A8. Ground Conditions

Purpose of the Assessment

A8.1 The purpose of this addendum to the July 2016 ES is to assess the potentially likely significant environmental effects as a result of the amendments which have been made to the proposals (as described in Chapter A4). In addition, any relevant new/updated information or points of clarification which could be considered relevant to identifying the potential likely significant effects of the proposals are presented.

A8.2 In 2016, an ES (July 2016 ES, to be found at **Technical Addendum Appendix A1.0 and A1.1)** was prepared to support the redevelopment of the former North Bierley WWTW and adjacent land for mixed use purposes comprising B2/B8 employment and residential development. In addition, a related planning application for a new car park for a local school was submitted. This ES Addendum will consider the changes between the original scheme and the new scheme which now comprises a solely commercial development on a reduced development area along with the new car park.

A8.4 This Chapter is prepared by Wardell Armstrong

A8.4 The following comments are made with regard to the Ground Conditions chapter and will clarify whether the information contained within the original ES (July 2016 ES) remain valid or whether the changes to the development proposal would result in a change to the assessment.

Legislative Framework

National Policy and Legislation

A8.5 The relevant legislation, planning policy and guidance set out in paragraphs 8.3 – 8.10 remains valid.

Local Policy

Kirklees

A8.6 The relevant local policy Kirklees Council as set out in paragraphs 8.11 – 8.12 remains valid.

A8.7 However, the Kirklees Publication Draft Local Plan [Ref. A8.1] was published for consultation in December 2016 prior to being submitted to the Secretary of State for independent examination, due to start on 10 October 2017. The Development should also be considered in the context of this policy as follows:

Policy PLP 52

Protection and improvement of environmental quality

A8.8 Proposals which have the potential to increase pollution from noise, vibration, light, dust, odour, shadow flicker, chemicals and other forms of pollution or to increase pollution to soil or where environmentally sensitive development would be subject to significant levels of pollution, must be accompanied by evid*ence to show that the impacts have been evaluated and measures have been incorporated to prevent or reduce the pollution, so as to ensure it does not reduce the quality of life and well-being of people to an unacceptable level or have unacceptable impacts on the environment. Such developments which cannot incorporate suitable and sustainable mitigation measures which reduce pollution levels to an acceptable level to protect the quality of life and well-being of people or protect the environment will not be permitted.*

Where possible, all new development should improve the existing environment.

Policy PLP 53

Contaminated and unstable land

A8.9 Development on land that is unstable, currently contaminated or suspected of being contaminated due to its previous history or geology, or that will potentially become contaminated as a result of the development, will require the submission of an appropriate contamination assessment and/or land instability risk assessment.

A8.10 For developments identified as being at risk of instability, or where there is evidence of contamination, measures should be incorporated to remediate the land and/or incorporate other measures to ensure that the contamination/instability does not have the potential to cause harm to people or the environment. Such developments which cannot incorporate suitable and sustainable mitigation measures which protect the well-being of residents or protect the environment will not be permitted.

Bradford

A8.11 Paragraphs 8.13 – 8.22 of July 2016 ES are no longer valid following the adoption of the Core Strategy (Ref A8.8) by Bradford Metropolitan District Council on 18 July 2017. The Core Strategy now forms part of the Development Plan for the Bradford District and will be used in determining planning applications. The following paragraphs are now to be inserted after Paragraph 8.12 of July 2016 ES:

"Policy EN8: Environmental Protection

A8.12 In order to protect public health and the environment the Council will require that:

A8.13 Proposals which are likely to cause pollution or are likely to result in exposure to sources of pollution (including noise, odour and light pollution) or risks to safety, will only be permitted if measures can be implemented to minimise pollution and risk to a level that provides a high standard of protection for health, environmental quality and amenity. The following issues require particular attention:

B. Land

A8.14 Proposals for development of land which may be contaminated or unstable must incorporate appropriate investigation into the quality of the land. Where there is evidence of contamination or instability, remedial measures must be identified to ensure that the development will not pose a risk to human health, public safety and the environment. Investigation of land quality must be carried out in accordance with the principles of best practice.

A8.15 The focus on encouraging the re-cycling of brownfield land, the need to identify land suitable for accommodating future growth, combined with the District's history of industrial activity, mean that land contamination is frequently an important planning consideration within the District. This is often a significant issue where sites proposed for residential use were formerly occupied by manufacturing activities or other industrial processes. To successfully resolve issues relating to residual contamination, sites must be subject to appropriate investigation and assessment of potential risks associated with previous land uses to make them 'suitable for use'. Addressing land quality issues is an important consideration in seeking to attract investment into the District. In the majority of cases, where the Local Planning Authority works in partnership with developers from the outset, contamination issues relating to previous land uses can be successfully resolved".

Policy WM1: Waste Management

A8.16 A. The Council will work with its partners and neighbouring authorities to integrate strategies for waste management in Bradford and at the sub-regional and regional levels. All forms of waste will be managed in accordance with the principles of the waste management hierarchy.

- Prevention
- Preparing for re-use
- Recycling
- Other recovery
- Disposal

"Core Strategy Objective 13:

A8.17 To reduce the impact of climate change through mitigation and adaptation, particularly through reducing pollution, energy consumption, the risk of flooding, and promoting the use of renewable energy and securing the means to become locally self sufficient".

"Core Strategy Objective 16:

A8.18 Safeguard and enhance the District's natural and renewable energy resources, including water, agriculture, woodland and minerals, and promote the sustainable management of waste and recycling".

Assessment Methodology

A8.19 Paragraph 8.23 is deleted and replaced by:

'Available reports and published information have been reviewed with the aim of identifying the ground conditions within and surrounding the proposed commercial development. This data review has established the geological situation beneath the site, identified areas of potentially contaminated land and of potential land instability and made an assessment of the engineering properties of the soils and rocks. It also identified potential pollutant linkages, and facilitated a risk assessment for each of the identified pollutant linkages'.

A8.20 Paragraph 8.24 remains valid.

Methodology

A8.21 Paragraph 8.25 is deleted and replaced by:

'This assessment is based upon a review of current and historical data, site walk overs and site investigations. The development area has been considered following appropriate guidance for the proposed land use. The school parking area in the north west of the site has been considered as a commercial land use'.

A8.22 Paragraph 8.26 now includes a further appendix:

- Wardell Armstrong LLP. Updated Ground Conditions Risk Assessment, Reference JAS/JL/SH10534-LET-011, dated 10 October 2017 (**Addendum Technical Appendix A8.0**).

A8.23 July 2016 ES Technical Appendices 8.4 has now been superseded.

A8.24 The methodology for assessment as set out in Paragraph 8.27 remains valid.

Significance Criteria

A8.25 The significance criteria as set out in Paragraph 8.28 remains valid.

Study Area

A8.26 The study area is as set out in Chapter3 of the July 2016, **Figure 3.1**. Namely, it is unchanged from the red line area for the planning application.

Surveys

A8.27 Paragraph 8.30 – 8.33 referring to the surveys used to inform the chapter remain valid with any reference to residential development disregarded.

Consultation

A8.28 Paragraph 8.34 remains valid. However, consultation responses were also received following the submission of the application in 2016. The Environmental Health comments were that the contamination aspects of the application were acceptable.

Limitations of Site Investigation

A8.29 The limitations of the site investigation as set out in Paragraph 8.35 remain valid.

Baseline Conditions

A8.30 The baseline conditions as set out in Paragraphs 8.36 – 8.37 remain valid.

Site Investigation

A8.31 Paragraph 8.38 remains valid. However, due to the change in land use from mixed residential and commercial to solely commercial and the reduction in the developable area, the site has been reassessed to accurately reflect this new proposal. A letter report has been prepared and is appended at AA8.6 entitled "*Updated Ground Conditions Risk Assessment*" which summarises this new assessment.

Geology

A8.32 The description of the geological setting beneath the site as described in Paragraph 8.39 remains valid.

Hydrogeology

A8.33 The hydrogeological setting at the site as described in Paragraph 8.40 – 8.43 remains valid.

Hydrology

A8.34 The hydrological setting as described in Paragraph 8.44 remains valid.

Mining

A8.35 The mining setting at the site as described in Paragraphs 8.45 – 8.58 remain valid.

Phase II Intrusive Site Investigation

A8.36 The Phase II investigation as set out in Paragraphs 8.59 – 8.61 remain valid. However, reference should now be made to **Addendum Technical Appendix A8.0** as well as July 2016 ES Technical Appendix 8.2 and drawing SH10534-008c.

Scope

A8.37 The scope of the investigation as set out in Paragraphs 8.62 – 8.64 remain valid.

Contamination Assessment

A8.38 Paragraphs 8.65 – 8.77 are no longer valid due to the new Development Proposals (commercial only) and the reduced developable area. The Contamination Assessment has therefore been updated based on letter report JAS/JL/SH10534-LET-011 dated 10 October 2017. The site has been reassessed with regard to this information and the following paragraphs are now valid.

Human Health

Human Health – Future Occupiers

A8.39 Generic Assessment Criteria (GAC) values derived using the CLEA Model with an SOM of 2.5% have been selected in this GQRA assessment.

A8.40 The soil concentrations for heavy metals, Polycyclic Aromatic Hydrocarbons (PAHs), petroleum hydrocarbons (TPHCWG) were below their respective GAC for commercial land use.

A8.41 Thirteen soil samples were screened for asbestos and no asbestos fibres were detected. In addition, no visual evidence of asbestos was recorded during site investigation works. Therefore, asbestos in soil contamination is unlikely to pose a risk to future site occupiers.

A8.42 The proposed car park is considered to have a low sensitivity as it is greenfield and covered by hardstanding. No source-pathway-receptor linkages are identified for this area and it is not considered further within the risk assessment.

Human Health – Construction Workers

A8.43 Thirteen samples tested for asbestos in made ground across the site recorded non-detect at screening level. These areas are not likely to pose a significant risk to construction workers.

A8.44 However, as with groundworks on all sites where made ground is present, it would be prudent to employ good site practices such as wearing of PPE and hazard awareness etc. during the groundworks. In addition, in the event that asbestos is visually identified during the groundworks, all works within the vicinity should cease and further advice should be sought.

A8.45 If further testing demonstrates that asbestos is present the following additional precautions may be required:

- Use of personal protective equipment such as gloves and masks during excavations
- Dust suppression employed in the form of a water mist during excavations;
- Dust monitoring of generation and levels employed throughout the works; include visual checks and use of a portable, hand held nephelometer; and
- Any stockpiles of excavated material will need to be kept damp and placed in a designated area lined and securely covered with polythene sheets or similar.

Surface Water and Groundwater

A8.46 From a comparison of soil and groundwater concentrations recorded on site against environmental quality standards, the recorded concentrations of medium to long chain petroleum hydrocarbons in groundwater are elevated with respect to the UKDWS in

BH5 and BH6 which are located outside of the proposed development area to the south. No significantly elevated petroleum hydrocarbon concentrations were identified in soil and the concentrations of petroleum hydrocarbons in groundwater across the development area are generally below the LOD and/or UKDWS, therefore the risk to surface water and groundwater can be considered more towards low than moderate for the development area.

Preliminary Remediation Options

A8.47 The previous assessment was based on a residential and commercial land use and recommended further work with respect to elevated heavy metal concentrations in the formerly proposed residential area in the north west area. However, as this area is now proposed for commercial land use and the soil concentrations are below their respective commercial GAC, this work is no longer considered necessary.

Buildings and Property

A8.48 Results from sulphate (2:1 extract) for materials on site indicate that a worst case design sulphate class of DS-2 and Aggressive Chemical for Concrete (ACEC) class of AC-2 may be appropriate for the application site.

Ground Gas

A8.49 The monitoring wells within the development area are characterised by low concentrations of methane (max 1.6%) and moderate concentrations of carbon dioxide (max 3.7%). The calculation of the Gas Screening Value using the ground gas data from the monitoring wells at the site indicates a classification of Characteristic Situation 1. No special ground gas protection measures are required for the development area.

Ecology

A8.50 The phytotoxic metals were analysed against the ECO-SSL threshold values for risk to sensitive plants. The results displayed numerous samples to have elevated metals considered likely to hinder sensitive plant growth in planned areas of landscaping. This is based on an overly conservative assessment using generic criteria and plants have been observed growing on site. Therefore this is not considered to be a significant concern.

Coal Mining

A8.51 The coal mining assessment as set out in Paragraph 8.78 remains valid. However, reference is made to BH6 which now lies outside the newly proposed developable area. Should development be proposed in this area in the future, this area will require further investigation and stabilisation.

Revised Conceptual Model

A8.52 The revised conceptual model as set out in Paragraphs 8.79 – 8.85 is no longer valid. The paragraph should now read: In line with current Environment Agency guidance, source, pathway and receptor linkages have been considered for the Application Site

based on the findings of the intrusive site investigation works and associated geochemical testing. Based on the information available for the site, no plausible source-pathway-receptor linkage has been identified for the proposed commercial land use.

Geotechnical and Foundation Design

A8.53 Paragraphs 8.86 and 8.91 – 8.96 remain valid.

A8.54 Paragraphs 8.87 – 8.90 are no longer valid as residential development is no longer proposed at the site.

North Bierley Mining Remediation Strategy

A8.55 The Mining Remediation Strategy as set out in Paragraphs 8.97 – 8.100 remain valid.

A8.56 However, July 2016 ES Technical Appendix 8.2 (found in Paragraph 8.97 and incorrectly referred to as Technical Appendix 8.3) should now be read in conjunction with **Addendum Technical Appendix A8.0,** which assesses the new proposals for the development following the comments received through the consultation. The July 2016 ES Technical Appendix 8.4 has been superseded.

A8.57 Paragraph 8.101 should now read:

'*The drilling works carried out to date have indicated some evidence of broken or soft ground indicative of old workings between 11.3m and 16.7m below ground level in BH6. Mine workings are primarily anticipated beneath the south of the newly proposed development area'.*

Soils and Agricultural Land Desk Study, Wardell Armstrong, July 2015 (superseded by report dated October 2017)

A8.58 The Soils and Agricultural Desk Study as set out in Paragraphs 8.102 – 8.106 remain valid.

A8.59 Paragraph 8.107 is deleted and replaced by:

'The Proposed Development would result in permanent loss of approximately 12ha of non-BMV agricultural land. It would also result in disturbance to soil resources due to earthworks. There is a potential to retain the majority of soil resources at the Application Site and reuse them in the creation of greenspaces, as well as use of suitable subsoil as an engineering fill, if required. Should the soil resources be exported from the Application Site appropriate Environment Agency permits will be required as waste regulations would apply to surplus soil. It is recommended that Defra's 2009 Construction Code of Practice for the Sustainable Use of Soils on Construction Sites is followed to minimise disturbance to soil resources and ensure suitable land quality for non-agricultural uses within the Proposed Development.

Predicted Significant Effects

A8.60 The predicted significant effects as set out in Paragraph 8.108 remain valid.

Assessment of Construction Effects

A8.61 The assessment of construction effects as set out in Paragraph 8.109 remains valid. However, Potential Impact [3] in Table 8.8 should read: *Impact on construction workers as a result of excavations into potentially contaminated soils/groundwater*.

Assessment of Operational Effects

A8.62 The assessment of operational effects as set out in Paragraph 8.110 remains valid. However, Potential Impact [8] in Table 8.9 is no longer valid. The rest of Table 8.9 is valid.

Scope of Mitigation

A8.63 The scope of mitigation as set out in Paragraph 8.111 remains valid.

A8.64 No mitigation is identified with respect to ground contamination as no plausible source-pathway-receptor linkage has been identified for the proposed commercial land use. However, as with groundworks on all sites where made ground is present, it would be prudent to employ good site practices such as wearing of PPE and hazard awareness etc. during groundworks on site.

Construction Phase

A8.65 The construction phase mitigation as set out in Paragraphs 8.113 – 8.114 remain valid.

A8.66 Paragraph 8.115 is deleted and replaced by:

'There is a potential to retain the majority of soil resources at the Application Site and reuse them in creation of greenspaces, as well as use of suitable subsoil as an engineering fill, if required. Should the soil resources be exported from the Application Site, appropriate Environment Agency permits will be required as waste regulations would apply to surplus soil. It is recommended that Defra's 2009 Construction Code of Practice for the Sustainable Use of Soils on Construction Sites is followed to minimise disturbance to soil resources and ensure suitable land quality for non-agricultural uses within the Proposed Development'.

A8.67 Paragraphs 8.116 – 8.117 remain valid.

A8.68 Paragraph 8.18 should now read:

'The Phase II Assessment indicates that there are no elevated levels of contaminants at the site with respect to the proposed commercial use. However, the potential for pockets of unidentified contamination remains a possibility. The significance of any unmitigated effect is assessed as moderate adverse'.

A8.69 Paragraphs 8.19 – 8.122 remain valid.

Operational Phase

A8.70 The operational phase mitigation as set out in Paragraphs 8.123 – 8.131 remain valid.

A8.71 Paragraphs 8.132 – 8.134 are no longer valid as they relate to residential development which no longer forms the Proposed Development.

A8.72 The ground gas assessment classified the development area as Characteristic Situation 1 and no special ground gas protection measures are required for this area.

Residual Effect Assessment

A8.73 The residual effect assessment as set out in Paragraph 8.137 remains valid. Table 8.10 is now superseded by the following table:

Table A8.1 Summary of Residual Effects

Potential Impact	Impact Area	Phase	Significance of unmitigated impact	Mitigation Measures	Residual Significance	Period and Permanent/ temporary
Permanent loss of soils/natural strata through construction/ excavation.	Local	Construction	Minor adverse	Cut material from site used elsewhere on Application Site. EA permit to be obtained should soil resources need to be removed from site. Defra's 2009 Construction Code of Practice for the Sustainable Use of Soils on Construction sites to be followed.	Negligible	Long term Permanent
Introduction of additional contamination into soil/ groundwater during construction phase as a result of accidental spillages i.e. fuels,	Local	Construction	Minor adverse	All fuel, oil and chemicals should be contained within a bunded compound or in bunded, double skinned tanks. Spill control and clean up facilities will be provided and	Negligible	Short term Temporary

Potential Impact	Impact Area	Phase	Significance of unmitigated impact	Mitigation Measures	Residual Significance	Period and Permanent/ temporary
construction materials.				on-site vehicle maintenance will be prohibited.		
Impact on construction workers as a result of excavations into potentially contaminated soils/ groundwater	Local	Construction	Moderate adverse	All construction workers and visitors will adhere to relevant health and safety measures including the use of PPE.	Negligible	Short term Temporary
Impact on construction workers as a result of excavations into and treatment of unstable mining features i.e. shafts/bell pits.	Local	Construction	Major adverse	All mining features which are likely to be impacted by the proposed development will be investigated and treated to stabilise them. Construction works will be carried out to agreed methods statements and a watching brief will be maintained for unrecorded features.	Negligible	Short term Temporary
Introduction of contamination into soil/ groundwater as a result of accidental spillage/ leakage from	Local	Operation	Minor adverse	Fuel interceptors will be incorporated within the drainage design to remove any hazardous substances	Negligible	Short term Temporary

Potential Impact	Impact Area	Phase	Significance of unmitigated impact	Mitigation Measures	Residual Significance	Period and Permanent/ temporary
vehicles (site users and delivery vehicles).				which might be present. Interceptors will be subject to regular maintenance inspections.		
Degradation of building materials over time as a result of contact with sulphates within soils.	Local	Operation	Minor adverse	Selection of foundations and concrete should consider the results of the site investigation and be designed accordingly. Buried concrete structures will be designed taking into account the pH and sulphate concentration in the ground. Water supply pipes and buried pipes will be composed of a suitably resistant material.	Negligible	Short term Permanent
Impact on buildings/ development as a result of unstable ground (mining features, cut and fill groundworks).	Local	Operation	Major adverse	Made ground and areas where filling is required may require ground engineering to ensure a suitable founding medium. Mine	Negligible	Short term Permanent

Potential Impact	Impact Area	Phase	Significance of unmitigated impact	Mitigation Measures	Residual Significance	Period and Permanent/ temporary
				workings will require stabilisation beneath the Proposed Development.		

Cumulative Effect Assessment

A8.74 The cumulative effect assessment as set out in Paragraphs 8.138 – 8.140 remains valid.

Monitoring

A8.75 The suggested monitoring regime as set out in Paragraph 8.140 remains valid.

References

A8.1 Kirklees Publication Draft Local Plan (November 2016)

A8.2 Bradford Council Core Strategy (July 2017)