

### Coal Mining Risk Assessment

This assessment has been written in accordance with guidance contained in The Coal Authority document: *Risk based approach to development management, Guidance for developers, Version 4, 2017*.

The assessment aims to:

- Provide a desk-based report of information on the coal mining issues which are relevant to the application site;
- Use the available information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact or issues;
- Set out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development;
- Demonstrate to the Local Planning Authority that the application site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on unstable land.

### Site Location and Description:

*The site is located in Whiston, Knowsley with a central National Grid reference number of 347493E 390378N. It is accessed via Lickers Lane and the proposed development area is shown on Drawing Number GM11893-001 Rev A. The proposed development comprises a residential development and associated infrastructure.*

### Sources of information:

- ***The Coal Authority Consultants Mining Report reference 51002541812001 dated 2 July 2021 (Appendix A). Please note: the boundary shown on the Coal Authority Report is not the actual Site boundary and covers a larger area.***
- ***The Coal Authority Interactive Map Viewer.***
- ***British Geological Survey (BGS) Onshore GeoIndex Borehole Records, checked on 14/7/2021 (nearest available borehole logs approx. 600m south of the Site).***
- ***BGS geological mapping: Geological Survey of England and Wales 1:10,560 geological map series, New Series. Sheet 107. Lancashire. 1957 (Excerpt at Appendix B).***
- ***BGS Onshore GeoIndex geological mapping: Artificial Ground, Superficial Deposits, Bedrock Geology and Linear Features.***
- ***BGS Onshore GeoIndex Opencast Coal Prospecting Sites.***
- ***BGS Geological Memoirs.***
- ***Unpublished information contained in Wardell Armstrong archives.***

| Identification, Assessment and Mitigation of Site-Specific Coal Mining Risk                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                      |
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| Issue                                                                                                                                       | Site Affected (Yes/No)                                                                                                                                                                                                                                                                                                                                                                                 | Hazard                                                                                                                                                                                                   | Consequences                                                                                                                                                                                                                                                                    | Recommended Mitigation Measures                                                                                                                                                                                      |
| 1. Are there any recorded coal mine entries within the site or within 20m of the site boundary?                                             | <p><b>No</b> – There are no mine entries on Site or within influencing distance (20m) of the search area. Drawing Number GM11893-002 displays the approximate shaft locations in relation to the Site boundary.</p> <p>Three shaft entries are shown on the geological mapping for the area, but are located approximately 130m SW from the site boundary, as shown on Drawing Number GM11893-002.</p> | N/A                                                                                                                                                                                                      | N/A                                                                                                                                                                                                                                                                             | N/A                                                                                                                                                                                                                  |
| 2. Is the proposed development in the likely zone of influence of past deep underground mining?                                             | <b>Yes</b> - The Coal Authority note that the search area is located in the zone of influence of past underground coal mining from seams of coal reported from 146m and 427m in depth. Reported to have last been mined in 1902 latest.                                                                                                                                                                | <ul style="list-style-type: none"> <li>Ground subsidence.</li> <li>Ground instability, loss of ground, generation of crown holes.</li> <li>Transmission of mine gas emissions and mine water.</li> </ul> | Ground subsidence related to collapse or settlement. However, bearing in mind the depth and age of deep workings, all significant ground movement arising from deep underground coal workings should now have ceased.                                                           | N/A                                                                                                                                                                                                                  |
| 3. Is the proposed development in the likely zone of influence of any present underground coal workings?                                    | <b>No.</b>                                                                                                                                                                                                                                                                                                                                                                                             | N/A                                                                                                                                                                                                      | N/A                                                                                                                                                                                                                                                                             | N/A                                                                                                                                                                                                                  |
| 4. Is the proposed development within the likely zone of influence of underground coal workings at shallow depth (depths of less than 30m)? | <b>No</b>                                                                                                                                                                                                                                                                                                                                                                                              | N/A                                                                                                                                                                                                      | N/A                                                                                                                                                                                                                                                                             | N/A                                                                                                                                                                                                                  |
| 5. Is there a possibility of unrecorded shallow mine workings and/or mine entries?                                                          | <p><b>Unrecorded Shallow Mine Workings:</b></p> <p><b>Yes</b> – The British Geological Survey, 1957, Lancashire, England and Wales Sheet 107 (Bedrock and Bedrock and Superficial Deposits</p>                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>Ground subsidence.</li> <li>Ground instability, loss of ground, generation of crown holes.</li> </ul>                                                             | <p><b>Unrecorded Shallow Mine Workings:</b></p> <p>Ground subsidence related to collapse or settlement processes associated with mine workings may result in:</p> <ul style="list-style-type: none"> <li>Ground instability and damage to the future infrastructure.</li> </ul> | <p><b>Unrecorded Shallow Mine Workings:</b></p> <p>In the event that unrecorded shallow workings do exist, they would be of pillar and stall type and could potentially represent a source of future subsidence.</p> |

| Identification, Assessment and Mitigation of Site-Specific Coal Mining Risk |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| Issue                                                                       | Site Affected (Yes/No)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Hazard                                                                                                                                                                                                                                                                                       | Consequences                                                                                                                                                                                                                                                                                                                                                                   | Recommended Mitigation Measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                                             | <p>Editions) display the Lower Florida and Higher Florida coal Seams to outcrop on the site and subcrop beneath the Site. The Coal Authority Mining Report also notes that the site has probable unrecorded shallow workings.</p> <p>The distribution of bedrock geology beneath the Site is fault controlled. There is a fault (Eccleston Fault) on site trending in an approximate N-S direction.</p> <p>The western area of the Site (west of the Eccleston fault) is recorded to be underlain by the Carboniferous Middle Coal Measures, however in the eastern area of the Site (east of the Eccleston fault) the bedrock is reported to be the Triassic non-coal bearing Lower Mottled Sandstone. The Carboniferous Middle Coal Measures (Lower Florida and Higher Florida seams) are indicated to subcrop beneath the superficial deposits on site and dip towards the south west. The Triassic Lower Mottled Sandstone also subcrops beneath the site and dips south west.</p> | <ul style="list-style-type: none"> <li>• Catastrophic collapse of mine entry leading to ground instability or voids at the ground surface.</li> <li>• Settlement of the ground surface above/adjacent to the mine entry.</li> <li>• Mines gas emissions and mine water migration.</li> </ul> | <ul style="list-style-type: none"> <li>• Harm to human health, injury or death of occupiers of construction workers. Damage to vegetation and other ground material.</li> <li>• Potential for mine gas migration to surface, where it may represent a hazard the end user.</li> <li>• Damage to machinery may arise if subsidence occurs when work is taking place.</li> </ul> | <p>Bearing in mind the nature of the superficial deposits (Glacial Till) it is possible that crown holes (surface voids) or localised shallow depressions could develop following the collapse of such workings.</p> <p>In the event that subsidence was to occur prior to development and was proven to be as a result of the coal mining, then the Coal Authority will have a duty to reinstate the damage under the requirements of the Coal Mining Subsidence Act 1991.</p> <p>In order to prevent damage to future development any potential shallow mine workings should be investigated, and the geological regime beneath the site confirmed. Furthermore, if required stabilisation of shallow mine workings by drilling and pressure grouting should be considered prior to development of the site.</p> <p>All intrusive works should be designed to ensure no risk to members of the public or the environment. If any remediation is required, it should be carried out in accordance a Coal Authority Permit and the current industry guidance contained in CIRIA C758D Abandoned Mine Workings Manual (2019).</p> |
|                                                                             | <p><b>Unrecorded Mine Entries:</b><br/><b>Yes</b> – Bearing in mind that the site lies within a former coal mining area, the possibility of unrecorded mine entries being present within the site cannot be discounted. The</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                              | <p><b>Unrecorded Mine Entries:</b><br/>Ground subsidence related to collapse or settlement processes associated with mine entries may result in:</p> <ul style="list-style-type: none"> <li>• Ground instability and damage to infrastructure.</li> </ul>                                                                                                                      | <p><b>Unrecorded Mine Entries:</b><br/>The potential for unrecorded mine entries to be present should be considered by all parties involved with any works on site and appropriate methods of working should be adopted. Appropriate contingency plans should be prepared in the event that an</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Identification, Assessment and Mitigation of Site-Specific Coal Mining Risk                                                                           |                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| Issue                                                                                                                                                 | Site Affected (Yes/No)                                                                                                                                                                                                                                                                          | Hazard                                                                                                                                                                                                 | Consequences                                                                                                                                                                                                                                                                                                                                                                | Recommended Mitigation Measures                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                       | mining records are recognised as incomplete and unrecorded mine entries are a risk to future development on Site.                                                                                                                                                                               |                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Harm to human health, injury or death of occupiers of construction workers. Damage to vegetation and other ground material.</li> <li>Potential for mine gas migration to surface, where it may represent a hazard to the end user.</li> <li>Damage to machinery may arise if subsidence occurs when work is taking place.</li> </ul> | <p>unrecorded mine entry is located either during any stabilisation works (if required) or during construction works, particularly within excavations.</p> <p>If any anomalous feature is encountered, it should be reported for further investigation and dealt with accordingly.</p>                                                                                                                                                                         |
| 6. Is there a record of mine gas emissions within the site boundaries?                                                                                | <b>No</b> – The Coal Authority have no records of mines gas emissions on or within 500metres of the site requiring their action. Notwithstanding this, the site lies within a known coal mining area and mine gas emissions may potentially impact upon the site due to the presence of shafts. | <b>N/A</b>                                                                                                                                                                                             | <b>N/A</b>                                                                                                                                                                                                                                                                                                                                                                  | <b>N/A</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 7. Is the proposed development in an area for which The Coal Authority is determining or has granted a licence to remove coal by underground methods? | <b>No</b>                                                                                                                                                                                                                                                                                       | <b>N/A</b>                                                                                                                                                                                             | <b>N/A</b>                                                                                                                                                                                                                                                                                                                                                                  | <b>N/A</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 8. Are there known faults or other lines of weakness due to coal mining at the site?                                                                  | <b>Yes</b> – There is a single geological fault on Site trending in an approximate N-S direction. The fault is recorded to subcrop beneath the superficial deposits across the Site.                                                                                                            | <ul style="list-style-type: none"> <li>Such features may contribute to surface subsidence as a consequence of underground coal mining.</li> <li>Mine gas and mine water migration pathways.</li> </ul> | <p>The presence of geological faults and potentially broken/fractured rock strata associated with them, represent a potential gas transmission pathway for mine gas movement from unrecorded mine workings, should there be any beneath the Site.</p> <p>Ground movement associated with reactivation of the faults.</p>                                                    | <p>Review the potential mine gas source and consider, if necessary, in the land contamination risk assessment for the Site. Undertake ground gas monitoring as part of the Ground Investigation works prior to development of the site.</p> <p>The potential for reactivation of the faults is considered to be low. Any development within the vicinity of the fault lines should consider the risk of ground movement due to the presence of the faults.</p> |
| 9. Is there a record of coal mining surface hazards                                                                                                   | <b>No</b>                                                                                                                                                                                                                                                                                       | <b>N/A</b>                                                                                                                                                                                             | <b>N/A</b>                                                                                                                                                                                                                                                                                                                                                                  | <b>N/A</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Identification, Assessment and Mitigation of Site-Specific Coal Mining Risk                                                                                    |                        |        |              |                                 |
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| Issue                                                                                                                                                          | Site Affected (Yes/No) | Hazard | Consequences | Recommended Mitigation Measures |
| within the site boundary?<br>Has the site been subject to remedial works by, or on behalf of, the Coal Authority under its surface hazard call out procedures? |                        |        |              |                                 |
| 10. Is the proposed development within the boundary of a surface mining/opencast site from which coal has been removed by surface mining/opencast methods?     | No                     | N/A    | N/A          | N/A                             |
| 11. Is the proposed development within 200m of a surface mining/opencast site from which coal is being removed?                                                | No                     | N/A    | N/A          | N/A                             |

#### Assessment of Cumulative Impact of Coal Mining Issues:

##### Recorded and Unrecorded Mine Entries

There are no recorded mine entries (shafts) recorded to be present on the site. However, reviewing the information currently available, the Coal Authority reports the presence of possible unrecorded mine shafts within the site boundary. Without records of treatment, the possible unrecorded shafts should be considered as untreated, and therefore requiring further assessment and investigation. Should unrecorded shafts be located during further investigation, the shafts should be treated as appropriate e.g. by drilling, pressure grouting and capped to ensure future stability. The absence of unrecorded mine entries being encountered during the development is not definitive proof that such entries do not exist on site and this residual risk should be considered by the developer. The presence of a mine entry should not preclude development of the Site provided appropriate mitigation measure are undertaken.

##### Shallow Mine Workings

Due to the position of the Lower Florida and Higher Florida Coal seams sub-cropping across the Site and potentially being at shallow depth beneath parts of the western area of the Site, this area is considered to represent a High Risk in terms of coal mining legacy issues. It is considered that the Site is suitable for development for the



proposed end use, however the geological and mining settings should be confirmed by site investigation (additional desk study and rotary boreholes) prior to the confirming the layout. Following a revised risk assessment, mining remedial works such as drilling, and pressure grouting **are likely to be required in parts of the site** to ensure the future stability and safety of the proposed development.

Such mining investigations and remedial measures are “normal” practice in many areas of former exposed coalfield and their potential requirement is not considered to be prohibitive to development of the site.

N/A = Not Applicable

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