if any.

Table 12.1: Source-pathway-receptor model

Source	Pathway	Receptor	Plausible health impact	Explanation
X	✓	✓	No	There is not a clear source from where a potential health impact could originate.
✓	X	✓	No	The source of a potential health impact lacks a means of transmission to a population.
✓	✓	X	No	Receptors that would be sensitive or vulnerable to the health outcome are not present.
✓	✓	✓	Yes	Identifying a source, pathway and receptor does not mean a health outcome is a likely significant effect; health impacts should be assessed (describing what effect will occur and its likelihood) and likely health effects are then evaluated for significance.

12.16 It should be noted that the scope and focus of the original 2014 HIA was defined and iteratively refined through engagement with key stakeholders; initially through the formal EIA scoping exercise with statutory consultees; and subsequently through a separate HIA scoping exercise with key health stakeholders and local communities via an integrated engagement strategy.

12.17 Health determinants scoped into the original 2014 HIA all remain relevant. However, it should be noted that due to the transition from HIA to health in EIA, some health determinants are either combined or dealt with elsewhere within the ES. As such, the health determinants re-visited as part of the ES Addendum chapter focus on:

- air quality;
- noise and vibration; and
- traffic.

12.18 No update is provided in relation to health benefits from direct, indirect and induced employment opportunities as the magnitude of impact remains the same.

12.19 An additional ‘risk perception’ section has been included to address key concerns raised during the planning process, which centre around specific hazards that are perceived as risks, but do not present any credible risk to health. The hazards considered in this section comprise:

- nuisance effects (from flies and vermin); and
- exposure to electromagnetic fields (EMF).

Assessment criteria and assessment of significance

Introduction

12.20 As part of integrating health in EIA, an assessment of significance needs to be provided. The following section outlines the approach to this, drawing from both IPH HIA guidance and IEMA health in EIA guidance.

Sensitivity

12.21 As detailed in the IPH HIA guidance, sensitivity is the sensitivity of the receptor to change. It includes consideration of that receptor’s capacity to accommodate changes brought about by the proposal.

12.22 The criteria for defining sensitivity in this chapter are outlined in **Table 12.2**.

Table 12.2: Sensitivity descriptors

Sensitivity	Description
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependants; people with very poor health status; and/or people with a very low capacity to adapt.
Medium	Moderate levels of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose

Sensitivity	Description
	outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care; people with poor health status; and/or people with a limited capacity to adapt.
Low	Low levels of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and/or people with a high capacity to adapt.
Very low	Very low levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a community whose outlook is predominantly support with some concern; people who are not limited from undertaking daily activities; people who are independent (not a carer or dependant); people with good health status; and/or people with a very high capacity to adapt.

Source: IEMA Guide to Determining Significance for Human Health in EIA (IEMA, 2022)

12.23 An extensive baseline has been collected in order to interpret local health circumstance, and consequent population sensitivity. This information is detailed in Appendix 12.1 and summarised in the ‘Explanation of Baseline Conditions’ section. Overall, it is concluded that local health circumstance in the study area is generally good.

12.24 On this basis, the sensitivity of the population within the study area is considered to be “low”. This position has not changed from the baseline conclusion in the original 2014 HIA.

Magnitude of impact

12.25 As detailed in the IPH HIA guidance, magnitude considers the characteristics of the change which would affect the receptor as a result of the proposal. There are several components of magnitude, which include:

- Exposure – exposure tends to vary with proximity of the population to the source, but also has an important time dimension relevant to health, e.g. low concentrations over a long period, or high concentrations over a short period.
- Scale – the scale of change is a useful characterisation, particularly when exposure is not a relevant descriptive for the type of effect. For example, the scale of change in open space that is available for physical activity.
- Duration – effects that continue for a long duration are of greater magnitude (including inter-generational effects). Where effects are best characterised as short term, other factors such as scale or exposure may still indicate that the change is of high magnitude.
- Frequency – effects that are frequent or continuous are likely to indicate greater magnitude; however, even where the effect would be occasional, other factors such as scale or exposure may still indicate that the change is of high magnitude.
- Severity – health severity relates to the type of health outcome affected, such as changes predominantly related to mortality, disease, nuisance or wellbeing. It may also relate to the type of change relative to the baseline conditions (for example, onset of new conditions, a change affecting existing conditions or change to day-to-day functioning). While changes in mortality indicate a higher magnitude than changes in wellbeing or quality of life (less severe), this should not preclude a large change in quality of life from being a high-magnitude effect.

- Population extent – the proportion of the population (defined by the assessment) that is affected informs the decision on magnitude. Where most of the study area’s population is affected, this would indicate a higher magnitude. This is not to downplay cases where only a few people are affected to a high degree; however, where this is the case, this may indicate greater potential for targeted mitigation. Furthermore, a population health effect would not occur.
- Outcome reversibility – some changes in health outcomes rapidly reverse once the source is removed, for example, the cessation of nuisance will lead to reduction in anxiety. In other cases, health effects may reverse at a slower rate, for example, gradual returns to physical activity levels once access is resorted to amenities. Where health effects are considered permanent, this indicates a higher magnitude.
- Service quality implication – there may be an associated or independent change in the quality of services that support or facilitate good health (including health services, schools, social care, etc.). For example, where direct population health reductions (or population influx) increase demand on services that consequently reduce in quality, the magnitude of the effect on health is amplified.

12.26 The criteria for defining magnitude of impact in this chapter are outlined in **Table 12.3**.

Table 12.3: Magnitude descriptors

Sensitivity	Description
High	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/injury outcomes; majority of population affected; permanent change; substantial service quality implications.
Medium	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications.
Low	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications
Negligible	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life; very few people affected; immediate reversal once activity complete; no service quality implication.

Source: IEMA Guide to Determining Significance for Human Health in EIA (IEMA, 2022)

Significance of effect

12.27 As detailed in the IPH HIA guidance, significance relies on an informed, expert judgement about what is important, desirable or acceptable with regards to changes triggered by the proposal in question. In addition to the components on sensitivity and magnitude contributing to significance conclusions, the following components should also contribute to the significance conclusion and provide context relating to the importance/acceptability/desirability of a change to population health:

- Scientific literature – the literature can indicate if there is evidence to support an association between the proposal-related change, a relevant determinant of health and a relevant health outcome.
- Health priorities – these can identify if relevant determinants of health or health outcomes have been identified as particularly important locally, regionally or nationally.
- Baseline conditions – these can establish if relevant sensitivities or inequalities identified in the scientific literature are present. It may be relevant to note whether conditions differ from local, regional, national or international comparators, or if geographic or population features may amplify effects.
- Health policy context – this can identify published local or national government position statements that raise particular expectations for the relevant proposal change, determinant of health or health outcome. The health policy context may include adopted local area development plans or references (implicit or explicit) to health in published planning or other sectoral policies. Wider international health policies or treaties may also be relevant.
- Regulatory standards – such standards (if applicable) can identify where there would be formal monitoring by regulators. Discussion may include modelling results on the extent to which regulatory or statutory limit values would be met. It may also be relevant to discuss advisory guidelines. Limit values for occupational exposure tend to differ from non-occupational exposure. Where thresholds have been set, these do not mean that there would be no health effect below these levels. For example, in the case of fine particulate matter and nitrogen dioxide, there are non-threshold health effects (i.e. no known limit below which health effects may not occur).

12.28 For simplicity, a significance matrix (which takes into consideration sensitivity and magnitude) is provided in **Table 12.4**. As outlined above, a range of other components contribute to the determination of significance. For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Table 12.4: Significance of effect matrix

		Magnitude of impact			
		Negligible	Low	Medium	High
Sensitivity	Negligible	Negligible	Negligible	Minor/negligible	Minor/negligible
	Low	Negligible	Minor	Minor	Moderate/minor
	Medium	Minor/negligible	Minor	Moderate	Major/moderate
	High	Minor/negligible	Moderate/minor	Major/moderate	Major

Source: IEMA Guide to Determining Significance for Human Health in EIA (IEMA, 2022)

Explanation of Baseline Conditions

Introduction

12.29 Individuals and communities have varying susceptibilities to adverse and/or beneficial population and health effects associated with changes in environmental and socio-economic conditions as a result of: demographic structure (i.e. age); existing burden of poor health; behaviours (i.e.

lifestyle choices which constitute risk factors); and socio-economic circumstance. As an example, an elderly individual with an existing chronic cardiovascular health condition who is a smoker and has a lower than average socio-economic circumstance, would be considered more sensitive than a healthy working age individual.

12.30 The original 2014 HIA applied a series of nationally collected demographic health and health care statistics to provide a platform to the assessment, and to further explore individual circumstance that might establish heightened sensitivity to any particular hazard at the local level; result in a disproportionate outcome; or form a barrier to any benefit uptake. The 2011 census data formed the core to the assessment.

12.31 Census data has since been updated, and a wider set of public health data is available. As a result, it is considered appropriate to update the health baseline (previously called community profile) to identify whether or not local health and socio-economic circumstance has materially changed over the years.

Baseline summary

12.32 The aim of the following information, is to summarise the local health and socio-economic circumstance of the communities surrounding the proposed development at the Hightown Quarry on the Boghill Road, Mallusk, Co. Antrim. The study area comprises the District Electoral Area (2014) of Airport, using Antrim and Newtownabbey Local Government District (2014) and national (Northern Ireland) data as relevant comparators. Refer to Appendix 12.1 for the population and health baseline in full.

12.33 Overall, the population living within the study area have relatively low levels of deprivation. Wages remain similar to the national average, while educational attainment surpasses the national average.

12.34 Life expectancy for both males and females in the study area is higher than average. All-cause mortality rate and specific causes of mortality analysed (cancer and circulatory disease) for the study area show positive downwards trends and are lower than the national average. Respiratory disease mortality rate in the study area has remained relatively static over the years, with fluctuations both above and below the national average.

12.35 Mental health in the study area has worsened over time; both prescription rates for depression/anxiety and hospital stays for self-harm have increased. While this is the case, both indicators are better than the national average.

12.36 Drinking prevalence and alcohol-related hospital admissions in the study area are both better than the national average, with the proportion of the study area population drinking above weekly limits being equal to the national average. Smoking prevalence has been decreasing in the study area and is lower than the national average. Body mass index data shows a lower proportion of the population in the study area who are overweight compared to the national average.

Baseline conclusion

- 12.37 In conclusion, the local health circumstance in the study area is generally better than the relevant comparators. As a result, the population living within the study area are not considered to be particularly sensitive to environmental and/or socio-economic changes associated with the proposed development.
- 12.38 This is consistent with the baseline conclusions presented previously, whereby trend analysis generally shows improvements in health and socio-economic circumstance and a local community which is still not considered particularly sensitive to changes in environmental and socio-economic health determinants.

Predicted Environmental Impacts (Construction)

Health effects from changes in air quality

- 12.39 As detailed in Chapter 10 (Air Quality) in relation to deposited dust, the process contributions and assessment criteria are unchanged, hence the potential level of deposition is considered to remain insignificant.
- 12.40 As stated in the original 2014 HIA, activities with the potential to create dust include ground clearance and excavation, deliveries of construction materials and landscaping activities. However, construction-related emissions from the existing quarry site will not materially differ to permitted quarrying operations at the site, nor are they of a type, concentration or level of exposure to result in any measurable adverse health outcome. The mitigation measures detailed in the Construction Management Plan (CMP) are sufficient to control potential nuisance dust.
- 12.41 On this basis, the magnitude of impact on human health would be negligible. In the context of a low sensitivity receptor, the significance of effect would be negligible, which is not significant in terms of the EIA Regulations.

Health effects from changes in noise exposure

- 12.42 As detailed in Chapter 9 (Noise), the construction noise does not require re-assessment, therefore no changes to the original ES were proposed and the original ES conclusions remain valid. The original 2014 HIA draws from the original noise conclusions and on this basis, also does not need to be updated.
- 12.43 The original 2014 HIA concludes that noise impacts would be minimised through best practice techniques, and is not anticipated to result in any measurable health outcome. As a result, the magnitude of impact on human health would be negligible. In the context of a low sensitivity receptor, the significance of effect would be negligible, which is not significant in terms of the EIA Regulations.

Health effects from changes in traffic nature and flow rate

- 12.44 As detailed in Chapter 8 (Transport), traffic movements associated with the construction phase will include cars and light goods vehicles (LGVs) for construction workers as well as heavy goods

vehicles (HGVs) delivering construction materials and plan to the site. The CMP outlines detailed proposals for temporary traffic and environmental measures to be adopted during construction.

12.45 Chapter 8 (Transport) states that key information presented within previous submissions are summarised below and are considered to be unchanged and remain current. The original 2014 HIA draws from the original transport conclusions and on this basis, also does not need to be updated.

12.46 The original 2014 HIA concludes that operating in accordance with the CMP and close liaison between the contractor and the local Road Service section officer, the short-term traffic impact on the site or its general vicinity during the construction will be reduced to minimum. As a result, the magnitude of impact on human health would be negligible. In the context of a low sensitivity receptor, the significance of effect would be negligible, which is not significant in terms of the EIA Regulations.

Predicted Environmental Impacts (Operation)

Health effects from changes in air quality

Odour

12.47 As detailed in the original 2014 HIA, the operator will work in accordance with an Odour Management Plan (OMP) that details how the operator will assess and manage the risk of odour. Design-related mitigation (such as slight negative pressure and use of wet scrubbers passed through a biofilter) is such that potential odour emissions from the MBT with the proposed exhaust air treatment system are unlikely to cause annoyance complaints from the nearby residents.

Road traffic emissions

12.48 As stated in Chapter 10 (Air Quality), the updated appraisal for the application site opening in 2028 shows an increase in total AADT from 159 (118 HDVs) to 249 vehicles (154 HDVs). As such, this still does not exceed the screening criteria of daily traffic flows changing by $\geq 1,000$ AADT or HDV flows changing by ≥ 200 AADT.

12.49 As such, consistent with the conclusions detailed in the original 2014 HIA and Chapter 10 (Air Quality), the increase in traffic movements will have a marginal impact on local air quality at most, and would not be not of a level to quantify any change in local health outcome.

Stack emissions (PM and NO₂)

12.50 As detailed in the original 2014 HIA, research into the potential health effects from exposure to air pollution is extensive. The relationship between various air pollutants and a range of health outcomes is well understood, whereby it is possible to reliably quantify health effects at the population level. A comprehensive update to the health evidence base presented in the original 2014 HIA (which was reviewed in the 2019 HIA Addendum) is provided in Appendix 12.2 (Health and Waste Management Evidence Base).

- 12.51 In order to quantify the health impact associated with changes in exposure to air quality, concentration response functions (CRFs) (which are representative of the quantitative relationship between a health outcome and long-term exposure to an air pollutant) are applied with the absolute change in air quality associated with operation of the proposed development, population estimates, and various baseline health data.
- 12.52 The original 2014 HIA applied a hypothetical worst-case scenario to establish the potential impacts on all-cause mortality rate, whereby:
- The entire population of Antrim, Belfast and Newtownabbey (419,529 people at the time) were to live at the residential receptor / receptor grid point that would experience the greatest increase in annual average PM_{2.5} exposure – in reality, the changes in air pollution exposure would be much less and would not affect such a wide area.
 - The entire PM₁₀ fraction is assumed to be PM_{2.5} – whereby, PM_{2.5} has a higher risk ratio and is a subset of PM₁₀.
- 12.53 The original 2014 HIA concluded there would be no measurable risk to human health on the basis that the increase in PM concentration predicted at the most-affected residential receptor is 0.026 µg/m³, which would lead to a 0.02% increase in mortality, equating to an additional 0.6 deaths brought forward per year.
- 12.54 For the reasons below, the results of the quantitative health assessment detailed in the original 2014 HIA remain appropriate for the purposes of this ES Addendum. As a result, no update to the quantitative health assessment is necessary.
- 12.55 Firstly, as stated in Chapter 10 (Air Quality), there is no change to the design parameters and emissions rates for the proposed development, hence the process contributions predicted by the air dispersion model are unchanged.
- 12.56 In addition, the assessment detailed in the original 2014 HIA grossly overestimated population exposure due to the hypothetical worst-case scenario applied within the calculations (i.e. using the entire population of Antrim, Belfast and Newtownabbey). As such, while the number of people living in proximity to the proposed development is likely to have increased since the original 2014 HIA was submitted, in reality, the number of people affected remains much lower than the 419,529 population figure applied.
- 12.57 A gap analysis on the health evidence base applied in the original 2014 HIA and 2019 HIA Addendum has been completed (refer to Appendix 12.2) and shows that the evidence base has evolved somewhat.
- 12.58 Specifically, the relative risk defined by the Committee on the Medical Effects of Air Pollutants (COMEAP) in 2009 relating to all-cause mortality from exposure to PM_{2.5} has increased from 6% per 10 µg/m³ increase (applied in the original 2014 HIA) to 8% per 10 µg/m³ increase (refer to Table 1 in Appendix 12.2). While this is the case, as previously stated, the assessment detailed in the original 2014 HIA grossly overestimated population exposure due to the hypothetical worst-

case scenario applied within the calculations and therefore the additional 2% would not alter the results of the original assessment.

12.59 Similarly, the original 2014 HIA stated that the evidence is not sufficient to confidently quantify an increase in disease or mortality risk from NO₂ exposure. As a result, all-cause mortality rate was the only health outcome assessed. However, COMEAP CRFs have since been updated in 2020 and 2022 to include both mortality and hospital admission outcomes relating to NO₂ and PM_{2.5} (refer to Table 1 in Appendix 12.2). While this is the case, it is not appropriate to combine the health effects associated with both NO₂ and PM_{2.5} due to the risk of double counting and therefore it is still appropriate to only assess the effects from PM_{2.5} (which has the higher CRF).

12.60 Furthermore, CRFs are now available for a wider range of health outcomes (such as asthma and Chronic Obstructive Pulmonary Disease) are now able to be quantitatively assessed. These are also summarised in Appendix 12.2 and have lower risk ratios than the general mortality and morbidity (i.e. respiratory and cardiovascular hospital admissions) health outcomes. Therefore, where mortality and morbidity results are not measurable or material, it can be inferred that results for specific health outcomes would also not be measurable.

Stack emissions (dioxins, furans, PAHs and heavy metals)

12.61 The original 2014 HIA communicated the potential for exposure through inhalation, ingestion and dermal contact, drawing from human health risk assessment (HHRA) outputs during normal and abnormal operations.

12.62 The HHRA concluded that the total lifetime cancer risk due to emissions from the proposed facility would be well below an annual risk rate of 1 in 100,000 at any of the residential receptor locations or at the point of maximum predicted air concentration or watershed deposition. The 1 in 100,000 criterion is a level considered to represent 'minimal risk'. For non-cancer health risks, the HHRA concludes that the hazard index at these locations would be below 1.0. The hazard index is relative to a standard exposure level estimated to pose no appreciable likelihood of adverse health impacts, so an index of below 1 indicates that the hazard is below this no-appreciable-impact level.

12.63 As stated in Chapter 10 (Air Quality), on the basis that HHRA methodology considers the process contributions only and not in combination with background concentrations that study does not need reconsideration and its conclusions remain applicable for the proposed development. On this basis, the conclusion detailed in the original 2014 HIA remain valid.

Abnormal operations

12.64 As detailed in the original 2014 HIA, abnormal operation typically includes incidents such as technically unavoidable stoppages, disturbances or failures of the pollution control equipment or monitoring equipment. However, it was concluded that none of the potential scenarios assessed would lead to pollutant exposure that would breach the standards set to protect health. Furthermore, the duration of any periods of abnormal operations would be limited.

12.65 As stated in Chapter 10 (Air Quality), despite small changes identified for the predicted background concentrations of some substances in the opening year of 2028, there will be no adverse impact from short term or long term air quality from abnormal operation if it occurs. On this basis, the conclusion detailed in the original 2014 HIA remain valid.

Significance conclusion

12.66 The original 2014 HIA and 2019 HIA Addendum concluded that there would be no measurable risk to human health. On the basis that the assessment remains valid, the magnitude of impact on human health would be negligible. In the context of a low sensitivity receptor, the significance of effect would be negligible, which is not significant in terms of the EIA Regulations.

12.67 This conclusion is consistent with the former Health Protection Agency (HPA) statement in the 'Impact on Health of Emissions to Air from Municipal Waste Incinerators – RCE 13' report (Health Protection Agency, 2010), which states that:

“While it is not possible to rule out adverse health effects from modern, well-regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable. This view is based on detailed assessments of the effects of air pollutants on health and on the fact that modern and well managed municipal waste Incinerators make only a very small contribution to local concentrations of air pollutants.”

Health effects from changes in noise exposure

12.68 As stated in Chapter 9 (Noise), the source noise levels and assessed receptors have remained unchanged. However, the assessment has been updated to take into consideration the updated 2023 background sound levels.

12.69 The original 2014 HIA looked at changes in noise exposure from both the operational site and operational traffic.

12.70 As detailed in Chapter 9 (Noise), night time noise levels due to the operational site show that six out of eight receptors would not experience significant noise effects. The remaining two receptors on Flush Road would experience significant noise effects. While this is the case, it should be noted that the increase in noise level at these receptors would be minor (less than or equal to 1dB) which due to rounding and lower predicted background levels changes the significance level from what was assessed in the 2019 ES Addendum. The daytime assessment of the operational site also reports significant noise effects at the same two receptors on Flush Road, which is consistent with the conclusions of the 2019 ES Addendum.

12.71 In relation to site access traffic noise, the updates provided in Chapter 9 (Noise) show a minor improvement to most properties compared to the 2019 ES Addendum assessment. Furthermore, with the exception of 34 Boghill Road, all other properties assessed in the vicinity of the access road will be compliant with the WHO 2018 guidelines for road traffic impacts of 53 dB L_{den} .

12.72 On the local road network, the change in noise level on each of the assessed road links is below +1 dB $L_{A10,18\text{ hour}}$. These conclusions are consistent with the noise assessment undertaken in the

original ES 2014 and 2019 Addendum, which the original 2014 HIA and 2019 HIA Addendum draw from.

12.73 The original 2014 HIA and 2019 HIA Addendum concluded that there would be no measurable risk to human health. The majority of noise impacts would remain the same or improve from what was previously reported. However, a small increase in noise levels during the night time period associated with the operational site would occur at two receptors, bringing them above the threshold for significant noise effects. While this is the case, the actual change in noise that would occur to cause these receptors to exceed the threshold for significant effects is minimal and from a health perspective would not be sufficient to alter the conclusions made in the original 2014 HIA and 2019 HIA Addendum.

12.74 On this basis, the magnitude of impact on human health would be negligible. In the context of a low sensitivity receptor, the significance of effect would be negligible, which is not significant in terms of the EIA Regulations.

Health effects from changes in traffic nature and flow rate

12.75 Chapter 8 (Transport) has been updated to make no allowance for Councils sending waste to Cottonmount and therefore all traffic to the proposed site are considered new trips.

12.76 This update re-endorses the conclusion of the original TA and subsequent updates in that only two junctions (Hydepark Road/Boghill Road and Hydepark Road/Hightown Road) exceed the 5% threshold required to undertake detailed analysis to determine their operational performance without and with development traffic. As such, the conclusions within the previous assessments remain valid.

12.77 The original 2014 HIA draws from the original transport conclusions and on this basis, also does not need to be updated.

12.78 The original 2014 HIA concludes that traffic movements are unlikely to result in community severance or risk of accident/injury. As a result, the magnitude of impact on human health would be negligible. In the context of a low sensitivity receptor, the significance of effect would be negligible, which is not significant in terms of the EIA Regulations.

Risk perception

12.79 The original 2014 HIA stated that there was community concern regarding:

- nuisance effects (from flies and vermin); and
- exposure to EMF.

12.80 Nuisance effects from flies and vermin was addressed in the original 2014 HIA, whereby nuisance effects are managed through design and operational features to deter pests. The design of the proposed development has not changed and therefore, the conclusions remain valid.

12.81 The original 2014 HIA also explores the potential health impacts from exposure to EMF from the underground grid connection cable, which is designed to operate at 33kV. As per the discussion

in the original 2014 HIA, electric fields are not relevant in this instance as they would be fully screened by the cable sheath material and the trench infill. In relation to magnetic fields, the Department of Energy and Climate Change (DECC) Code of Practice specifies a guideline limit of 360 µT for general public exposure based on 1998 ICNIRP guidance, whereby compliance is assumed for all electrical infrastructure operating at or below 132 kV. The 360 µT still remains the most stringent guideline limit, and on the basis that the proposed development electrical infrastructure would still operate at 33 kV, compliance with the guideline limit is assumed, and the conclusions of the original 2014 HIA remain valid.

Description of Proposed Mitigation Measures

12.82 On the basis that no significant population and human health effects are reported in the main assessment, no additional mitigation measures are considered necessary.

Statement of Significance of Residual Effects

12.83 On the basis that no specific health mitigation is required, the significance of residual population and human health effects remain the same as in the main assessment.

Cumulative Effects

12.84 Cumulative projects are only considered where there is the potential to interact with the health determinants assessed, modify exposure pathways or introduce new receptors. **Table 12.5** identifies which developments have been included as part of the population and human health cumulative assessment.

Table 12.5: Cumulative development short-list

Application Reference	Description	Location	Date of Decision	Included/excluded
LA03/2022/0597/F	Proposed erection of 126 dwelling in a mix of detached, semi-detached, townhouse and apartment units with associated car parking, amenity space, retention and enhancement of existing open space and creation of new open space, equipped children's playpark, hard and soft landscaping and associated site works	Lands encompassing Mayfield Park between Mayfield Dale and Alderley Crescent and spanning Mayfield Link bound to the north by Mayfield High Street and Aylesbury Place to the east by 4-22 Mayfi...	Pending	Included
LA03/2019/1048/F	Erection of 22 no. dwellings (part of Mayfield Village	Lands to the east of Aylesbury Rise and south of Aylesbury	13 Feb 2020	Included

Application Reference	Description	Location	Date of Decision	Included/ excluded
	development) – Variation of Condition 2 of U/2013/0311/F (vehicular access and visibility splays)	Place Newtownabbey BT36		

12.85 Based on the average household size in Northern Ireland of 2.44¹, both developments are anticipated to introduce approximately 213 new receptors.

12.86 These receptors are not considered to be in close enough proximity to experience any cumulative change in noise exposure. Regarding potential cumulative changes to local air quality, the quantitative exposure response assessment already grossly overestimates population exposure and therefore, this increase in population would not alter the results of the assessment.