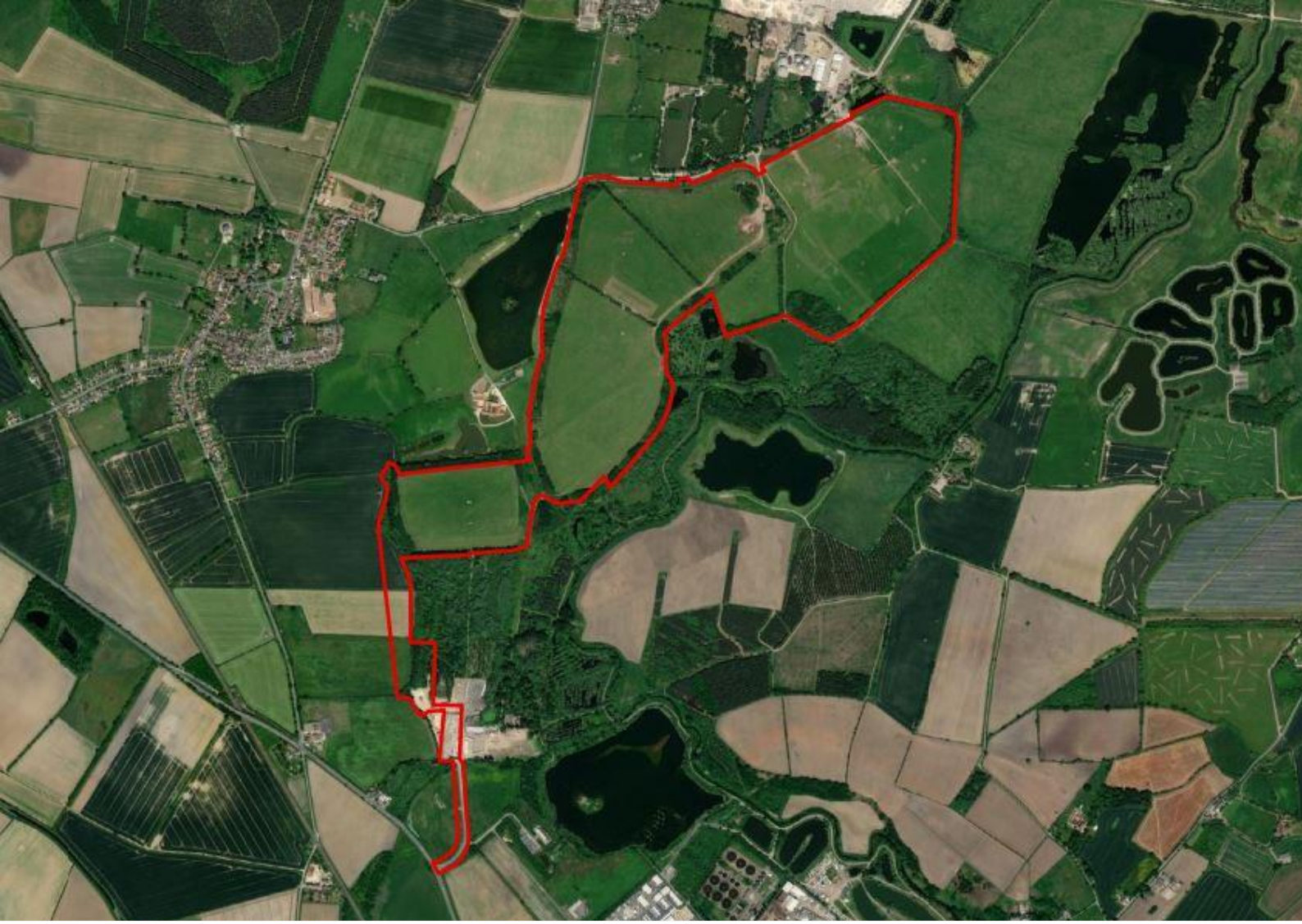

HIVE AGGREGATES

Retford Circular Economy Project Environmental Statement Addendum

Technical Appendix 3.2 Health Technical Note and Health Matrix

January 2024

Project No.: 0695864

ERM

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Retford Circular Economy Project Environmental Statement Addendum

Technical Appendix 3.2 Health Technical Note and Health Matrix

Kevin Nimoh
Managing Technical Consultant

ERM

2nd Floor, Exchequer Court

33 St Mary Axe

London

EC3A 8AA

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1. HEALTH TECHNICAL NOTE AND UPDATED HEALTH MATRIX

1.1 Introduction

This revised Health Technical Note and Health Matrix addresses potential effects on human health raised by some stakeholders during the post-submission consultation following the submission of the planning application for the Retford Circular Economy Project ('RCEP' or the 'Proposed Development') in March 2023 and the receipt of a request for supplementary information under Regulation 25 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. In that request, it was noted that specific concerns have been raised with regard to contamination and airborne dust. It was also noted that there was no requirement to undertake (for the purposes of the EIA Regulations) a full Health Impact Assessment (HIA). Previously, as part of scoping for the Environmental Impact Assessment (EIA), human health was scoped out by Nottinghamshire County Council (NCC) Public Health on the proviso that potential emissions and risks would be assessed in the relevant topic areas within the Environmental Statement (ES).

Since the submission of the planning application, further site investigations have been completed, changes have been made to the working scheme (in Area A), and additional management and mitigation measures have been proposed. Furthermore, the restoration plan has been significantly improved and amendments have been made to the layout of the Main Processing Site in Area C. These changes have resulted in an update to the scheme design for the Proposed Development (referred to as the 'Amended Proposed Development') with environmental effects reported in the Environmental Statement Addendum (ESA). Full details of the Amended Proposed Development can be found in ESA Volume 1, Chapter 5.

Human health can be defined as *"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*[1]*".* New developments such as the Amended Proposed Development have the potential to affect the lives of those who live near or pursue recreational activities close by, e.g. walkers, horse riders, off road cyclists etc. Environmental issues that are likely to give rise to human health concerns relate to those that cause audible discomfort (noise), visual (affecting amenity and the enjoyment of surroundings), toxic/odious pungent smells (air quality) and direct harm from being in contact with toxic substances i.e. contamination.

With regard to the impacts arising from the Amended Proposed Development in so far as they could potentially affect human health, the relevant chapters within ESA Volume 1 are therefore:

- Chapter 7, Landscape and Visual;
- Chapter 10, Ground Conditions and Contamination;
- Chapter 12, Noise; and
- Chapter 13, Air Quality.

These and all other topics presented in the ES and updated in the ESA have been undertaken using 'The Rochdale Envelope parameters'[2] which provides for assessment to be undertaken of the worst-case, the inference being that actual outcomes would be less than those predicted in the ES and ESA.

It is acknowledged in the ESA that that there would be some visual and noise impacts arising from elements of the construction, extraction and restoration phases of the Amended Proposed

[1] Definition of human health according to the World Health Organisation.

[2] The Rochdale Envelope arises from two cases: R. v Rochdale MBC ex parte Milne (No. 1) and R. v Rochdale MBC ex parte Tew [1999] and R. v Rochdale MBC ex parte Milne (No. 2) [2000]. Part of the judgement calls for the assessment should be based on cautious 'worst case' approach.

Development. These are discussed in the relevant chapters and would be appropriately mitigated. These topics are therefore not considered further in this Technical Note.

With regard to the specific concerns raised by some consultees around contamination and airborne dust, an overview of the effects on human health is provided within this technical note. In addition, the Nottinghamshire Rapid Health Impact Assessment Matrix has also been updated to reflect the Amended Proposed Development and is included at the end of this technical note.

2. CONTEXT

As described in ES Volume 1, Chapter 1: Introduction, the Site typifies much of the surrounding rural area, although it and the surrounding area have an extensive history of sand and gravel extraction, and associated operations. The Site itself was previously quarried for sand and gravel (known as Bellmoor Quarry), prior to being infilled with PFA via pipeline from Cottam Power Station.

The Site, at its northernmost point, is bound by Lound Low Road, off which Low Farm, Sutton Grange Farm and Wetland Fisheries are located. At its western end, the road connects the village of Sutton cum Lound with Lound. At its eastern end Lound Low Road connects to Chainbridge Lane, also a Byway Open to all Traffic (B.O.A.T) route and where a large pre-cast concrete works is located.

The Idle Valley Nature Reserve (IVNR), a network of mosaic lakes, woodland and open farmland covering 375 ha from Neatholme Pit to Bellmoor Lake, borders the Site along some of the eastern and southern boundary.

To the west of the Site, Sutton Lake and residential properties (Bellmoor Farm and associated properties) are located, with Sutton Cum Lound village approximately 1.3 km to the west.

To the south east of the Site is the Idle Valley Nature Reserve Visitor Centre and Bellmoor Lake.

Ther are also two public right of ways (PRoW) that run through the Site (NT Sutton FP1 and NT Sutton FP2), which connect with a wider Public Right of way Network.

In summary, there are some residential receptors, a visitor centre and PRoWs within relatively close proximity to the Site.

2.1 Changes to the Proposed Development

As discussed, changes to the PFA extraction process have been developed which provide for improved and more prescriptive measures to reduce potential for dust, visual and noise impacts. These measures include:

- Methods of working to reduce the area of influence/working area, including splitting extraction into small micro-phases (each no greater than 1% of Area A) to limit and control the effect of airborne dust;
- Greater use of dig cuts and working through the Site progressively;
- Working at a lower level within a void using the existing lagoon embankments to screen activities;
- Progressive extraction and processing operating behind the existing lagoon embankments;
- The minimisation of vehicle movements and tracking through Area A;
- The maximisation of covered conveyor use;
- The containment of working extraction areas wholly within each phase, with no travel to remote semi-fixed Processing Areas; and
- No dewatering of the extraction void.

3. AIRBORNE DUST AND DUST EXPOSURE

Note that the constituent components of the PFA and contamination matters are discussed in the next section. Here the technical note focuses on the potential for airborne dust and exposure to it.

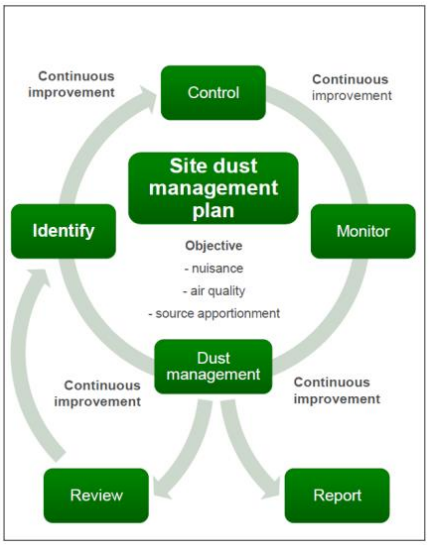
Airborne dust and dust exposure, including from extracting and processing the pulverised fuel ash (PFA) at the Site, have the potential to have effects on human health, particularly in scenarios where stringent management and mitigation measures are not in place, and where there are significant fugitive dust emissions. The effects relating to air quality and dust are reported in ESA Volume 1, Chapter 13: Air Quality.

With regard to the PFA at the Site, it should be noted that it has been in the ground for many years and, as such, has an in situ moisture content of 18% to 47%, or an average of 31% across the Site. Natural moisture content and rainfall are the most effective measures in suppressing/minimising airborne dust emissions in the first instance. The PFA would therefore have a very limited potential for dust generation when it is excavated and screened.

Notwithstanding the above, it is acknowledged that extraction would take place in the open air before the process is fully enclosed once material is placed into the conveyor hopper in each micro-phase. The changes to the Amended Proposed Development have therefore been specifically designed with dust management at the centre of all operations, in accordance with the Institute of Air Quality Management (IAQM) and MIRO good practice guidance. These changes have been designed so that extraction activities (i.e. the main potential source of dust) in Area A, including processing (shredding and screening), are concentrated in the smallest area possible area at any given time (less than 1% of Area A), thereby vastly reducing the area where fugitive dust emissions could potentially be generated.

In addition to these changes, an amended Dust Management and Monitoring Plan (DMMP), Appendix 13.7, ESA Volume 3, has been prepared. The DMMP controls as illustrated in the diagram below (Image 3-1) provide a continuous process of dust control and monitoring to ensure that airborne dust and dust exposure would be stringently managed within the working area at any given time.

Image 3-1: Dust Management and Monitoring (DMMP) Processes



In addition, as an added precaution, dust monitoring would be undertaken for a minimum period of six months from the commencement of extraction activities, with an additional two months ‘baseline’ monitoring prior to any onsite works. The results would be compared to the benchmarks for the protection of amenity derived from Environment Agency (M17), Government sponsored best practice

guidance[3], and Institute for Air Quality Management guidance[4] on dust monitoring. As a further measure, contingency plans have also been identified (DMMP, Appendix 13.7, ESA Volume 3, Section 5.0) which would be deployed where there is a malfunctioning/ breakdown of machinery/ equipment or water supply failure for dust dampening/ suppression, with a final measure of cessation of all works until the issue is resolved.

Chief amongst these measures are:

- Additional screening along the northern and southern boundaries for the duration of extraction activities in the Low-Rise, increasing screening to around 5 m at locations closest to sensitive human receptors (combination of working depth and screen bunds/fencing);
- A sealed screening bund along the western boundary of each of the phases until extraction has been completed, ensuring the working phases are not susceptible to prevailing winds from the west;
- Continuous dampening down of working areas during extraction activities and sealed with soil cement and/or compacted overnight and on weekends during period of dry weather ('dry days' = days with <0.2 mm rainfall);
- The installation of a static water suppression system to cover the PFA inspection laydown area, and to be in operation on a continuous basis on 'dry days';
- Twice daily dampening down of oversized PFA stockpile on 'dry days';
- Twice daily dampening down of unvegetated areas of soil to be dampened down twice daily on 'dry days';
- A dust monitoring scheme for dust deposition off-site (see the DMMP, Technical Appendix 13.7 in Volume 3 of this ESA); and
- A series of contingency measures, as detailed in the DMMP.

In addition to the updated DMMP, an updated Air Emissions Risk Assessment (ESA Volume 1, Chapter 13, Section 13.4, and ESA Volume 3, Appendix 13.8) has been undertaken following the design changes to the Main Processing Site (Area C) regarding potential effects on human health arising from the PFA drying process, including from the combined heat and power (CHP) plant and 8x drying lines. Note that the drying lines now include external ventilation using individual filters, stacks and condensers, and their purpose is to enable exhaust of clean air only.

Following assessment for NO_2, PM_{10} and NOx from the CHP plant, it is concluded that the process contributions would not lead to any exceedances of the standards (long-term or short-term) for the protection of human health at any location outside of the Site. Also, in consideration of the proposed drying plant, the Air Emissions Risk Assessment concluded that the drying processes would not lead to any exceedances of the standards (long-term or short-term) for the protection of human health at any location outside of the Site.

Extracted PFA was also noted to have no discernible odour and the risk of odour being generated from processing is therefore considered to be very low.

3.1 Impacts on Human Health

In summary, the potential effects on human health are predicted to be negligible for those who live and work close to the Site, use the PRoWs or visit the nearby Idle Valley Nature Reserve, as a result of the Amended Proposed Development. This conclusion has been reached by also considering the information relating to contamination set out in the next section.

[3] The Environmental Effects of Dust from Surface Mineral Workings, DETR (1995) Arup Environmental.

[4] IAQM, Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites.

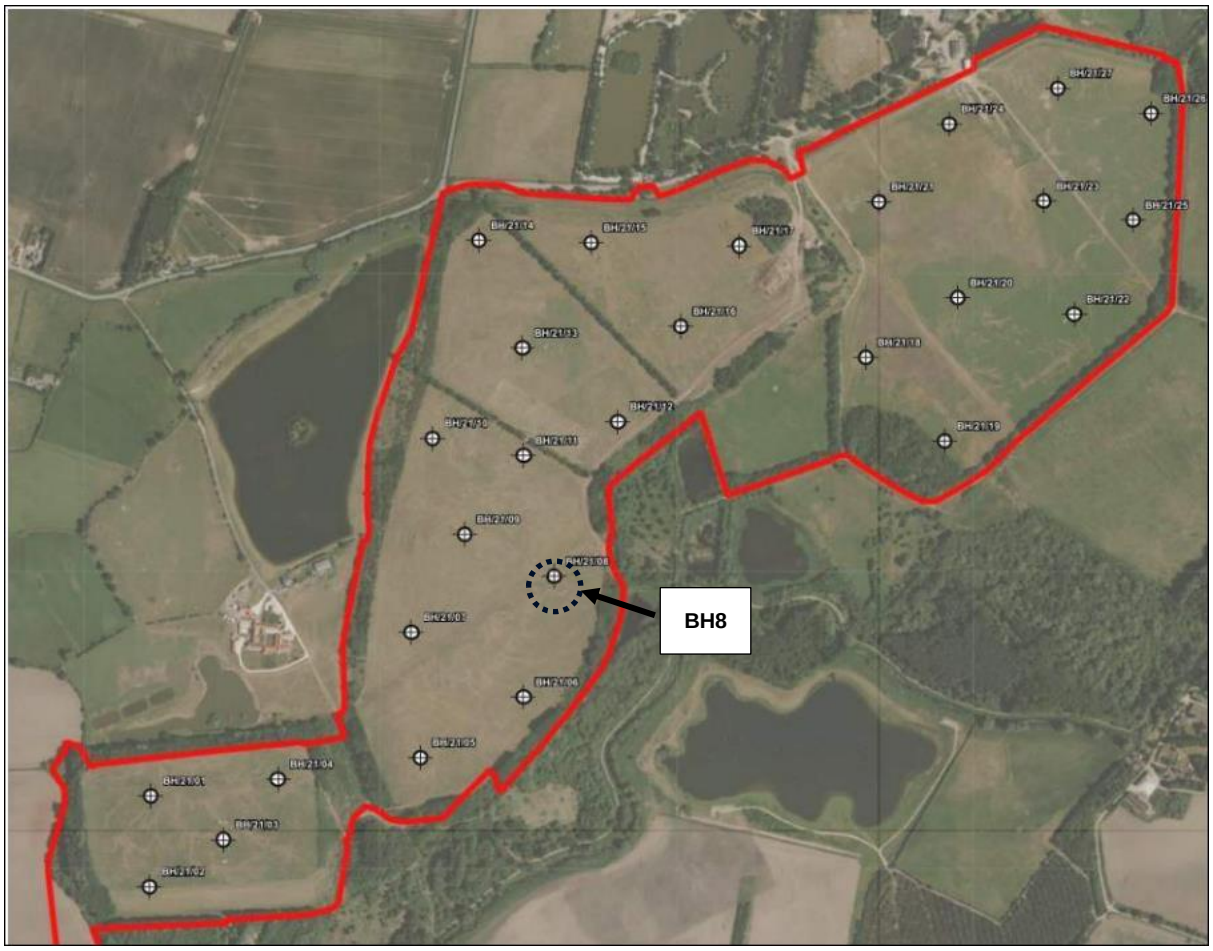
4. CONTAMINATION

Ground contamination by potentially hazardous substances has the potential to negatively affect human health in certain circumstances, including when extracting materials from the ground and processing them. The effects of contamination are reported in ESA Volume 1, Chapter 10: Ground Conditions and Contamination.

PFA is however a well characterised substance and is classified by the Environment Agency as a non-hazardous waste. It is the residual solid material from the combustion of coal at high temperatures in coal-fired power stations and consists of inorganic mineral residues; these primarily being oxides of silicon, aluminium, iron and calcium. As part of the EIA, a ground investigation was completed in 2021 to undertake initial characterisation of the PFA, focussing primarily on chemical composition and quality.

The investigation comprised the drilling of 23 boreholes and excavation of four trial pits (as shown on Image 4-1). The boreholes were extended to a maximum depth of 18 m below ground level (bgl) and the trial pits to 4.5 m below ground level. Samples of PFA were collected at an approximate vertical sample interval of every 1.5 m. The field results of this investigation (geology and depth to groundwater) were included in the baseline conditions detailed in Chapter 10: Ground Conditions and Contamination, Section 10.4 of the ES.

Image 4-1: Location of sampling boreholes within Area A



The Applicant then, as part of the ESA process and to address comments from consultees, undertook further assessment (in 2023) to characterise the constituent nature of the PFA. It included testing

samples from multiple locations and depths across Area A. Full detail of the assessment undertaken can be found in Volume 1, Chapter 10: Ground Conditions and Contamination in the ESA.

The PFA was scheduled for a suite of analysis that comprised:

- Asbestos identification and quantification – 96 samples;
- Metals – 62 samples;
- Poly-aromatic hydrocarbons (PAH) – 62 samples; and
- Semi-volatile organic compounds (SVOC) – 62 samples.

PFA samples were also selected for leachate analysis that comprised:

- Metals – 25 samples;
- Poly-aromatic hydrocarbons (PAH) – 25 samples; and
- Semi-volatile organic compounds (SVOC) – 25 samples.

There were no concentrations of PAH or SVOC detected above the laboratory limit of detection (LOD) in any of the samples. Metals were detected at anticipated concentrations for the PFA (iron, magnesium, titanium, manganese, barium, strontium, vanadium, zinc, arsenic). No asbestos was detected in 95 of the 96 samples. A small, isolated fibre bundle of chrysotile (white) asbestos was encountered at one location (at BH8 shown in Image 4-1).

Additional ground investigations and field visual asbestos screening and asbestos identification and quantification analysis would also be undertaken as part of a further characterisation exercise before PFA excavation is commenced in each extraction phase. It is proposed that this would be secured by a suitable planning condition and/or as part of the site environmental permit. Further detail is provided in ESA Volume 3, Technical Appendix 10.1, Update to Preliminary Land Quality Risk Assessment (PLQRA).

An update of the Dust Impact Assessment (DIA) (Volume 3 Technical Appendix 13.6 of the ESA) and DMMP (Volume 3, Technical Appendix 13.7 of the ESA) have also been provided, which include significantly more detail and additional measures, such as a monitoring regime, and being more consistent with the higher level of information usually reserved by planning condition. It is also notable that the revision in the extraction methodology would ensure further dust protection. The extraction scheme, including the recent amendment and the adoption of the micro-phased approach, are very important from a dust management and contamination perspective.

For the PFA leachate analysis, none of the 25 samples contained PAH or SVOC above the laboratory LOD. Metals were detected at anticipated concentrations for the PFA (magnesium, boron, strontium, titanium, arsenic, molybdenum). The results of the leachate analysis are comparable to the concentrations detected within the underlying groundwater.

As stated previously, the extraction methodology has also been updated such that the below groundwater PFA would now be worked wet, and no pumped abstraction and associated discharge is proposed; thereby removing this potential contamination source. Notwithstanding this and taking into consideration the comments from NCC, the Applicant has committed to a groundwater and surface water monitoring programme. This would include monitoring prior to construction to establish baseline conditions for surface waters and groundwater, and ongoing monitoring thereafter. As a minimum this would include surface water monitoring at locations on the River Idle upstream, mid-point and downstream of the Site.

It is proposed that this would be secured by a suitable planning condition and/or as part of the site environmental permit. Further detail is provided in ESA Volume 3, Technical Appendix 10.1, Update to Preliminary Land Quality Risk Assessment (PLQRA).

4.1 Impacts on Human Health

From the ground investigations and PFA characterisation investigation undertaken to date, there is no indication that any significant hydrocarbon, other chemical or asbestos contamination is present in any areas of the Site. The analysis of the PFA has demonstrated its constituent components are in accordance with the concentrations of a typical PFA, which is classed as a non-hazardous waste.

The analysis has confirmed the detection of metals (iron, magnesium, titanium, manganese, barium, strontium, vanadium, zinc, arsenic) and the absence of any trace signature of organics (PAH, TPH, SVOC). There was an absence of asbestos detected within the PFA with the exception of a very small asbestos fibre bundle at one isolated location. The findings of the analysis are consistent with historical records and anecdotal evidence provided to the Applicant, all of which indicate that only PFA was disposed of at the Site.

The PFA at the Site originates from Cottam Power Station. The PFA was piped as a slurry (a mix of PFA and water) from the power station to infill former sand and gravel extraction pits. The Cottam Power Station Historic Building Record[5], produced in 2018, states that the PFA generated by burning of coal was directed by ducts within an enclosed process to electrostatic precipitators of steel construction located outside and separate from the main generating building, where the particles were separated from exhaust gases into collection hoppers and transferred by pipes to be mixed with water to form a slurry. The slurry was then piped to a dust slurry pumphouse and off-site through the pipeline to the Sutton and Lound lagoons, i.e. the Site.

No other materials were added into the PFA collection and disposal process, at source, within pipelines or by tipping directly into the lagoons. EDF, the owner of Cottam Power Station, has confirmed in correspondence that the PFA collection and delivery system was completely enclosed. This has also been confirmed to the Applicant by individuals who lived next to and worked at the Site when it was operational.

The EA has confirmed in its planning consultation response dated 2 May 2023 that (underlining added): "Lound Quarry, near Lound, was permitted to receive non-hazardous waste…According to our site inspection records, this site was found to be compliant with their permit whilst it was active. No enforcement action was taken". Note that, as previously stated, PFA is classed as 'non-hazardous' by the EA, whereas asbestos, for example, would be classed as 'hazardous'.

ESA Volume 3, Outline Construction Environmental Management Plan, Technical Appendix 5.3, Appendix D, Discovery Strategy therefore notes that it is not immediately clear how the single instance of asbestos was found to be present, as waste documentation does not indicate any asbestos disposal at the Site. Furthermore, that this asbestos cannot conclusively be attributed to any specific known asbestos-containing material (ACM), although it is plausible that the material could have originated from asbestos textile jointing material used as caulking for pipework[6] at the Site. Note that anecdotal evidence provided by those living close to and working at the Site when it was operational, along with historic aerial imagery, indicate that all such pipework was removed from the Site following operation; although, it is possible, for example, that the asbestos encountered could have broken free at this time.

[5] https://www.rictyler.com/project/1960s-coal-fired-power-stations/

[6] In common with any brownfield site there is the potential for asbestos contamination associated with former structures since asbestos is frequently found in structures built as recently as the 1990s. A study 'The Public Health Significance of Asbestos Exposures from Large Scale Fires' by the Health Protection Agency in 2007 states "…Mineral fibres, including asbestos, are widespread contaminants of the environment and everybody will have been exposed at some stage. In the literature a wide range of background levels are reported. The then UK Department of the Environment (DoE) estimated a level of regulated fibres of 0.0005 f/ml above background (DoE, 1991).

The 'trace'[7] occurrence of asbestos encountered does not meet the definition of asbestos as regulated under regulation 2 of the Control of Asbestos Regulations 2023, owing to the very small quantity identified. However, notwithstanding this, the Applicant is proposing to adopt a precautionary approach during operation, including defined management measures and procedures. These would be carried out in accordance with the requirements of the Control of Asbestos Regulations 2012, the accompanying Approved Code of Practice and Guidance as well as CAR-SOIL industry guidance. This is in common with conventional approaches to the redevelopment of brownfield land. The specific measures to be implemented, including a watching brief and contingency plans, are outlined in ESA Volume 3, Technical Appendix 5.3, Outline Construction Environmental Management Plan, Appendix D, Discovery Strategy.

On the basis of existing PFA characterisation data, the asbestos risk level to Site operatives is assessed as being very low, if not entirely negligible. Furthermore, the high existing natural moisture content of the PFA, combined with operational controls designed to mitigate fugitive dust emissions would suppress any potential fugitive emissions at source. Consequently, it is reasonably concluded that the potential risk of exposure to off-site receptors would also be negligible. For further detail on these conclusions please refer to ESA Volume 3, Outline Construction Environmental Management Plan, Technical Appendix 5.3, Appendix D, Discovery Strategy

The leachate analysis of the PFA is comparable to the concentrations detected within the underlying groundwater. Metals were detected at anticipated concentrations for the PFA (magnesium, boron, strontium, titanium, arsenic, molybdenum) and there were no concentrations of PAHs or SVOCs detected above the laboratory LOD. The data demonstrates that there would be no increased detrimental impact or further deterioration in groundwater quality, as existing concentrations within the groundwater exhibit similar concentrations to the leachate recorded from the PFA. In addition, the removal of the overlying PFA would ultimately result in removal of a contaminant source and therefore provide betterment over a period of time.

In conclusion, when considering the Amended Proposed Development and additional assessment work carried out, the potential effects on human health from contamination are predicted to be negligible for those who live and work close to the Site, use the PRoWs within the vicinity of the Site, or visit the nearby Idle Valley Nature Reserve. The potential effects on human health from contamination are also predicted to be negligible for Site operatives due to the use of stringent mitigation measures and best available techniques as described above and in full accordance with health and safety legislation[8].

[7] HSG 248 (2nd Edition) Asbestos: The Analysts Guide (May 2021). It is the authoritative source of asbestos analytical procedures within Great Britain. The document provides a definition of 'trace' asbestos. A section on sampling and analysis of soils and made ground is also included.

[8] The Contaminated Land (England) (Amendment) Regulations 2012 [online] Available at: https://www.legislation.gov.uk/uksi/2012/263/made (Accessed 17/01/2023)

[8] Environmental Protection Act 1990 : Part 2A. Contaminated Land Statutory Guidance. Defra April 2012 [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/223705/pb13735cont-land-guidance.pdf (Accessed 17/01/2023)

[8] Defra Circular 01/2006. Environmental Protection Act 1990: Part 2A. Contaminated Land. September 2006 [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69309/pb12112-circular01-2006-060817.pdf (Accessed 17/01/2023)

[8] Land Contamination: Risk Management (LCRM) (2020) [online] Available at: https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm (Accessed 17/01/2023)

[8] Safeguarding our Soils: A Strategy for England. DEFRA (2009). [online] Available at: https://www.gov.uk/government/publications/safeguarding-our-soils-a-strategy-for-england (Accessed 10/11/2022).

[8] CIRIA (2015) Environmental Good Practice on Site [Online] Available at: https://www.ciria.org/Training/Training_courses/Environmental_good_practice_on_site.aspx (Accessed 10/11/2022)

5. WATER ENVIRONMENT

Other avenues of potential contamination that might affect human health are through contamination leaching into open water within watercourses and standing water bodies e.g. lakes, ponds etc and rivers, and from chemical pollution, construction spills, leakages and accidental discharges. This matter, particularly in relation to leaching, has been partially covered in the 'Contamination' section above, however it is expanded on further here.

The potential risks to the water environment have been further addressed through the changes to the working scheme and the mitigation measures and procedures provided within the ESA. It should be noted however, that the leachate data obtained for the PFA demonstrated that there would be no increased detrimental impact or further deterioration in groundwater quality, as existing concentrations within the groundwater exhibit similar concentrations to the leachate recorded from the PFA.

Nevertheless, the changes to the PFA extraction processes now provide for the PFA to be wet worked. This removes the requirement to discharge abstracted groundwater into a surface water drainage system or soakaway, reducing potential risk to surface water bodies. Also, as a further precaution, several other measures would be implemented. These include:

- The retention of a residual basal coverage of PFA within excavation areas to provide a further level of protection to infiltration of leachate into groundwater;
- The retention of sandstone embankments preventing the potential for interaction with floodwater during an extreme storm event that could lead to PFA being carried into adjacent surface water bodies; and
- The implementation of site drainage measures and SuDs to maintain natural site drainage and infiltration as much as possible to reduce sedimentation and erosion.

To avoid the potential for accidents arising from chemical pollution, construction spills, leakages and accidental discharges, stringent mitigation measures are provided in the following Volume 3, Technical Appendices to ensure the protection of human health and the environment:

- Technical Appendix 13.7, Dust Management and Monitoring Plan,
- Technical Appendix 5.3, Outline Construction Environmental Management Plan,
- Technical Appendix 5.3, Appendix D, Discovery Strategy,
- Technical Appendix 9.1, Water Environmental Management Plan and,
- Technical Appendix 9.3, Drainage Management Plan.

Also, as mentioned previously, there is a commitment from the Applicant to further characterise the PFA through completion of further ground investigation work, sampling and analysis prior to commencement of extraction in each phase, which would provide a further level of confidence to the findings that have been obtained to date.

[8] CIRIA (2001), Control of Water Pollution from Construction Sites (C532) [Online] Available at: https://www.ciria.org/ProductExcerpts/C532.aspx (Accessed 10/11/2022)

[8] UK Government (2021) Discharges to surface water and groundwater: environmental permits [online] Available at: https://www.gov.uk/guidance/discharges-to-surface-water-and-groundwater-environmental-permits#apply-for-a-standard-rules-permit (Accessed 10/11/2022)

[8] UK Government (2021) Apply for a water abstraction or impoundment license [online] Available at: https://www.gov.uk/guidance/water-management-apply-for-a-water-abstraction-or-impoundment-licence#before-you-apply (Accessed 10/11/2022)

5.1 Impacts on Human Health

With the changes to the PFA extraction process and the stringent mitigation measures proposed, the potential effect on human health is predicted to be negligible[9]. The potential for PFA contaminant leaching into groundwater is not considered significant during extraction within any phase. Furthermore, the gradual removal of the overlying thicknesses of PFA would ultimately result in the removal of a contaminant source and therefore provide betterment over a period of time. Consequently, the removal of PFA is predicted to be a beneficial effect as a result of the Amended Proposed Development[10].

6. CONCLUSION

The changes to the Amended Proposed Development and the stringent mitigation measures proposed have led to further reductions in potential adverse effects to human health. ESA Volume 1, Chapter 10: Ground Conditions and Contamination, Chapter 13: Air Quality and supporting technical appendices have assessed the likely effects of the Amended Proposed Development. This technical note has considered each assessment and concluded with the mitigation controls in place, potential adverse effects on human health are negligible when considering dust, contamination and the water environment for those who live and work close to the Site, use the PRoWs in the vicinity of the Site, or visit the nearby Idle Valley Nature Reserve. For Site operatives, potential adverse effects on human health are also predicted to be negligible due to the use of stringent mitigation measures and best available techniques in full accordance with health and safety legislation.

The Amended Proposed Development would not be likely to have a detrimental effect on the health of those who live, work or use the PRoWs close to the Site. The Applicant has provided detailed measures to manage potential impacts. This demonstrates a level of surety that environmental effects are fully considered, managed and mitigated from the outset, including through the embedded mitigation provided by the Amended Proposed Development.

[9] Further detail on the mitigation of potential risks to the water environment is detailed within ESA Volume 1, Chapter 9, Hydrology, Hydrogeology and Flood Risk.

[10] Volume 1, Chapter 10, Section 10.6.3.3 of the ES, have been updated such that the magnitude and significance of impacts to surface water bodies following restoration is moderate beneficial.

6.1 Revised Health Matrix

Table 6-1: Revised Health Matrix Based on Nottinghamshire Rapid Health Impact Assessment Matrix

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
1. Housing quality and design				
1. Does the proposal seek to address the housing needs of the wider community by requiring provision of variation of house type that will meet the needs of older or disabled people? [For example, does it meet all Lifetime Homes Standards, Building for Life etc.?]	Yes Partial ✓ No		Positive Negative Neutral Uncertain	
2. Does the proposal promote Development that will reduce energy requirements and living costs and ensure that homes are dry in winter and cool in summer.	Yes Partial ✓ No		Positive Negative Neutral Uncertain	
2. Access to healthcare services and other social infrastructure				
3. Does the proposal seek to retain, replace or provide health and social care	Yes Partial ✓ No	N/A	Positive Negative Neutral	N/A

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
related infrastructure?			Uncertain	
4. Does the proposal address the proposed growth/ assess the impact on healthcare services?	Yes Partial ✓ No	N/A	Positive Negative Neutral Uncertain	N/A
5. Does the proposal explore/allow for opportunities for shared. community use and co-location of services?	Yes Partial ✓ No	N/A	Positive Negative Neutral Uncertain	N/A
3. Access to open space and nature				
6. Does the proposal seek to Retain and enhance. existing and provide new. open and natural spaces to support healthy living and physical activity?	✓ Yes Partial No	The Amended Proposed Development retains existing Public Rights of Way (PRoWs) crossing the Site, enabling continued use by the public throughout the operational phase. Once restoration has been completed, new open spaces, woodland and waterbodies would be created, providing additional interest, enhancing the mental wellbeing for those using the PRoWs. Impacts arising from the restoration of the Site are therefore considered to be positive and beneficial.	✓ Positive Negative Neutral	Initiatives such as wayfinding and interpretation boards would enhance the experience for those using the PRoWs by providing educational information relating to key facts about the development of the Site; biodiversity and placemaking. Work with NWT and other interested local environmental groups throughout the 30 year post restoration aftercare period. Ensure interpretation boards are regularly updated to remain relevant as the restored landscape develops and matures.
7. Does the proposal promote links between open and natural spaces and areas of residence, employment	✓ Yes Partial No	The Amended Proposed Development retains. existing PRoWs crossing the Site, enabling continued use through the operational phase.	✓ Positive Negative Neutral Uncertain	

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
and commerce?		These connect the villages Lound and Sutton cum Lound to the Sutton & Lound SSSI, Local Wildlife Site and Idle Valley Nature Reserve. The Amended Proposed Development retains the existing permissive NWT path to the Idle Valley Nature Reserve and Rural Learning Centre.		
Assessment criteria	**Relevant?**	**Details/evidence**	**Potential health impact?**	**Recommended amendments or enhancement actions to the proposal under consideration**
8. Does the proposal seek to Ensure that open and natural spaces are welcoming, safe and accessible to all?	✓Yes Partial No	The Amended Proposed Development would retain and enhance accessibility to open and natural spaces. However, access within the Site would be seasonally restricted to protect sensitive ecological species (i.e. birds) during breeding seasons.	✓ Positive Negative Neutral Uncertain	Bird hides, viewing areas would be provided for the public to use in times when access within the Site is restricted to protect breeding species. As discussed above, the restoration of the Site would provide new natural spaces that would improve the biodiversity and landscape quality and value of the area. Interpretation boards situated at points along PRoWs and within the Site would provide educate and increase awareness of the emerging ecological value of the restoration landscape.
9. Does the proposal seek to provide a range of play spaces for children and young people (e.g., play pitches, play areas etc.) including provision for those that are disabled?	Yes Partial ✓No	N/A	Positive Negative Neutral Uncertain	N/A
4. Air quality, noise, and neighbourhood amenity				
10. Does the proposal seek to	✓Yes	The PFA is odourless and classified by the	Positive	

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
minimise construction impacts. such as dust, noise, vibration, and odours?	Partial No	Environment Agency as non-hazardous waste. Changes to PFA extraction processes have been made to reduce impacts relating to noise, dust and contamination to reduce the effects on neighbourhood amenity. These include: • Stringent noise thresholds developed to monitor any exceedances during the noisier temporary construction activities; • Changes to the PFA extraction process with soil stripping activities limited to a maximum of 12 days in any one year of extraction operations; • Working within micro phase (less than 1%of area A) and within a void to limit the potential for airborne dust making use of the lagoon embankments (primarily within the High-Rise areas) as shields to screen extraction activities and provide acoustic screening; • Erection of temporary noise mitigation bunds/timber acoustic fences in the Low-Rise areas to supplement the smaller lagoon embankments at strategic locations; • Placing ancillary plant in areas to cause minimum noise disturbance; and	Negative ✓ Neutral Uncertain	

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
		• Development of a circular vehicular movement system within Area C to minimise vehicle movements and route efficiency. • Control measures within an updated Dust Management and Monitoring Plan (DMMP). • An updated Outline Construction Environmental Management Plan (OCEMP), Technical appendix 5.3 ESA Volume 3 including specific plans relating to the discovery and handling of asbestos and other contaminants (Discovery Strategy and Waste Acceptance Procedures).		
11. Does the proposal seek to Minimise air pollution caused by traffic and employment/commercial facilities?	✓Yes Partial No	An Air Emissions Impact Assessment of the 'point source' emissions from the Amended Proposed Development has been undertaken, the results of which are reported in ESA Chapter 13; Air Quality. The assessment reports on the impacts from the drying units within the Main Processing Site (Area C) and airborne dust from the extraction and handling of PFA. The DMMP provides measures to limit airborne dust and fugitive emissions. These include: • Updated procedures to mitigate dust, including management of PFA stockpiles and methods for dampening and sealing the surface; • Routine visual dust monitoring procedures through the working day • targeted monitoring	Positive Negative ✓ Neutral Uncertain	

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
		• Contingency plans in the event of equipment failures and or complaints are received. • Weather monitoring • The temporary retention of lagoon embankments as shields against the prevailing wind Further construction mitigation measures are included in the OCEMP (TA5.3). As mentioned above, the updated noise . Predicted impacts arising from traffic pollution remain as reported in the ES, Chapter 13: Air Quality. In terms of significance with regard to the Environmental Regulations (2017) this is considered to be of negligible significance.		
12. Does the proposal seek to minimise noise pollution. caused by traffic and employment/ commercial facilities?	✓Yes Partial No	The assessment operational traffic on the existing local road network as reported in the ES Chapter 12: Noise d that there would be a negligible increase in road traffic noise for existing noise sensitive receptors during all phases. Embedded and additional mitigation measures for noise impacts include: • The works no longer requiring dewatering of the PFA; • Soil stripping activities limited to 12 days in any given year; • Installation of a timber acoustic fence during both the extraction and restoration; • An additional 2m bund formed of soil placed on top of the of the existing embankment to increase the total height to approximately 5 m;	Positive Negative ✓Neutral Uncertain	

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
		• The conveyor belt would be covered where practicable in order to reduce noise emissions. • Removal of temporary processing areas; • Vehicle movements would be minimised across the site; and • The restoration activities would take place progressively and would be completed as quickly as possible in areas where extraction has ceased. Further construction mitigation measures are included in the OCEMP (TA5.3). As mentioned above, the updated noise impact assessment has identified the predicted likely noise levels. The noise sensitive receptors have reduced slightly due to the revisions of the Amended Proposed Development. The removal of processing areas and updates to the extraction scheme. Therefore, there are no other major changes to the noise impact assessment.		
Assessment criteria	**Relevant?**	**Details/evidence**	**Potential health impact?**	**Recommended amendments or enhancement actions to the proposal under consideration**
5. Accessibility and active transport				
13. Does the proposal prioritise and encourage walking (such as through shared spaces) connecting to local walking networks?	✓ Yes Partial No	The proposal retains existing PROWs which would remain open during the operation of the Amended Proposed Development. This would ensure local walking networks remain intact and accessible.	Positive Negative ✓ Neutral Uncertain	

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
14. Does the proposal prioritise and encourage cycling (for example by providing secure cycle parking, showers, and cycle lanes) connecting to local and strategic cycle networks?	Yes Partial ✓No		Positive Negative Neutral Uncertain	
15. Does the proposal support traffic management and calming measures to help reduce and minimise road injuries?	✓Yes Partial No	As stated in the Environmental Statement (ES), Chapter 15: Traffic and Transport traffic movements would be controlled during the construction phase to minimise potential impacts on the surrounding road network. A range of best practice measures during the construction phase to minimise traffic impacts upon local highways would be applied through the implementation of a Construction Traffic Management Plan (CTMP), to be secured by a suitable planning condition. The following avoidance measures would be considered in relation to the traffic forecasts and impacts during operation for the lifetime of the Proposed Development: • Operational Traffic Management Plan (OTMP), to mitigate the impact of the operational phase and associated traffic. • Staff Travel Plan to reduce the number of employees travelling to the Site by single occupancy car.	✓ Positive Negative Neutral Uncertain	It should be noted that Nottinghamshire County Council Highways have reviewed the ES and raised no objection on traffic grounds.

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
16. Does the proposal promote accessible buildings and places to enable access to people with mobility problems or a disability?	Yes Partial ✓ No		Positive Negative Neutral Uncertain	
6. Crime reduction and community safety				
17. Does the proposal create environments & buildings that make people feel safe, secure, and free from crime?	Yes Partial ✓ No	Not applicable as the Amended Proposed Development would not be accessible to the general public during operation.	Positive Negative ✓ Neutral Uncertain	
7. Access to healthy food				
18. Does the proposal support the retention and creation of food growing areas, allotments, and community gardens in order to support a healthy diet and physical activity?	Yes Partial ✓ No		Positive Negative Neutral Uncertain	

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
19. Does the proposal seek to restrict the development of hot food takeaways (A5) in specific areas?	Yes Partial ✓ No		Positive Negative Neutral Uncertain	
8. Access to work and training				
20. Does the proposal seek to provide new employment opportunities and encourage local employment and training?	✓ Yes Partial No	As reported in the ES and updated ESA, it is estimated that around 20-30 direct jobs would be created including site processing and handling staff, admin & welfare, construction machine operators, landscape construction and forestry workers. Also, a number of the direct jobs would be skilled jobs such as project managers and engineers. There would also be indirect job creation, including in the local supply chain and haulage contracts.	✓ Positive Negative Neutral Uncertain	
9. Social cohesion and lifetime neighbourhoods				

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
21. Does the proposal connect with existing communities where the layout and movement avoids physical barriers and severance and encourages social interaction? [For example, does it address the components of Lifetime Neighbourhoods?]	Yes Partial ✓ No		Positive Negative Neutral Uncertain	
10. Minimising the use of resources				
22. Does the proposal seek to incorporate sustainable design and construction techniques?	✓ Yes Partial No	Reusing PFA in the concrete and cement industries presents an important example of the circular economy where the waste output of one process can be used as a material component to another - reducing the need to extract primary resources. Additionally, unless stockpiled PFA deposits, like those derived from the Amended Proposed Development are utilised, manufacturers who currently use PFA would have to revert to Portland cement or import PFA from abroad. The use of PFA from the Amended Proposed Development would contribute overall to the development of sustainable development through its application as a cement substitute. Also, the Amended Proposed Development as demonstrated in the previous sections of this report would provide an overall beneficial significance in terms of GHG emissions.	✓ Positive Negative Neutral Uncertain	

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
11. Climate change				
23. Does the proposal incorporate renewable energy and ensure that buildings and public spaces are designed to respond to winter and summer temperatures, i.e. ventilation, shading and landscaping?	✓ Yes Partial No	A qualitative assessment of the climate resilience of the Amended Proposed Development to climate change was undertaken with the original EIA – which has not been updated. The climate resilience measures identified and adopted by the design seek to minimise climate risks due to future climate change. These include, but are not limited to: • Design standards to meet higher ambient temperatures; • Active surface water management measures in place; • Planting chosen to be resilient to drought; and, • Roofs and facades designed to withstand storm damage. The assessment has found that the Amended Proposed Development is resilient to climatic changes within its lifetime and the effects are not significant.	✓ Positive Negative Neutral Uncertain	
24. Does the proposal maintain or enhance biodiversity	✓ Yes Partial No	Through the implementation of mitigation measures: • Outline Monitoring and Mitigation Plan; • A Restoration Scheme • Outline Construction Environment Management Plan, • Avoiding high value boundary habitats • Best practice mitigation;	✓ Positive Negative Neutral Uncertain	

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
		• A Dust Management Plan Using these mitigation measures, the potential residual effects of the Amended Proposed Development are assessed as being of low to negligible magnitude and thus not significant in terms of the EIA regulations. The Amended Proposed Development includes the following key changes which would enhance biodiversity: • Reduced areas of open standing water at the eastern end of the Site, with more scalloped edges and shallower depths. • Reduced areas of native tree planting in the western edge of the Site and increased woodland / scrub planting along the southern edge. • Increased and broader areas of wet grassland and reduced areas of pasture. • Scrapes included amongst the wet grassland that would be beneficial to amphibians, insects, and other invertebrates. • Areas of wet scrub along the southern edge of the Site. • Increased areas of species rich grassland at the western end of the Site. The Applicant is committed to a 10% net gain in biodiversity, and it is anticipated that there would be a significant improvement on the		

Assessment criteria	Relevant?	Details/evidence	Potential health impact?	Recommended amendments or enhancement actions to the proposal under consideration
		current habitats at the Site. This 10% net gain is demonstrably achievable as the outline calculation suggests the Proposed Development would have a biodiversity net gain of 43.64%. Details of this are provided and would be implemented through the through the compensatory habitat and implementation of the Outline Restoration Strategy, Habitat Management and Monitoring Plan (HMMP and associated BNG assessment.		
12. Health inequalities				
25. Does the proposal consider health inequalities and encourage engagement by underserved communities?	Yes Partial ✓ No	N/A	Positive Negative Neutral Uncertain	N/A
Any other comments				
N/A				
Name of assessor and organisation	Environmental Resources Management Limited on behalf of Lound Hive Limited.			
Date of assessment	January 2024			