MINERAL RESOURCE ASSESSMENT

Loddon Garden Village, University of Reading

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V1
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1 INTRODUCTION

1.1 Background

1.1.1 RPS Consulting Services Ltd (RPS) has been commissioned by the University of Reading (herein referred to as the Client) to produce a Mineral Resource Assessment (MRA) to support a planning application for a mixed-use development, as detailed in Section 1.2, on land south of the M4 in Reading (herein referred to as the Site). Figure 1 below identifies the redline planning boundary, comprising an approximate area of circa 397.4 hectares (ha).

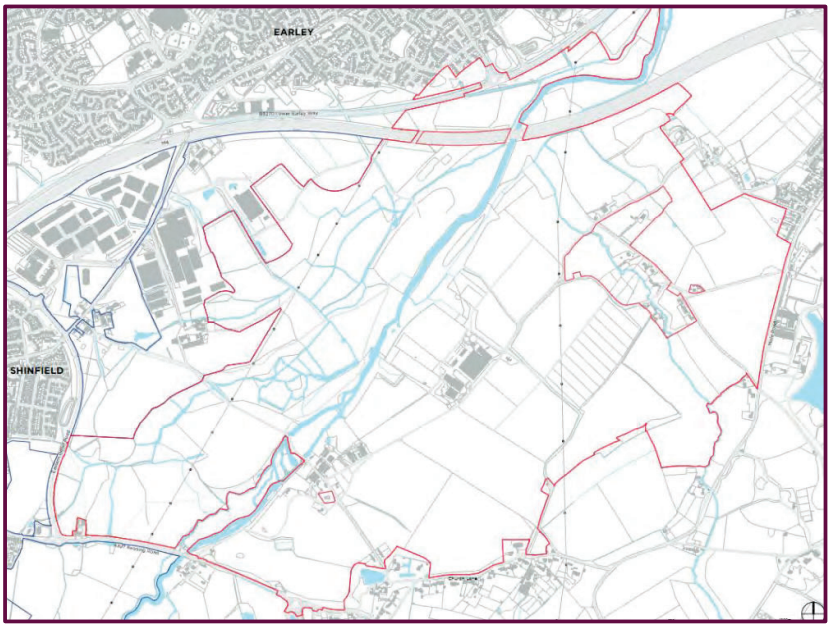


Figure 1 – Site Redline Planning Boundary Plan

1.1.2 The Application Site is centred at National Grid Reference SU 75048 68830 and the nearest postcode for the Site is RG2 9HX. The Site comprises a number of University of Reading (UoR) owned research buildings and agricultural land, the majority of which is predominantly used for grazing by UoR dairy herds. Further detail on the site setting is presented in Section 3.

1.1.3 The Site is located to the immediate south-east of UoR's Thames Valley Science and Innovation Park (TVSP) and is on land designated as a Strategic Development Location (SDL) in the emerging Wokingham Borough Local Plan update for a sustainable urban extension, known as Loddon Valley Garden Village (LVGV) (Local Plan Update Policy SS13). LVGV is herein referred to as the Proposed Development.

1.2 Proposed Development Details

1.2.1 Outline planning will be sought for the phased delivery of the Proposed Development that is to comprise the following:

"*Application for the phased development of a new community at Loddon Garden Village, comprising, in outline:*

- *Up to 2,800 residential units to include up to 100 custom and self-build plots;*

- *2 primary schools (up to 3 forms of entry) to include early years provision and 1 secondary school (up to 12 forms of entry);*
- *One District Centre, to incorporate up to 11,000 m2 of Class E (Commercial, Business and Service, to include a food store of around 2,500 m2), and Class F (Local Community and Learning);*
- *One Local Centre; to incorporate up to 2,400 m2 of Class E;*
- *A Sports Hub to include sports pitches and pavilion space;*
- *Up to 4,250 m2 of further Class E and Class F development to include commercial, health care and public house (sui generis);*
- *Comprehensive green infrastructure including a Country Park, landscaping and public open space, and ecological enhancement measures;*
- *20 gypsy and traveller pitches;*
- *Comprehensive drainage and flood alleviation measures to include Sustainable Urban Drainage Systems (SUDS) and engineering measures within Loddon Valley for the River Loddon;*
- *Internal road network including spine road with pedestrian and cycle connections and associated supporting infrastructure;*
- *New and modified public rights of way;*
- *Associated utilities, infrastructure, and engineering works, including the undergrounding of overhead lines;*
- *Ground reprofiling to accommodate infrastructure, flood alleviation and development parcels;*
- *Up to 0.5 ha of land adjoining St Bartholomew's church for use as cemetery;*
- *Electricity substation (up to 1.5 ha).*

All matters reserved other than access, incorporating:

- *A new pedestrian, cycle and vehicular access to Lower Earley Way via a new 4th arm to the Meldreth Way roundabout;*
- *A new pedestrian, cycle and vehicular bridge over the M4;*
- *A new pedestrian, cycle and vehicular bridge over the River Loddon;*
- *A new vehicular access to the A327 Reading Road, via a new arm to the Observer Way roundabout;*
- *A new pedestrian, cycle and vehicular access to Thames Valley Science Park;*
- *An initial phase of internal roads with associated drainage, landscape and engineering works and ground reprofiling, between the A327 and the south eastern boundary of the site.*

Application includes full permission for the change of use of 40.4 hectares of agricultural land to Suitable Alternative Natural Greenspace (SANG), 18.35 hectares of SANG link, and provision of Biodiversity Net Gain measures, the demolition and clearance of 20,809 m2 of buildings and structures at the Centre for Dairy Research (CEDAR) and at Hall Farm, the demolition of 3 existing dwellings on Carter's Hill Lane, and the retention of specified buildings at Hall Farm."

1.2.2 A draft illustrative masterplan for the Proposed Development is presented within Drawing 1.

1.3 Report Structure

1.3.1 The remainder of this report is structured as follows:

- *Section 2: General Approach* – Provides a summary of the general approach adopted to deliver the agreed scope of works, including a summary of all key data sources used in the MRA.
- *Section 3: Site Setting* – Provides a summary of key aspects of the site setting, including a description of the geological and hydrogeological context for the assessment. This section describes the mineral designations relevant to the Site.
- *Section 4: Reviewing of Mineral Planning Policy* – Provides a summary of the National, Regional and Local planning policy content in relation to minerals. It also provides commentary on any supplementary planning documents relating to minerals.
- *Section 5: Mineral Resource Assessment* – Provides the mineral resource assessment for the Site in terms of likely quantity and quality of mineral reserves and likely constraints on mineral extraction and an evaluation against mineral planning policies.
- *Section 6: Summary and Conclusions* – Summary of mineral resource assessment and evaluation of potential constraints for development resulting from criteria outlined in planning context applicable for the Site.

2 GENERAL APPROACH

2.1 Overview

2.1.1 This MRA utilises available geological and site setting information to evaluate the constraint that mineral resources present on the Site are likely to place on the Proposed Development given local mineral planning policy. The MRA provides a resource assessment that defines the extent of viable (extractable) mineral resources present on the Site(refer to Section 5), principally in relation to designated Mineral Safeguarding Areas (MSAs) defined in line with The Central and Eastern Berkshire Joint Minerals and Waste Plan, adopted in 2023 (refer to Section 4.2). The available mineral resource is then evaluated against the mineral planning policy for the Site, with the viability and practicability of extraction and practicability of prior extraction of the safeguarded resources considered (refer to Section 5).

2.2 Data Sources

2.2.1 Wokingham Borough, Bracknell Forest, Reading Borough and the Royal Borough of Windsor and Maidenhead Councils, collectively referred to as the 'Central and Eastern Berkshire Authorities' (CEBA) have produced a Joint Minerals and Waste Plan. The following mineral planning documentation produced by CEBA has been reviewed as part of this assessment:

- Central and Eastern Berkshire Joint Minerals and Waste Plan (JMWP), adopted in 2023; and
- Central and Eastern Berkshire Joint Minerals and Waste Plan Policies Map.

2.2.2 The following local policies have also been reviewed:

- Wokingham Borough Local Development Framework Adopted Core Strategy Development Plan Document, adopted January 2010; and
- Wokingham Borough Local Plan Update 2023 – 2040 Proposed Submission Plan (yet to be adopted).

2.2.3 The site-setting environmental and geological setting has been obtained from a review of publicly available data sources and available commissioned Phase 1 and Phase 2 reports for the Site:

- British Geological Survey (BGS), Geoindex Onshore;
- Phase 1 Ground Conditions Desk Top Study and Preliminary Risk Assessment, ref. JER9482 (RPS, 2022)[1];
- Desktop Study and Preliminary Risk Assessment – University of Reading - The Natural History Museum Access Road, ref. JER9482 (RPS, 2023)[2];
- Desk Top Study and Preliminary Risk Assessment, University of Reading – Thames Valley Science Park Foul Pumping Station Access Track, ref. JER9482 (RPS, 2023)[3]

[1] RPS, 2022. Ground Conditions Desk Top Study and Preliminary Risk Assessment. University of Reading. JER9482, 10 June 2022.

[2] RPS, 2023. Phase 1 Desk Top Study and Preliminary Risk Assessment. University of Reading – The Natural History Museum Access Road. JER9482, 27 September 2023.

[3] RPS, 2023. Desk Top Study and Preliminary Risk Assessment. University of Reading – Thames Valley Science Park Foul Pumping Station Access Track. JER9482, 22 November 2023.

- Science and Innovation Park – Ground Conditions Report, ref. JER7522 (RPS, 2008)[4];
- Thames Valley Science Park Ground Investigation Report, ref. 3616-WSP-GE-101-RP-001 (WSP, 2015)[5];
- Tier 2 Contamination Assessment, ref. 662020206-MLM-ZZ-XX-RP-J-0001 (MLM Consulting Engineers Ltd, Feb 2021)[6];
- Tier 2 Contamination Assessment, ref. 66202206-MLM-ZZ-XX-RP-J-0002 (MLM Consulting Engineers Ltd, May 2021)[7];
- Natural History Museum – Collections and Research Centre Ground Investigation Report, ref. 1620012379 (Ramboll, 2022)[8] [CONFIDENTIAL];
- Natural History Museum – Thames Valley Site Factual Report, ref. C7638 (CC Ground Investigations Ltd, 2022)[9] [CONFIDENTIAL];
- Geoenvironmental Report, Hatch Farm Sindlesham, Berkshire, RG41 5DG, ref. CRM.731.001.GE.R.001.A (Enzygo, 2022)[10];
- Ground Investigation and Groundwater Level Monitoring - Factual Report, ref. JER9890 (RPS, 2023)[11];
- Deep Sewer Ground Investigation – Factual Report, ref. 794-ENV-GDE-21622 (RPS, 2024)[12];
- Culvert Extension Ground Investigation Technical Note, ref. 794-ENV-GDE-22372 (RPS, 2025) [13]; and
- Preliminary Ground Investigation Report, ref. 794-ENV-GDE-21850Z (RPS, 2025)[14].

[4] RPS, 2008. Science and Innovation Park, Ground Conditions Report. University of Reading, Shinfield. JER7522 Rev 0, 5 November 2008.

[5] WSP 2015. Thames Valley Science Park Ground Investigation Report. 3616-WSP-GE-101-RP-001, 27 February 2015.

[6] MLM Consulting Engineers Ltd, 2021. Tier 2 Contamination Assessment. 662020206-MLM-ZZ-XX-RP-J-0001, 2 February 2021.

[7] MLM Consulting Engineers Ltd, 2021. Tier 2 Contamination Assessment. 66202206-MLM-ZZ-XX-RP-J-0002, 24 May 2021.

[8] Ramboll, 2022. Natural History Museum – Collections and Research Centre. Ground Investigation Report. 1620012379, September 2022.

[9] CC Ground Investigations Ltd, 2022. Natural History Museum – Thames Valley Site. Factual Report. C7638, October 2022.

[10] Enzygo, 2022. Geoenvironmental Report, Hatch Farm, Sindlesham, RG41 5DG. CRM.731.001.GE.R.001.A, September 2022.

[11] RPS 2023. Ground Investigation and Groundwater Level Monitoring Factual Report. Land South of the M4, Shinfield. JER9890, 02 June 2023.

[12] RPS, 2024. Deep Sewer Ground Investigation Factual Report. Land South of the M4 Shinfield. 794-ENV-GDE-21622, 22 October 2024.

[13] RPS, 2025. Culvert Extension Ground Investigation Technical Note. University of Reading, Shinfield, Reading. 794-ENV-GDE-22372, 10 April 2025.

[14] RPS, 2025. Preliminary Ground Investigation Report. Land South of the M4, University of Reading. 794-ENV-GDE-21850Z. 12 June 2025.

3 SITE SETTING

3.1.1 This section presents the general site setting and site-specific geology for the Site, based on a review of the available commissioned reports, as listed under paragraph 2.2.3 of this report. Findings of this review are subsequently included within the Mineral Planning Policy Review (Section 4) and Mineral Resource Assessment (Section 5) of this report.

3.2 General Site Setting

3.2.1 The Site primarily comprises agricultural land, predominantly used by the UoR dairy herds, to support the existing research facilities at the Site. Hall Farm and its associated buildings (owned by UoR) is located centrally at the Site and The Centre for Dairy Research buildings, International Cocoa Quarantine Centre and Arborleigh Angling Club are sited in the south-west of the Site.

3.2.2 As identified within Figure 1, the redline planning boundary **excludes** an area around the Arborfield Old Church Ruins to the south of the International Cocoa Quarantine Centre, along with an area of land comprising private residential properties off Barrets Lane, Julkes Lane and Carters Hill / Copse Barnhill Lane in the north-east of the Site.

3.3 Topography

3.3.1 The Site topography is influenced by the River Loddon valley. To the north and west of the river, the Site is relatively low-lying with approximate elevations of between 39 to 40 m AOD. To the south of the River Loddon, the Site gradually rises up the valley with approximate elevations ranging between 39 m AOD and 55 to 60 m AOD in the east and south-east.

3.4 Hydrology

3.4.1 There are four watercourses on the Site that are designated as ‘Main Rivers’ by the Environment Agency (EA); River Loddon, Barkham Brook and two unnamed watercourses.

3.4.2 The River Loddon dissects the Site centrally trending north-east – south-west, whilst Barkham Brook trends north – south in the east of the Site. The unnamed watercourse to the north of the River Loddon trends north-east – south-west in the north of the Site and is herein referred to as the ‘Long Ten Watercourse’ for reporting purposes. The unnamed watercourse in the south - south-west of the Site trends east – west before diverting southerly and off-site. This watercourse is herein referred to as the ‘The Dell Watercourse’. Each watercourse is identified within Figure 2 below.

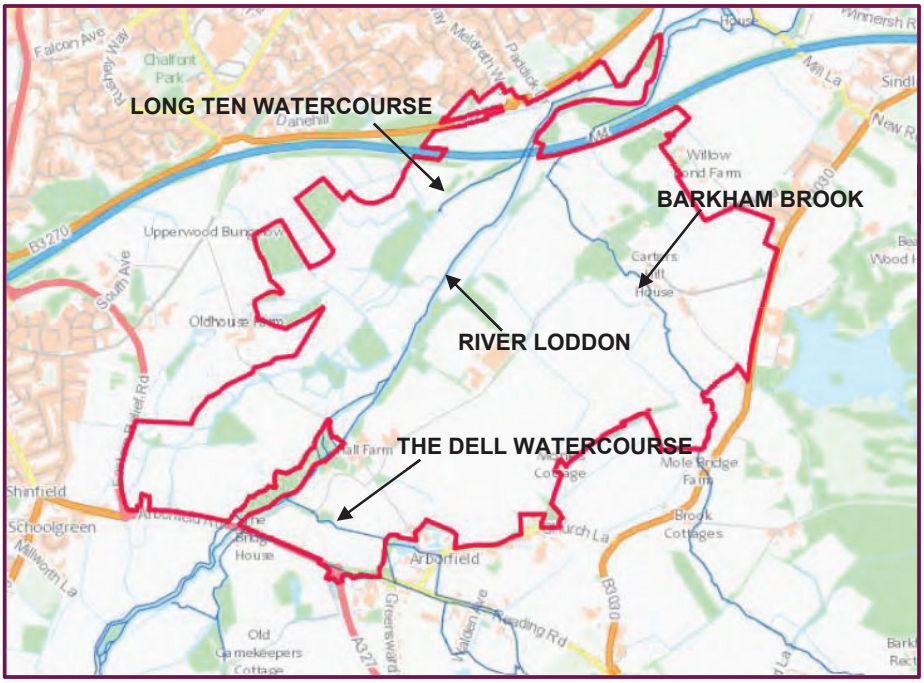


Figure 2 – EA Designated Main Rivers

3.4.3 The Site falls within Flood Zones 2 and 3 associated with the designated main rivers. The extents of the Flood Zones are outlined within Figure 3 below, based on EA flood mapping.

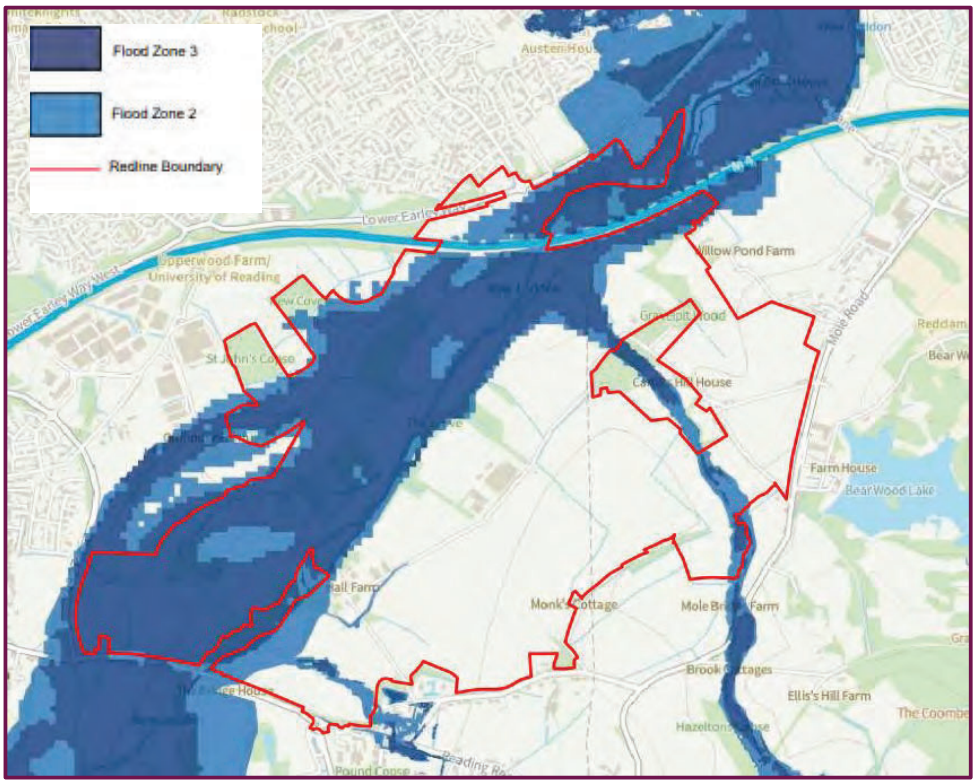


Figure 3 - Extent of Flood Zones 2 and 3 in relation to the Site

3.5 Geological Setting

3.5.1 The site-specific geology has been determined through a review of the available ground investigation reports, as listed under paragraph 2.2.3. Given the natural variability within the superficial deposits, only data from exploratory boreholes drilled within the redline planning application boundary, as presented within Figure 1, and within a **50 m** buffer of that boundary has been included. The stratigraphic sequence beneath the Site is indicated to be as follows:

Table 3-1 - Site-Specific Geology

Strata	Description	Proven Thickness (m)
Made Ground or Topsoil		
Made Ground	Soft dark brown slightly gravelly clayey silt with rare gravel-sized subangular fragments of brick or grey and brown gravelly to very gravelly sand with concrete, brick, tile and metal/wire fragments.	0.50 – 1.60*
Topsoil	Typically described as dark brown sandy gravelly organic clay.	0.06 – 0.65
Superficial Deposits		
Brickearth	Typically described as stiff orangish brown slightly gravelly slightly sandy to sandy clayey silt.	0.35 – 1.90
Alluvium	Identified as soft mottled reddish brown and dark grey sandy clay over grey medium to coarse sand and flint gravel.	0.80
River Terrace Deposits (RTD)	Typically described as orangish brown mottled grey or reddish brown clayey to very clayey sand, silty gravelly to very gravelly sand or yellowish brown and grey very clayey or silty sandy to very sandy flint gravel, and rare soft locally firm yellowish brown mottled grey slightly gravelly sandy clay.	0.15 – 2.90
Bedrock		
London Clay Formation (LCF)	Typically described as firm to stiff brownish grey slightly sandy silty clay with decomposed rootlet holes.	-**

*The descriptions of Made Ground from boreholes WS12 and WS152 of Enzygo Geoenvironmental Report (2022) are considered to constitute the 'Topsoil-like Made Ground' defined in Enzygo's report and have therefore not been considered as the 'general Made Ground' unit.

**Base of LCF not proven.

3.5.2 All exploratory hole locations utilised in the table above are presented within Drawing 2 and a full breakdown of the geological conditions per location is provided within Appendix A.

3.5.3 General Made Ground was identified within six exploratory borehole locations, and localised to areas of existing development or potential historical gravel pits. The majority of exploratory boreholes identified superficial deposits directly beneath topsoil.

3.5.4 Alluvium was identified within one exploratory borehole (WS08) within a ground investigation undertaken by RPS in 2025 and is generally consistent with the mapped extents of Alluvium along the River Loddon valley, as identified on published British Geological Survey (BGS) 1:50,000 scale sheet map 268 'Reading'. All remaining exploratory holes that were located within the redline boundary identified RTD directly beneath the Topsoil, overlying LCF, or proved LCF directly beneath Topsoil.

3.5.5 An investigation undertaken by CC Ground Investigation in 2022 in relation to the Natural History Museum (ref. C7638), to the immediate north-west of the Site as identified in Drawing 2, recorded

Brickearth overlying RTD in all but two of the locations. The RTD was generally described as clayey or silty very sandy gravel or clayey / silty very gravelly sand.

3.5.6 A number of exploratory hole locations to the south of the River Loddon identified the upper horizons of the RTD as predominantly clay-rich.

Table 3-2 - Clay-rich Upper Horizons of the RTD

Exploratory Hole Location	Description of Upper Clay-Rich Horizons within the RTD	Thickness of Upper Clay-Rich RTD (m)	Total Thickness of RTD unit (m)
RPS 2023 Ground Investigation (ref. 794-ENV-GDE-JER9890)			
WS01	Slightly gravelly sandy clay over slightly sandy clay	1.45	2.80
WS05	Slightly sandy silty clay over slightly gravelly sandy clay	0.70	0.90
WS07	Slightly gravelly sandy clay	0.50	0.90
WS08	Slightly gravelly sandy silty clay over	0.35	2.10
WS11	Slightly gravelly sandy clay	1.00	2.60
WS12	Slightly sandy gravelly silty clay	0.70	0.70
WS16	Slightly gravelly sandy clay	0.35	2.00
Enzygo 2022 Ground Investigation (ref. CRM.731.001.GE.R.001.A)			
WS152	Slightly gravelly silty clay	0.05	0.15
RPS 2025 Ground Investigation (ref. 794-ENV-GDE-21850Z)			
TP04	Sandy gravelly clay	0.20	0.80

3.5.7 Of the boreholes reviewed as part of this assessment, LCF was proven to a *maximum* depth of 30 metres Below Ground Level (m BGL) but base unproven.

3.6 Hydrogeology

3.6.1 The superficial deposits which cover the majority of the Site are designated Secondary A Aquifers (RTD and Alluvium) whilst the Brickearth, proven to the immediate north-west of the Site is designated a Secondary B Aquifer. The LCF bedrock is designated Unproductive Strata.

3.6.2 From a review of the borehole data taken from within the redline Site boundary and within a 50 m buffer, groundwater was generally encountered between depths of 0.50 m BGL and 2.70 m BGL. A summary of the groundwater strikes recorded is presented within Appendix B. Groundwater level monitoring data completed by CC Ground Investigation in 2022 and RPS between 2022 and 2023, is summarised in Table 3-3 below.

Table 3-3 - Summary of Groundwater Level Monitoring Data

Exploratory Hole Location	Depth to Base of Borehole (m BGL)	Response Zone (m)	Geological Strata	Groundwater Level Monitoring (m BGL)					
				Round 1	Round 2	Round 3	Round 4	Round 5	Round 6
CC Ground Investigation 2022 – Thames Valley Site (ref. C7638)									
BH02 (50 mm)	20.00	1.00 – 3.00	RTD/LCF	3.05	0.87	0.89	-	-	-
BH02 (19 mm)		16.50 – 17.50	LCF	3.36	3.46	3.26	-	-	-
BH03 (50 mm)	30.00	1.00 – 3.50	RTD/LCF	3.45	1.90	1.96	-	-	-
BH03 (19 mm)		25.00 - 27.00	LCF	3.95	3.82	3.83	-	-	-
WS01	6.00	1.00 – 6.00	RTD/LCF	0.98	0.95	1.00	-	-	-
WS03	6.00	1.00 – 3.00	Brickearth/RTD/LCF	1.41	1.36	1.28	-	-	-
RPS 2023 – Ground Investigation & Groundwater Level Monitoring (ref. 794-ENV-GDE-JER9890)									
WS01	4.00	1.00 – 4.00	RTD	1.05	0.40	1.16	0.75	0.76	0.75
WS02	3.00	0.50 – 3.00	RTD	0.97	0.83	0.98	0.92	0.98	0.93
WS03	3.00	0.50 – 2.40	RTD	0.49	0.12	0.10	0.00	0.33	0.42
WS04	2.80	1.00 – 2.60	RTD	1.74	1.04	1.58	1.65	1.38	1.60
WS05	3.00	0.50 – 3.00	RTD	0.87	0.87	0.00	0.25	0.37	0.20
WS07	1.30	0.50 – 1.00	RTD	0.82	0.46	0.56	0.67	0.83	0.89
WS08	3.00	1.00 – 2.70	RTD	0.79	0.20	0.25	0.54	0.32	0.82
WS09	3.00	1.00 – 3.00	LCF	0.93	0.25	0.29	0.67	0.72	0.55
WS10	3.00	0.50 – 1.20	RTD	0.84	0.69	0.85	0.91	0.88	DRY
WS11	3.00	1.00 – 3.00	RTD	0.91	0.49	1.06	-	0.98	0.79
WS12	3.00	1.00 – 3.00	RTD	DRY	2.81	2.24	1.14	1.42	0.89
WS13	3.00	0.50 – 1.70	RTD	1.44	1.14	1.27	1.11	1.49	1.15
WS16	3.00	1.00 - 2.30	RTD	1.68	0.75	0.92	0.91	0.97	0.94

3.6.3 The available data for the Site redline boundary and within a 50 m buffer, indicates that a consistent shallow groundwater body is present within the RTD. Where deeper groundwater is identified in the upper horizons of the LCF, this is attributed to the low permeability of the LCF forming a sump within the boreholes. It is not considered to indicate a groundwater body.

3.6.4 A number of observations were also recorded with respect to the stability of trial pit excavations within the RTD strata. These observations were attributed to the granular nature of the RTD and / or the presence of a shallow groundwater body. Further details on this is provided within Appendix A.

3.7 Environmental Sensitivity

3.7.1 The Site is located within or near the following environmentally sensitive sites, as identified on Drawing 3:

- Woodland, including Ancient Woodland in the north-west of the Site (on-site);
- Veteran Trees and Trees of Ecological Interest in the south-west of the Site (on-site);
- Valued Landscapes, in accordance with emerging policy NE6 of the WBC Local Plan (on-site);
- Biodiversity Opportunity Area, associated with land to the north and including the River Loddon (on-site);
- Six Local Wildlife Sites: Hall Farm Woodland Triangle, Arborfield Bridge Meadow, St John's Copse, Rushy Mead, Loader's Copse and Gravel Pit Wood (The Holt) (all on-site); and
- Mature vegetation associated with existing historical lane (see Section 3.8) (on-site).
- River Loddon and associated ecological habitats, as shown in Figure 4 below (EPR, 2024[15]):

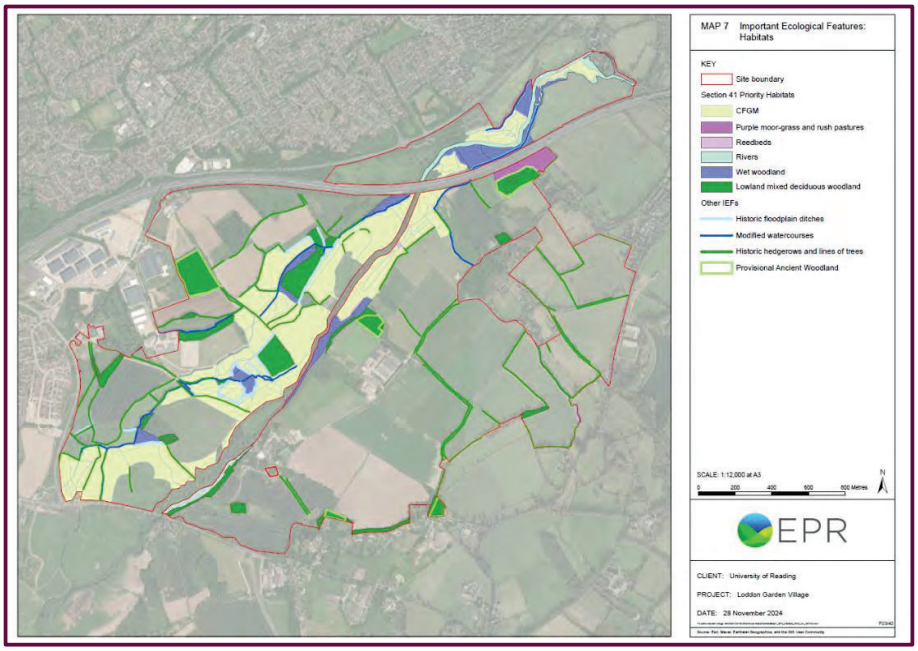


Figure 4 – Important Ecological Habitat along the River Loddon, EPR 2024

[15] EPR, 2024. Map 7 – Important Ecological Features: Habitats. Loddon Garden Village, 28th November 2024.

3.8 Heritage Assets

3.8.1 There are a number of heritage assets on the Site, including the former St. Bartholomew's Church Scheduled Monument and Arborfield Hall Farmhouse Grade II Listed Building.

3.8.2 There are several Grade II Listed Buildings within the immediate vicinity of the Site, including within an area of land in the north-east of the Site that has been excluded from the redline Site planning boundary.

3.8.3 All designated and non-designated heritage assets are included within Drawing 2.

3.9 Utilities

3.9.1 RPS has been provided with plans that identify the locations of known utilities that cross the Site. A copy of this plan is provided as Figure 5 below.

3.9.2 High voltage (33 and 132 kV) power lines run centrally north – south through the Site, whilst high and medium gas mains, located along the north-western boundary adjoining the M4, run north-west – south-east across the Site.

3.9.3 A foul sewer main cuts through the very north-western portion of the Site.

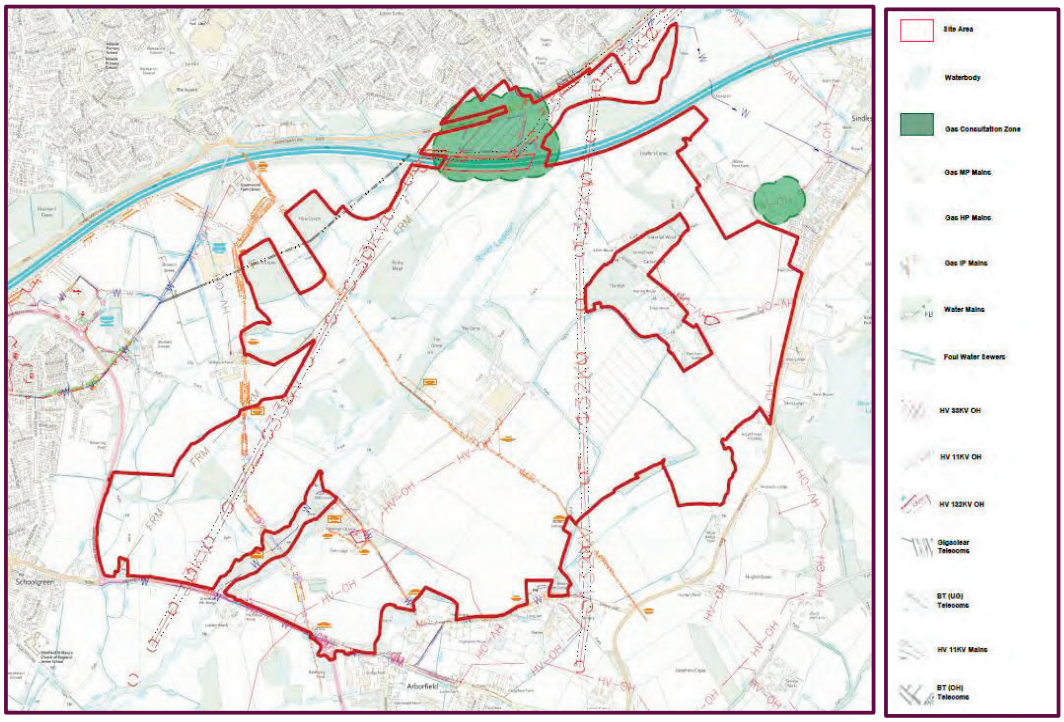


Figure 5 - Extract of Client Provided Utility Assets

4 REVIEW OF MINERAL PLANNING POLICY

4.1 Mineral Planning Context

4.1.1 For England, the key national planning policies for minerals are set out in the National Planning Policy Framework (NPPF), updated in February 2025. The focus of the NPPF is a presumption in favour of sustainable development. The NPPF recognises that minerals are essential to support sustainable economic growth and our quality of life. It is therefore important that there is a sufficient supply of material to provide the infrastructure, buildings, energy and goods that the country needs whilst ensuring that permitted mineral operations do not have unacceptable adverse impacts on the natural and historical environment or human health. The NPPF also recognises that, since minerals are a finite natural resource, and can only be worked where they are found, it is important to make best use of them and to secure their long-term conservation through the mechanism of mineral safeguarding.

4.1.2 In the context of local planning, the Site is situated within WBC Local Authority Area who form one of the authoring parties of the Central and Eastern Berkshire Joint Minerals and Waste Plan (JWMP). The JMWP was adopted in July 2023 and covers the period up to 2036. It therefore represents the relevant mineral policies in relation to mineral resources and mineral safeguarding on the Site.

4.1.3 The remainder of this section presents a review of the key policies outlined within the JMWP that is relevant to the Site and Proposed Development.

4.2 The Central and Eastern Berkshire Joint Minerals and Waste Plan (JMWP)

4.2.1 The JMWP identifies that the Site falls within a Mineral Safeguarding Area (MSA) for 'Sharp Sand and Gravel'. Based on published BGS 1:50,000 scale sheet map 268 'Reading', the sharp sand and gravel mineral resources are attributed to the underlying superficial River Terrace Deposits.

4.2.2 The extent of the MSAs within the redline Site planning boundary are also identified within the JMWP as 'Areas of Search for Sand and Gravel'. The extent of the MSA and Areas of Search are shown in Drawing 4.

4.2.3 Mineral Policy M2 (**Safeguarding Sand and Gravel Resources**) is the key policy of the JMLP with respect to mineral safeguarding and states:

"3. *Non-minerals development in the Minerals Safeguarding Area may be permitted if it can be demonstrated through the preparation of a Mineral Resources Assessment, that the option of prior extraction has been fully considered as part of an application, and:*

a. Prior extraction, where practical and environmentally feasible, is maximised, taking into account site constraints and phasing of development; or

b. It can be demonstrated that the mineral resources will not be permanently sterilised; or

c. It would be inappropriate to extract mineral resources in that location, with regard to other policies in the wider Local Plans."

4.2.4 There are five existing extraction sites that supply the four authority areas (under Central and Eastern Berkshire) with sharp sand and gravel, however the JMWP identified a requirement to provide a further 5.447 Mt of sand and gravel over the Plan period (equivalent to 0.628 Mt per annum). Two new sites have been identified under Policy M4, associated with the possible extension of the following two existing sites and would contribute approximately 0.4 Mt of sand and gravel. These are:

- Horton Brook and Poyle Quarry, Horton; and
- Poyle Quarry, Horton.

4.2.5 Subject to timely submission of planning applications, it is thought that the two extensions would not be live until at least 2024. A review of Windsor and Maidenhead Borough Council planning website indicates that there are no current or pending consents for extensions to the current quarry sites.

4.2.6 The JMWP however states under Policy M3 that current rates from permitted sites to provide at least 0.628 Mt of sand and gravel would cease by 2023 and there would be a shortfall of 2.5 Mt over the remainder of the Plan period to 2036. The authorities' also state that at the time of Plan preparation and adoption, the aggregate industry has not identified sufficient sites to bring forward to ensure a steady provision rate.

4.3 Central & Eastern Berkshire Authorities Joint Minerals & Waste Plan Local Aggregate Assessment 2023

4.3.1 The most up-to-date Local Aggregate Assessment (LAA) available covers the calendar year of 2023. As of 31 December 2022, the permitted reserves were at 5,569 million tonnes (Mt), with a landbank of reserves at 9.42 years; and therefore, above the 7-year landbank requirement as set out by the NPPF (2024) for sand and gravel.

4.3.2 The JMWP was adopted after the preparation of the LAA and therefore in the absence of an up-to-date LAA, it is suggested that supply from permitted sites were not able to provide ongoing demand to meet the requirement by the end of 2023.

4.4 Wokingham Borough Council Local Plan (adopted 2010)

4.4.1 The Wokingham Borough Council Local Plan (WBCLP) was adopted in 2010 and covers the period up to 2026, providing the current planning framework for the council to meet local development needs.

4.4.2 WBCLP identifies that part of the Site benefits from an existing allocation for a Strategic Development Location (SDL) in accordance with Policy CP19 of the Plan. The allocation is referred to as the 'South of the M4', and is allocated for mixed-used development. The allocation largely comprises land beyond the Site redline planning boundary, but does include much of the land to the north of the River Loddon within the Site. The extent of the allocation is shown in Figure 6 below.

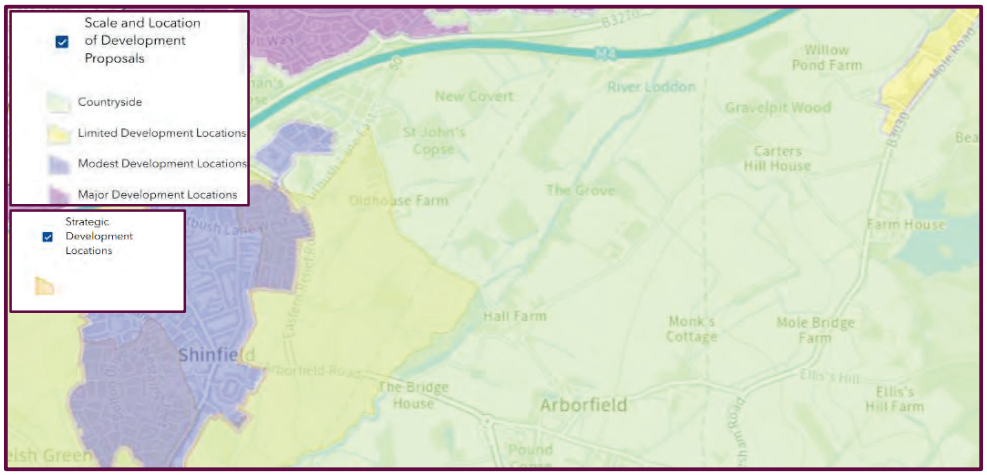


Figure 6 - Wokingham Borough Site Allocations (WBLP, 2010)

4.4.3 It is also noted that the WBCLP is currently undergoing consultation for an emerging Replacement Local Plan to cover the period up to 2024. An emerging policy of the Local Plan Update is to be NE6 ‘Valued Landscape’. It is understood that land associated with the River Loddon has been identified as a draft allocation for Valued Landscape, and part of this allocation falls within the Site. As shown in Figure 7 below, the ‘River Loddon’ Valued Landscape’ covers all areas of the Site that falls to the north of the River Loddon. There is also an indicative buffer of 41 m stipulated for such Valued Landscapes.

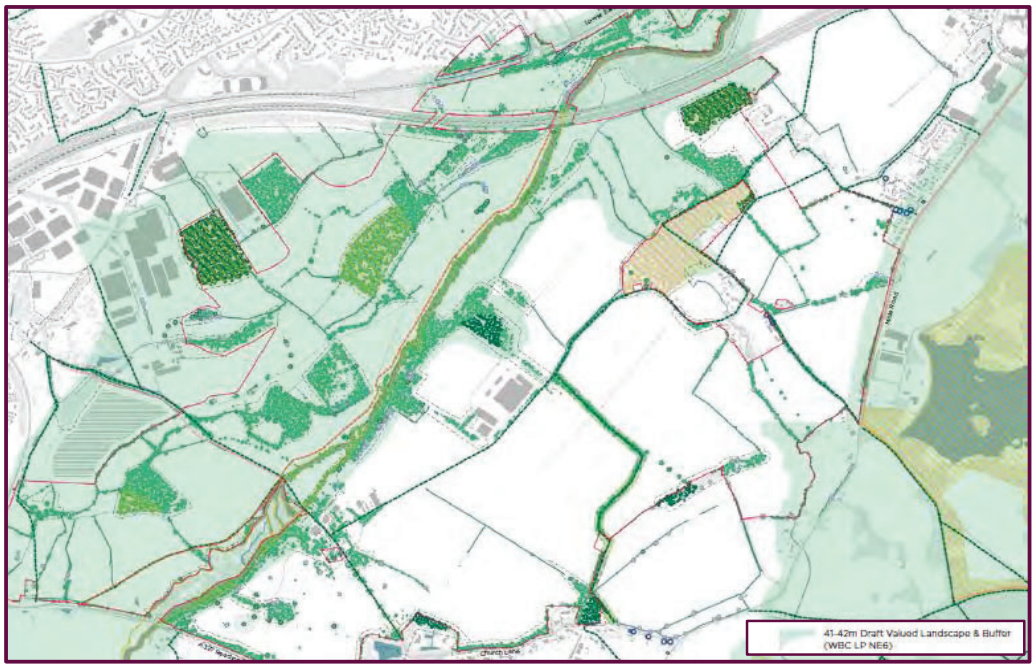


Figure 7 - Emerging River Loddon ‘Valued Landscape’ Allocation

5 MINERAL RESOURCE ASSESSMENT

5.1 Safeguarded Mineral Resource

5.1.1 The safeguarded mineral resource at the Site constitutes the RTD. From a review of available ground investigation data for the Site and within a 50 m buffer, the RTD is generally identified as a slightly sandy to sandy silty gravel or a slightly gravelly to gravelly silty sand with occasional upper clay-rich horizons, that were identified at exploratory locations to the south of the River Loddon. It is therefore considered that the RTD is relatively variable in composition across the Site. A detailed review of the ground conditions is summarised in Tables 3-1 and 3-2, and Appendix A.

5.1.2 RTD was proven between thicknesses of 0.15 m and 2.90 m, and either overlain by Brickearth or Alluvium, or directly by Topsoil / Made Ground. Table 5-1 below summarises the thickness of RTD against the thickness of overburden at each exploratory hole location.

5.1.3 For the purposes of this assessment, Topsoil, Brickearth, Alluvium and Made Ground, where present, has been grouped together as non-granular / clay-rich overburden material. The overburden presented within the table below also includes the upper horizons of the RTD that were recorded as a clay-rich horizon, as per the thicknesses stated within Table 3-2.

Table 5-1 - Thickness of RTD and clay-rich overburden material

Exploratory Hole Location	RTD Thickness (m)	Non-granular / clay-rich Overburden (m)
RPS 2024 Ground Investigation (ref. 794-ENV-GDE-21622)		
CP03	2.90	0.30
CCGI 2022 Ground Investigation (ref. C7638)		
BH02	1.60	0.90
BH03	2.00	1.00
WS01	2.20	0.70
WS02	0.50*	0.50
WS02A	0.70*	0.30
WS03	0.30	2.20
TP05	1.35	0.65
TP07	1.15*	0.65
TP09	0.60*	2.20
TP10	0.80*	0.80
RPS 2023 Ground Investigation (ref. 794-ENV-GDE-JER9890)		
WS01	1.35	1.80
WS02	1.40	0.55
WS03	1.10	0.30
WS04	2.40*	0.40
WS05	0.20	1.20
WS07	1.40*	0.90
WS08	1.75	0.65
WS10	1.05	0.35
WS11	1.60*	1.40

Exploratory Hole Location	RTD Thickness (m)	Non-granular / clay-rich Overburden (m)
WS13	1.85	0.45
WS16	1.65	0.85
Enzygo 2022 Ground Investigation (ref. CRM.731.001.GE.R.001.A)		
WS152	0.10	0.25
RPS 2025 Ground Investigation (ref. 794-ENV-GDE-21850)		
TP02	1.20	0.20
TP03	0.20	0.20
TP04	0.60	0.40
TP06	1.38	0.12
TP07	0.40	1.60
WS02	1.00	0.20
WS03	1.30	0.60
WS04	1.00	0.20
WS05	1.60	0.50

*Base not proven

5.1.4 Based on the data presented within Table 5-1, the average thickness of RTD is approximately 1.20 m, whilst the average overburden to the RTD is approximately 0.70 m. The average thickness of deposit south of the River Loddon is less than north of the river with an average deposit thickness of 1.17 m in the south and 1.28 m in the north.

5.1.5 As demonstrated on Drawing 2, the thickness of RTD across the Site is relatively variable and there does not appear to be any obvious patterns with respects to RTD thickness and distribution. This may reflect the possibility of a mixing zone between RTD and overlying Brickearth / Alluvium, where present, given the generally clayey nature of the RTD, which may have led to difficult identification of the boundary between the superficial units in the field.

5.1.6 Drawing 2 also highlights where RTD has been proven to be absent, particularly away from the River Loddon in the north-west of the Site.

5.2 Extent of Potentially Viable Mineral Resource on the Site

Total Volume of Potentially Viable Mineral Resource

5.2.1 The average thickness of the RTD at the Site that is considered to represent the granular-rich mineral resource is approximately 1.20 m, with thickness of 1.28 m and 1.17 m north and south of the River Loddon respectively. The granular-rich RTD horizon is overlain by overburden, of approximately, on average, 0.70 m thick.

5.2.2 As it is a 'clean' sand and gravel mineral resource within the RTD that is of potential commercial interest, it is reasonable to expect that:

1) Some mineral resource would be lost during excavation / removal of overburden by an over-dig into the mineral resource horizon; and
2) Some mineral resource will be left in place at the base of each excavation to ensure underlying clay is not intercepted during extraction.

5.2.3 Given that a proportion of the mineral resource will therefore be lost or left in situ following excavation, it is reasonable to consider that the viable mineral resource present on the Site is

represented by those areas where at least 1 m of sand and gravel mineral resource is present. Where the sand and gravel resource horizon is thin, it is considered to represent a non-viable mineral resource. Based on these assumptions, an estimate of the volume of potentially viable mineral resource on the Site has been derived and summarised in Table 5-2 below for the whole site and the area to the north and south of the River Loddon (as sub sites).

5.2.4 The revised average thickness of granular-rich RTD, based on the above has been calculated based on all granular horizons greater than 1 m in thickness in Table 5-1. The below calculations also assume that excavation below the water table (which will require groundwater controls). They also take account of the proportion of the area where deposits are RTD are greater than 1m, based on the proportion of exploratory locations proving at least 1 m of granular-rich RTD. In this context, these volumes will reduce when appropriate buffers are applied to sensitive receptors and the practicalities of extraction are considered.

Table 5-2 - Volume of Potentially Viable Sand and Gravel Mineral Resource

Site Area	Approximate Site Area within MSA (m^2)	Average Sand and Gravel Thickness (m)*	Percentage of Area with Thicknesses Greater than 1 m	Estimated Area (m^2) of Viable Mineral Resource#	Volume of Resource (m^3)	Volume of Resource Less 'Lost Resource' (m^3)**	Volume of Overburden***
Area of whole Site that falls within MSA	2,504,565	1.56	70%	1,753,195.50	2,734,984.98	2,033,706.78	1,279,832.72
Area to North of River Loddon that falls within MSA	1,220,900	1.87	55%	671,495	1,255,695.65	987,097.65	624,490.35
Area to South of River Loddon that falls within MSA	1,283,665	1.44	76%	975,585.40	1,404,842.98	1,014,608.82	614,618.80

#Based on the proportion of RTD > 1 m thick across the area of the Site that falls within the MSA

*Based on an average thickness > 1 m taking into account all relevant ground investigation for the Site and within a 50 m buffer

**Based on assumption that up to 40 cm of lost resource (i.e. 20 cm of resource below overburden and above clay)

***Based on an average thickness of 0.73 m, 0.93 m and 0.63 m of overburden for the total area of the Site that falls within the viable mineral resource area, to the north of the River Loddon, and to the south of the River Loddon, respectively

5.2.5 The above calculations suggest that there is a large volume of sand and gravel mineral resource at the Site.

Buffer Zones and Constraints on Mineral Extraction

5.2.6 The estimate of potentially viable sand and gravel resource presented in Table 5-2 however does not consider other limitations to mineral extraction that may reasonably be expected to apply, given the site setting and nature of the extraction process. As described in Mineral Safeguarding in England: good practice advice (BGS, 2011) buffer zones are commonly applied around safeguarded mineral areas and used in the consideration of the extent of viable resources. Buffer zones limit the area of potentially extractable resource, by defining those areas where the extraction of safeguarded mineral resources would not be expected due to:

- Proximity to existing sensitive development that could be adversely affected by the effects of extraction (i.e. noise, dust, visual impact, transport and/or vibration as per paragraph 224(c) of the NPPF, 2024) most notably:
  - Schools, hospitals and nurseries.
  - Residential development and supporting infrastructure (e.g. parks and amenity areas).
  - Community centres.
- The requirement to protect sensitive environmental receptors protected under paragraph 224(a) and (b) of the NPPF (2024) that could be impacted by extraction and include:
  - Designated sites (e.g. SSSI).
  - Ancient woodland.
  - EA designated main rivers (River Loddon, Long Ten and The Dell Watercourses, Barkham Brook).
- Strategic infrastructure including:
  - Roads and highways.
  - Above and below ground utilities.
- Geotechnical and operational considerations associated with mineral excavation, most notably securing a geotechnically sound site boundary.

5.2.7 The width of protective buffer zones that may potentially be applied are not prescribed in the planning policies reviewed as they would typically be determined as part of the planning process for a mineral extraction proposal and are typically based on a site-specific basis. Furthermore, the detailed quantitative assessment required to determine impacts and define buffer zones are beyond the scope of an MRA. However, it is noted that industry guidance does provide some indication of possible standoffs that may be required, for example the *Environmental Effects of Dust from Surface Mineral Workings* (Department of the Environment Minerals Division, 1995) states that in the absence of a quantitative dust assessment, a minimum standoff of 100 – 200 m is recommended from significant dust sources. Further to this, the Central and Eastern Berkshire authorities' recommend a minimum buffer zone of 100 m for operational mineral extraction, from the nearest sensitive human receptors.

5.2.8 For the purpose of this MRA, the following buffer zones, associated with potential constraints identified in Sections 3 and 4, are considered reasonable and have been initially applied to further evaluate the distribution, extent and volume of viable mineral resource and its associated economic viability as a resource. It should also be noted that where relevant, the buffers have also been based on buffers that have been considered as part of the indicative masterplan for the proposed development at the Site, as identified on Drawing 2:

- Protection of mineral excavation boundary structural integrity, construction of safe extraction faces, and allowance for the construction of Cut Off Walls, where required: **15 m**;
- High pressure gas mains: **31 m** either side of the mains (this includes the required 16 m easement either side and an additional 15 m either side to allow for safe extraction face construction and cut-off walls);
- Medium and intermediate pressure gas mains: **18 m** either side of the mains (this includes the required 3 m easement either side and an additional 15 m either side to allow for safe extraction face construction and cut-off walls);
- Foul sewer mans: **18 m** either side of the mains (this includes the required 3 m easement either side and an additional 15 m either side to allow for safe extraction face construction and cut-off walls);
- High power electrical OH lines: **15 m** either side of the lines (this includes the required 15 m easement either side and additional 15 m either side to allow for safe extraction face construction and cut-off walls);
- EA designated main rivers (River Loddon, Barkham Brook, Long Ten and The Watercourses): **20 m** either side of the watercourses from the top of the banks;
- Existing woodland: **15 m**;
- M4 motorway: **50 m**;
- Tree Protection Orders and Veteran Trees: **15 m**;
- Local Wildlife Sites: **15 m**;
- Valued Landscape: **41 m**;
- Historic lane with mature vegetation: **15 m**;
- Scheduled Monument and Listed Buildings: **100 m**;
- Existing buildings that are to be retained as part of the proposed development (including the International Cocoa Quarantine Centre and Arborleigh Angling Club): **50 m**; and
- Existing residential properties: **100 m**.

5.3 Extent of Potentially Extractable Mineral Resource on the Site

5.3.1 By applying the buffers defined in paragraph 5.2.9, the area for possible mineral extraction on the Site is reduced to approximately 856,000 m^2. The impact of the application of buffers renders the north of the River Loddon area as unviable for mineral extraction, as identified within Drawing 5. The volume calculations of potentially viable mineral resources, as presented within Table 5-2, have therefore been revised to reflect the application of buffers, for the south of the River Loddon only. The revised calculations are presented in Table 5-3 below.

Table 5-3 - Revised Volume of Potentially Viable Mineral Resource Following Application of Buffers

Area of Site	Site Area (m^2)***	Average Sand and Gravel Thickness (m)*	Percentage of Area with Thicknesses Greater than 1 m	Estimated Area (m^2) of Viable Resource#	Volume of Resource (m^3)	Volume of Resource Less 'Lost Resource' (m^3)**	Volume of Overburden##
South of River Loddon	856,000	1.44	76%	650,560	936,806.40	676,582.40	403,347.20

*Based on an average thickness taking into account all relevant ground investigation for the Site and within a 50 m buffer

**Based on assumption that up to 40 cm of lost resource (i.e. 20 cm of resource below overburden and above clay)

***Based on the area of the Site that falls within the MSA and not impacted by buffers

#Based on the proportion of RTD >1 m thick within the area of MSA, unaffected by the application of buffers

##Based on an average thickness of 0.63 m of overburden for the total area of the south of the River Loddon that falls within the viable resource area

5.3.2 Based on these revised calculations, it is considered that the sand and gravel resource of the RTD presents a viable mineral resource on the Site given the large volumes available for extraction.

5.4 Practicability of Prior Extraction

Hydrogeological Regime

5.4.1 An additional factor to consider with respect to the extraction of the mineral resource at the Site, is the environmental impact of a mineral activity. The River Loddon, as well as three additional EA designated 'main rivers' transect the Site. The northern half of the Site and localised areas in the south and north-east fall within Flood Zones 2 and 3, associated with the main watercourses at the Site. Groundwater level monitoring data based on a review of site-specific ground investigation data available for the Site, as summarised within Table 3-3, indicates a shallow groundwater body of approximately 0.50 m, and on occasion, shallower than this. Any mineral extraction below 0.50 m BGL, will require dewatering / groundwater control. Where extraction is proposed in the areas adjacent to the River Loddon the impacts of dewatering on the water course will need to be assessed and mitigation is likely to be required. Such mitigation may include the use of groundwater barriers.

5.4.2 In addition to this, the Central and Eastern Berkshire authorities' state, under paragraph 6.42 of the JMLP, that where it is impractical to remove an entire deposit, consideration should be made for partial recovery of a deposit. The authorities identify that areas liable to flooding may constitute such a scenario; the extraction of the upper levels of the deposit would be encouraged, whilst "removal of the entire deposit would render the land unsuitable without the importation of inert material raise the ground level above flood levels".

5.4.3 The likely hydrogeological continuity between the RTD and River Loddon means that the contamination status of any backfill materials will require careful consideration to avoid impact to the watercourses. This may impact the commercial and practical viability of any mineral operation.

Distribution of Potentially Extractable Mineral Resource

5.4.4 The application of reasonable buffers at the Site also has a profound impact on the distribution of areas that may be conducive to extraction. As shown in Drawing 4, the impact of buffers reduces a large area with potential resource into smaller areas, that on their own, may not be considered suitable for full prior extraction, particularly when the construction of excavation is a key consideration for safe extraction of granular material.

Further Considerations

5.4.5 As shown in Drawing 1, the majority of the north-east and the eastern periphery of the Site, to the south of the River Loddon, will constitute areas of open space, and therefore will not be subject to development that would permanently sterilise any mineral resource beneath that area of the Site.

5.4.6 It is also not considered that the proposed development over the larger area in the south of the Site, would sterilise the north-east area of the Site by virtue of buffers associated with the new development, given there are sensitive receptors (residential properties to the north and south of Jukes Lane) in closer proximity to this area which already imposes certain constraints to mineral extraction.

5.5 Full Prior Extraction

5.5.1 Although there is estimated to be a large mineral resource at the Site, the shallow groundwater table that is likely to be in hydrogeological continuity with the River Loddon and other main river

watercourses at the Site, coupled with the distribution of available areas for extraction, it is not considered that full prior extraction of the **entire** safeguarded resource at the Site in advance of construction would be feasible. Furthermore, to support development, ground levels will need to be maintained post extraction, particularly in areas liable to flooding, as considered in the JMLP under paragraph 6.42. The current assessments indicate an approximate material balance for the platform construction works, indicating that site won backfill from construction activities will be limited to the plot construction arisings and topsoil strip, which are estimated to generate circa 131,850 m^3 and 109,000 m^3 of material respectively. Assuming that these materials represent suitable backfill and subject to detailed design (including dewatering appraisals and phasing), it is considered that targeted prior extraction could be viable, allowing 240,850 m^3 of extraction. The use of site won materials will not lead to increased contaminant loadings at the Site, limiting the potential for impact to the surface water receptors at the Site.

5.6 Incidental Extraction

5.6.1 Incidental extraction should be adopted, by virtue of activities required as part of the proposed development construction activities, to meet part (a) of Policy M2 of the JMWLP; extraction of the upper 0.50 m BGL should be encouraged where this can be excavated in line with construction development phasing.

5.6.2 However, given that the groundwater table is shallow and parts of the Site are prone to flooding, excavations could only reasonably be opened up where there is an immediate availability of sufficient suitable material to backfill the excavations. To maximise the economic viability of the mineral resource extracted, the volume of material to be used to backfill the excavations should be site-won where possible.

6 SUMMARY AND CONCLUSIONS

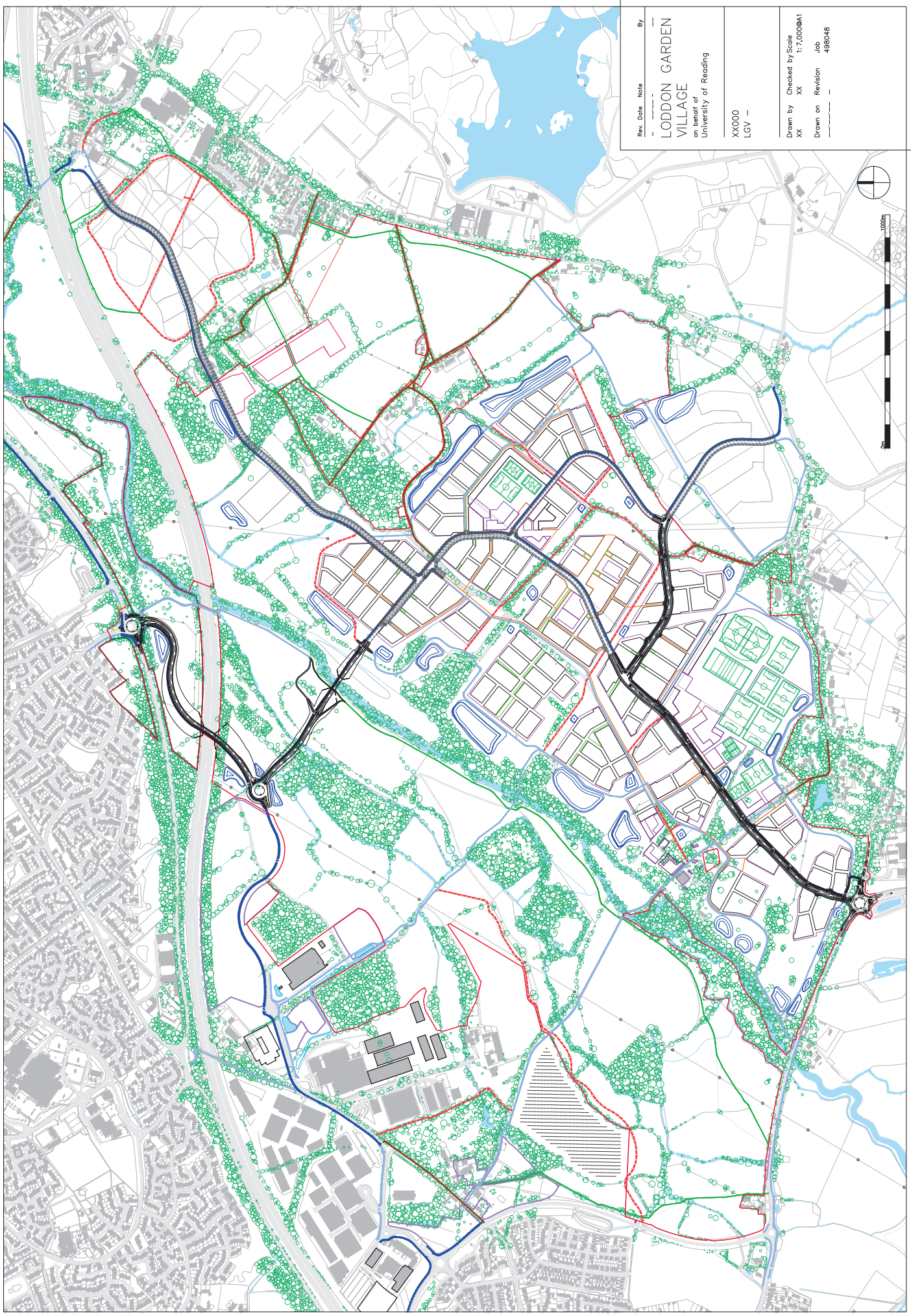
6.1.1 A mineral resource assessment has been undertaken to support outline and detailed planning for a proposed mixed-use development on land to the south of the M4, RG2 9HX (the Site).

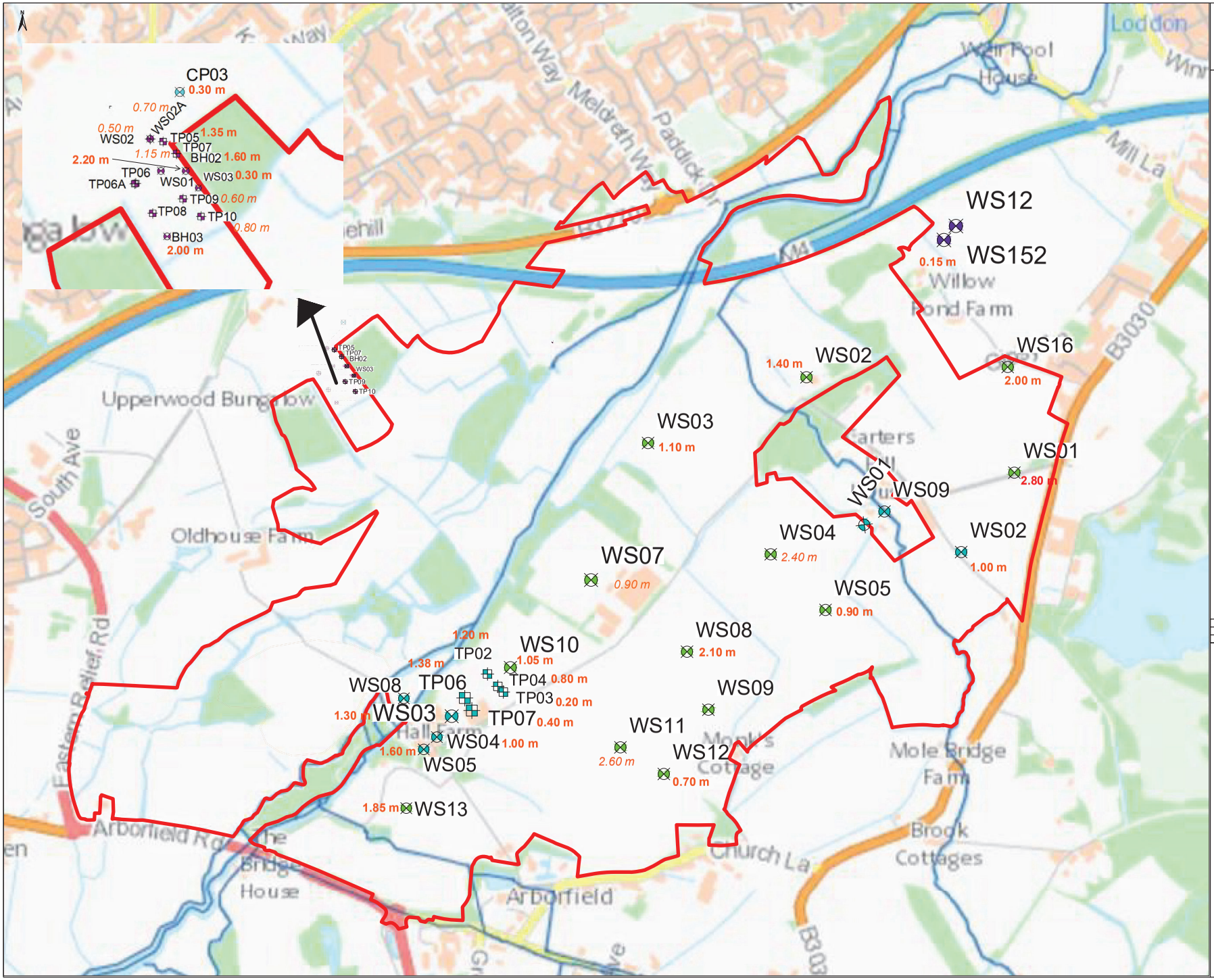
6.1.2 This mineral resource assessment has utilised publicly available geological information and has placed particular reliance on the available ground investigation data for the Site and within a 50 m buffer.

6.1.3 The safeguarded mineral resource present on the Site is the River Terrace Deposits. The geological data reviewed has demonstrated that the shallow sand and gravel deposits of potential commercial interest are widespread across the Site, albeit variable in thickness and composition.

6.1.4 Given the site setting, there are a number of constraints that are considered with respect to any mineral extraction at the Site. Following the application of reasonable buffers, including for residential properties, Valued Landscape, Local Wildlife Sites and ES designated main rivers, the volume of potentially extractable mineral resource equates to 676,582.40 m^3. Although this is considered to represent a potentially significant volume of mineral resource, excavations below approximately 0.50 m BGL of the RTD would not be viable without significant dewatering measures in place. Given the location of four designated main rivers within the Site redline planning boundary, and the likely hydrogeological continuity between the shallow groundwater body present within the RTD and the rivers, any excavations below the groundwater table could cause significant changes to the wider hydrogeological regime. Any material used as backfill following excavation would also need to demonstrate that they are inert and uncontaminated, to mitigate against introducing contaminants to a major hydrological body.

6.1.5 It is therefore considered that full prior extraction of the entire RTD deposit is **not** feasible, although excavation of safeguarded resources within the upper horizons of RTD above the water table should be considered. This could be achieved through adoption of incidental extraction principles, given the localised areas available for extraction, following the application of reasonable buffers. The viability of any proposed incidental extraction needs to take account of the availability and suitability of materials to backfill any resulting voids. Site won materials associated with the proposed development construction works (topsoil strip and plot engineering works) may represent suitable material (subject to detailed assessment) and may provide circa 240,000 m^3 of backfill.





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BH Enzygo - CRM.731.001.GE.R.001.A

BH RPS - 794-ENV-GDE-21850 2025

BH NHM Factual Report (CCGI) - C7638

BH UoR Deep Sewer - 794-ENV-GDE-21622

BH ALP GW Monitoring - 794-ENV-GDE-JER9890

Redline Boundary

2.00 m RTD **Proven** Thickness

2.40 m RTD Maximum Thickness but **Not Proven**

Rev	Description	By	CB	Date

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Client: University of Reading

Project: Loddon Garden Village

Title: Distribution of River Terrace Deposit Proven Thicknesses

Status	Drawn By	PM/Checked by
Final	LH	LB

Project Number	Scale @ A1	Date Created
794-ENV-GDE-21850	NTS	July 2025

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