Caulmert Limited

Engineering, Environmental & Planning
Consultancy Services

Cassington Quarry – Plant Area

Hanson Quarry Products Europe Limited

Bespoke Environmental Permit Application

Environmental Setting and Site Design (ESSD) Report

Prepared by:

Caulmert Limited
Nottingham Office, Strelley Hall, Main Street, Strelley, NG8 6PE
Tel: 01773 749132
Fax: 01773 746280
Email: andystocks@caulmert.com
Web: www.caulmert.com

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APPROVAL RECORD

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Project Manager:	Andy Stocks
Caulmert Limited:	Nottingham Office, Strelley Hall, Main Street, Strelley, Nottingham, NG8 6PE

Author	Kellie-Marie Pacifico Burston Senior Environmental Consultant	**Date**	06/07/2021
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DISCLAIMER

CASSINGTON QUARRY – PLANT AREA

ENVIRONMENTAL SETTING AND SITE DESIGN REPORT

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1.0 INTRODUCTION

1.1 Report Context

1.1.1 Caulmert Limited have been appointed by Hanson Quarry Products Europe Limited (the 'Operator'), to prepare an Environmental Setting and Site Design Report as part of a bespoke environmental permit application for the former 'plant area' (hereafter referred to as the 'application site') at Cassington Quarry, in Yarnton, Oxfordshire.

1.2 Site Details

1.2.1 The application site comprises the 'plant area' within the wider area of restored sand and gravel workings of Cassington Quarry and is approximately 7.12 hectares (ha) in size. The site is situated approximately 670m southwest of Yarnton village and 1.5km northeast of Cassington village. The site is 480m north of the A40 highway and the outskirts of Oxford are located approximately 2.2km southeast of the application site.

1.2.2 The site is located at postcode OX29 4FL and National Grid Reference SP 47437 11274. Access to the Site is from an unnamed road which comes off the eastbound A40 carriageway to the west of the site. This road serves the former quarry workings, the application plant site and three other waste management sites before heading back to re-join the westbound A40 carriageway. The site location is indicated below in Figure 1:

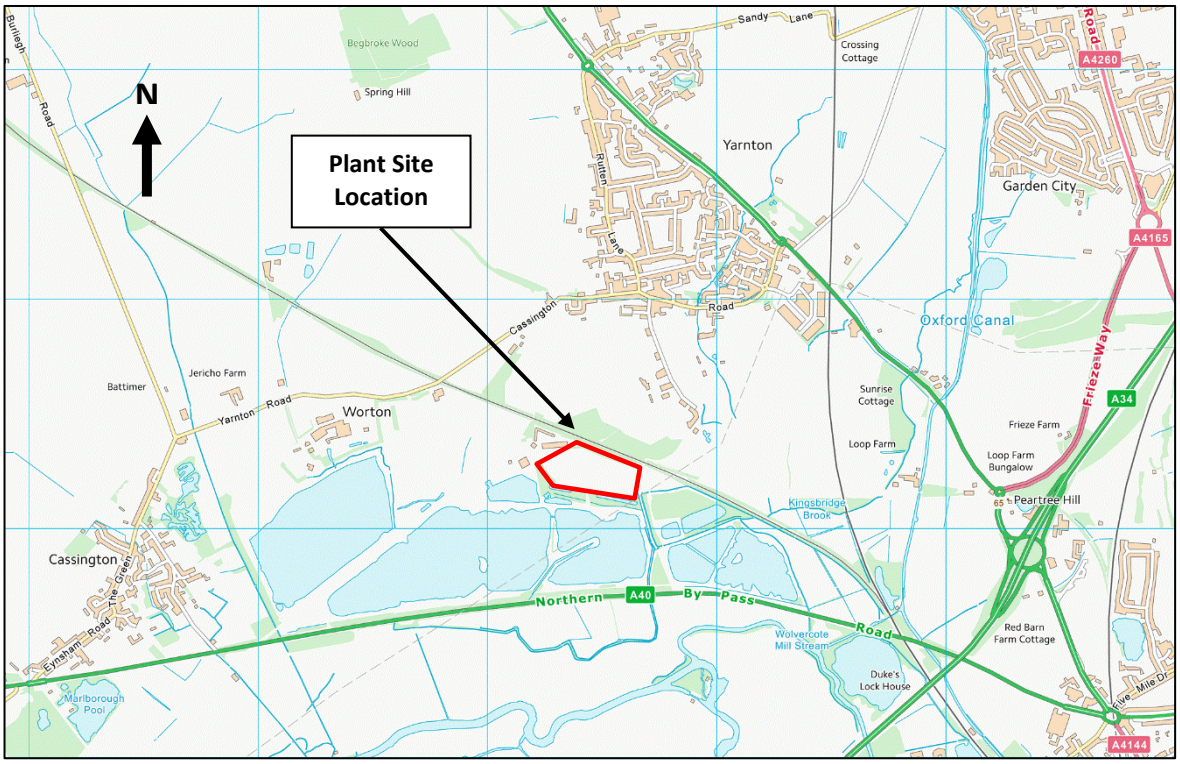


Figure 1 – Site Location (approximate boundary only)

1.2.3 The restoration of the wider area already comprises grassland and water bodies, many of which are immediately to the south of the site (visible in Figure 1), and the proposed end-use of the area once restoration is complete is a combination of agriculture and recreational use.

1.3 Site Context

1.3.1 The application site is surrounded by numerous large and small water bodies immediately to the south and the A40 main road is further south, 480m away.

1.3.2 There is the Oxford to Evesham railway line along the northern and eastern boundary of the site and arable agricultural land beyond to the north. Immediately east of the application site are some adjacent waste management sites. The site is set within the River Thames valley and the River Thames/Isis is 960m to the south-southwest.

1.3.3 The closest residential receptors are Mead Farm buildings and The Barn approximately 310m northeast. These residences are on the outskirts of Yarnton. The other nearest settlements are Worton 780m west and Cassington 1.5km southwest.

Designated Sites of Ecological Importance & Other Habitats

1.3.4 A search of the surrounding area using the DEFRA Magic Maps website1 has identified there is a Site of Special Scientific Interest (SSSI), a Special Area of Conservation (SAC) and a Local Wildlife Site (LWS) within 1km of the application site boundary:

- Pixey and Yarnton Meads SSSI
- Oxford Meadows SAC
- Oxey Mead LWS

1.3.5 The Pixey and Yarnton Meads SSSI is located on the floodplain associated with the River Thames and forms part of the larger Oxford Meadows SAC.

Pixey and Yarnton Meads SSSI

1.3.6 This designation is noted for being amongst the best remaining examples of neutral grassland in lowland England with botanically rich grassland. A variety of species include the cuckoo flowers which occupies much of the largest area of the SSSI with other notable plants including the green winged orchid and autumn crocus are part of the 150 species which dominates the meadow grassland. The watercourse surrounding the Meads have tall emergent vegetation frequented by dragon and damselflies. The Meads have been the subject of detailed botanical research and regular agricultural plant breeding.

Oxford Meadows SAC

1.3.7 The general site character of the Oxford Meadows is predominantly humid and mesophile grassland and improved grassland. Oxford Meadows represents lowland hay meadows in the Thames Valley centre include vegetation communities that are unique in reference to long-term grazing, hay-cutting on lowland hay meadows. The site benefits from the survival of traditional management and therefore exhibits good conservation of structure and function. Oxford Meadows is selected as a SAC because is it one of the larger of only two known sites in the UK for creeping marshwort, a creeping perennial that grown in wet grassland and areas subject to winder flooding (typically by rivers).

Oxey Mead LWS

1.3.8 The Oxy Mead Local Wildlife Site is home to swathes of flowers and butterflies found in profusion in England's meadows and pasture. It is described as one of the surviving ancient 'lot' meadows near the city of Oxford which date back to medieval times. The site is a dominant feature of wildflowers and wild grasses included common birds-foot, fairy flax and yellow rattle. Butterflies are attracted including the orange-tip, meadow brown and ringlet. Bird life is not prevalent to this area, with the occasional Skylark hovering high overhead and waders include snipe and redshank which may be observed during the wetter winter months.

Cassington to Yarnton Gravel Pits LWS

1.3.9 The Cassington to Yarnton gravel pits are extensive areas of lowland meadow habitat provides areas of standing water attracting a number of wildfowl. Similar to surrounding designation classes, this LWS provides a range of flora communities for wildflowers and meadow grasslands supporting a range of butterfly and insect habitats.

1.3.10 There are no Special Protection Areas (SPAs), National Nature Reserves (NNRs), Ramsar sites, Areas of Outstanding Natural Beauty (AONB), Local Nature Reserves (LNRs) or Ancient Woodlands within 1km of the site boundary.

1.3.11 An ecological assessment of the application site and wider Cassington Quarry was undertaken in 2015 by Applied Ecology Limited (see attached report ref. AEL1044 v2 in Appendix 1) and evidence was found of the presence of Great Crested Newts (GCN) habitat on site and in the vicinity of the plant area. The long rectangular pond <10m to the southwest of the application site boundary and the smaller pond 50m to the southwest were both found to be home to Great Crested Newts. Prior to any restoration activities (waste recovery and aggregate recycling operations) commencing at the application site, the newts will be captured and relocated to another area. The report highlighted that the restoration of the former gravel extraction (plant) area "would result in an increase of 0.9 ha of newt friendly terrestrial habitat within newt commuting range of two confirmed GCN waterbodies and would result in no loss or damage of any GCN breeding pond".

1.3.12 The sensitive receptors within 1km of the site boundary are presented below in Table 1. The closest residential receptors are Mead Farm buildings and The Barn approximately 310m northeast. These residences are on the outskirts of Yarnton. The other nearest settlements are Worton 780m west and Cassington 1.5km southwest.

Table 1 – Summary of Sensitive Receptors within 1km of the site boundary

Receptor	Land Use	Distance/Direction
Long rectangular pond	GCN Habitat – Surveyed	<10m SW
M&M Skip Hire Ltd Waste Transfer Station	Commercial/Industrial	<10m N
Woodland – Priority Deciduous	Habitat	<10m S, 270m NW, 670m E, 720m NW, 800m NW, 800m SE

Receptor	Land Use	Distance/Direction
Footpath	Public Footpath	15m E
Severn Trent Green Power Cassington Anaerobic Digestion Facility	Commercial/Industrial	20m W
Small pond	GCN Habitat – Surveyed	50m SW
Large Waterbodies	Surface Water	60m W, 100m S, 100m SW, 320m SE, 700m W
Unnamed Access Road	Public Road	100m W
Arable Fields	Agricultural	110m ENE, 120m N
M&M Skip Hire Ltd Waste Management Site	Commercial/Industrial	120m NW
Mead Farm	Residential/Recreational	310m NE
The Barn	Residential/Recreational	310m NE
Yarnton Manor	Residential/Recreational	350m NE
St. Bartholomew's Church	Residential/Recreational	410m NE
Pixey and Yarnton Meads SSSI	Habitat – Designated Site	460m S
Oxford Meadows SAC	Habitat – Designated Site	460m S
Oxey Mead LWS	Habitat & Surface Water	470m SE
A40	Public Road	480m S
Cassington Road	Public Road	510m NW
Windmill Farm	Residential/Recreational	580m N
Residential area of Yarnton	Residential/Recreational	610m NE
Car Tyre Shop / Yard	Commercial/Industrial	620m NE
Worton Kitchen Gardens	Commercial	780m WNW
Recreation Ground	Residential/Recreational	870m NE
Worton Business Park	Commercial/Industrial	870m WNW
Worton Hall / Events Venue	Recreational	925m WNW
Business Park / Depots	Commercial/Industrial	940m NE
Yarnton Nursing Home	Residential/Recreational	960mN
River Thames/Isis	Surface Water	960m SSW
William Fletcher Primary School	Residential/Recreational	990m N

Topography

1.3.13 The Site area is generally low relief, primarily associated with the flood plain of the River Thames. Ground elevations within the Site generally varies between 62metres above Ordnance Datum (mAOD) at the west, down to 58maOD in the east. Land elevation for the area of floodplain to the south of the Site (and A40) resides at some 58-59maOD. Land elevations increase immediately to the north of the Site, rising to a local high of some 96maOD, west of Yarnton.

1.3.14 In proximity to the Site area, the landform to the south is dominated by a series of large interconnected lakes, subdivided by a series of causeways. The eastern waterbodies comprise

the silt settlement/water circulation system and a number have now been infilled to form conservation areas (reed best and woodland).

1.3.15 Two large lakes to the south facilitate movement of water through the Site to the east, with outfall to the existing surface drainage passing from the eastern boundary of the Lake.

1.3.16 Within the Site area, the soils, overburden and upper level gravels have been removed to create a level platform of exposed sand and gravel, to provide foundation for the operation of the mineral processing plant and stockpiling area. Survey of this area shows that land elevation varies from 63maOD in the west to some 60maOD in the east. The landform rises steeply at the northern boundary, to the predevelopment ground level at some 66maOD (although this is partly obscured by the present of soil storage bund located along the northern boundary at 69maOD).

Agency's position statement on the location of landfills GPP3

1.3.17 With reference to '*The Environment Agency's approach to groundwater protection*' policy document, dated February 2018, Version 1.2, the placement of inert waste materials as part of the proposed restoration activities does not pose a potential hazard/pollution risk to the environment or groundwater, as these materials will not be a source of contaminants. Therefore, additional controls to protect groundwater from possible pollution from the waste materials is not required.

2.0 SOURCE

2.1 Historical Development

2.1.1 Cassington Quarry was a former 121ha sand and gravel quarry which has been extracted since 1989, the majority of the site comprised Thames floodplain 1st terrace gravel excavated to approx. 4m depth with some areas on higher 2nd terrace. Reserves were exhausted in 2008 and backfilling operations completed in 2012. Original phases of restoration comprise of large lakes with grassy margins and trees with areas of agriculture following inert importation, silt lagoons restored to native broadleaved woodland with a combination of planting and natural regeneration.

2.1.2 The Plant Area at Cassington Quarry was utilised as a processing area within Cassington Quarry for previous restoration activities and is situated within the wider development. Much like the surrounding environment, the Plant Area was extracted of sand following mineral extraction.

2.2 Proposed Development

2.2.1 The proposed development comprises the importation of approximately 279,000 tonnes (155,000m3) of inert material to infill the void created by the sand extraction in accordance with the implemented planning permission MW.0111/19. It seeks to utilise imported inert waste materials rather than using 'virgin' soils for the restoration as detailed in the Waste Recovery Plan (Appendix 3). The proposed development would use the imported inert waste material to create grassland, with perimeter tree and shrub planting, and areas of open water in the south eastern section of the site (as shown on Drawing ref. C4/HAN/05/4).

2.2.2 The open water complex in the south eastern part of the plant site would include lake shallows, reed beds and blocks of tree and shrub planting, creating a greater variance in increased habitats for local wildlife. Selected restoration materials will be used to form the northern slope of the wetland ponds. Where possible this will comprise site derived materials or selected (cohesive) soils. It is assumed that this material will be placed dry.

Volumes

2.2.3 The restoration of the plant site at Cassington Quarry will require approximately 279,000 tonnes (155,000m^3) material to be brought to the site to shape the void created by the sand extraction.

Waste Types

2.2.4 Permitted wastes accepted at the site will be strictly inert, as such the only waste types proposed for restoration activities include those listed in Table 2 below.

Table 2 – Proposed Waste Types for Restoration at the Site

EWC Code	Description	Restriction
01	**WASTE RESULTING FROM EXPLORATION, MINING, QUARRYING AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS**	
01 01	**Wastes from mineral excavation**	
01 01 02	Waste from non-metalliferous excavation	Restricted to waste overburden and interburden only
01 04	**Wastes from physical and chemical processing of non-metalliferous minerals**	
01 04 08	Waste gravel and crushed rocks other than those mentioned in 04 04 06	
01 04 09	Waste sand and clay	
10	**WASTES FROM THERMAL PROCESSES**	
10 12	**Wastes from manufacture of ceramic goods, bricks, tiles and construction products**	
10 12 08	Waste ceramics, brick, tiles and construction products (after thermal processing)	
10 13	**Wastes from manufacture of cement, lime and plaster and articles and products made from them**	
10 13 14	Waste concrete	
17	**CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**	
17 01	**Concrete, bricks, tiles and ceramics**	
17 01 01	Concrete	Selected C&D waste only
17 01 02	Bricks	Selected C&D waste only
17 01 03	Tiles and ceramics	Selected C&D waste only
17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 1701 06	Selected C&D waste only. Metal from reinforced concrete must have been removed.
17 05	**Soil (including excavated soil from contaminated sites), stones and dredging spoil**	
17 05 04	Soil and stones other than those mentionedin 17 05 03	Excluding topsoil, peat; excluding soil and stones from contaminated sites
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE**	
19 12	**Wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified**	
19 12 09	Minerals only	Wastes from the treatment of waste aggregates that are otherwise naturally occurring minerals. Does not include fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard.

19 12 12	Other wastes from mechanical treatment of wastes other than those mentioned in 19 1212	Restricted to crushed bricks, tiles, concrete and ceramics only. Metal from reinforced concrete must be removed. Does not include fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard.
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSITUTIONAL WASTES) INCLUDING SEPARATELYCOLLECTED FRACTIONS**	
20 02	**Garden and park wastes (including cemetery waste)**	
20 02 02	Soil and stones	Only from garden and parks waste; excluding topsoil, peat.

2.2.5 These waste types are identified by the Environment Agency as suitable for use in the restoration of mineral workings and as general fill material (Environment Agency Guidance; Waste Recovery Plans and Permits: October 2016).

Final landform and after use

2.2.6 Under revised proposals, the majority of the site will be restored to original (or near original) ground levels. The final landform will consist of grassland, perimeter tree and shrub planting and areas of open water in the south western section of the site as shown in drawing ref. C4/HAN/05/4. Final after use will incorporate a combination of agricultural grassland, conservation grassland and marginal smaller pond areas.

Phasing, size, and shape of working areas

2.2.7 Restoration will be undertaken in accordance with the revised restoration plan, drawing ref C4/HAN/05/4 and the Waste Recovery Plan, document ref. 'Cassington Quarry PA, FINAL, November 2020' (Appendix 3). The inert restoration materials will be sufficiently compacted to form a stable landform for the medium and long term and would undergo consolidation rapidly to reduce the risk of short-term instability.

2.2.8 The phasing of the working areas will be in accordance with planning permission Condition 6 MW.0111/19 as shown in drawings:

Drawing W92m/133;

Drawing C4/HAN/05/4C and,

associated section drawing C4/HAN/05/07.

Leachate quality

2.2.9 Due to the inert nature of the wastes accepted, it is anticipated that leachate will not be generated that could give rise to pollution within the site and therefore the Environmental Permitting Guidance Groundwater Activities do not apply. Following strict waste acceptance criteria (screening of waste materials on site and rejection of non-complying materials) it is unlikely that there will be a generation of leachate and pollution caused to the environment.

2.2.10 A Hydrogeological Risk Assessment (HRA) has been prepared as part of this bespoke environmental permit application under document ref. 4656-CAU-XX-XX-RP-V-0305. The HRA confirms that the permitted materials accepted at the site will be strictly inert as classified under the Landfill Directive which defines the waste as "one which does not undergo any physical, chemical or biological transformations; It does not dissolve, burn or otherwise physically or chemically react. Biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health. It's total leachability and pollutant content and the ecotoxicity of its leachate are insignificant and in particular, do not endanger the quality of any surface water or groundwater".

2.2.11 The HRA concluded from risk screening has concluded that there is no source of contamination based on the inert nature of the materials to be accepted at the site. The absence of any significant groundwater pathways also indicates there is no discernible pollutant linkages and therefore there is considered to be negligible risk on any potential receptors from the assessed recovery activity.

Method of placement

2.2.12 The restoration proposed under the planning permission has been designed to take into account the physical and technical requirements for the restoration in terms for land stability, drainage etc and the inclusion of landscape features in-fitting with the surrounding landscape character and consideration of previous landforms prior to the extraction of sands and gravels.

2.2.13 Following mineral extraction, overburden and then inert waste will be placed to the level required for the reinstatement with in-situ subsoils and topsoil to achieve original ground level in line with drawing ref. C4/HAN/05/4

2.2.14 The depth of inert waste required to be placed will vary accordingly as can be seen from drawing numbers C4/HAN/05/07.

2.2.15 Where required, dewatering will continue until final restoration. No waste will be tipped into water. Waste materials will be placed directly where directed following acceptance checks. Selected restoration materials will be used to form the northern slope of the wetland ponds. Where possible this will comprise site derived materials or selected (cohesive) soils. It is assumed that this material will be placed dry.

Installation engineering

2.2.16 The site will be situated within a void produced by the excavation of sand and gravels and will operate as a recovery activity. Consequently, this activity does not fall within the requirements of the Landfill Directive and therefore no engineering is proposed due to the nature of the wastes to be accepted.

3.0 PATHWAY AND RECEPTOR

3.1 Geology

3.1.1 The geology of the surrounding Site has been characterised from a number of sources include:

British Geological Survey (BGS) mapping;

Hydrogeological Risk Assessment (HRA) document ref. 4656-CAU-XX-XX-RP-V-0305 (2021); and,

'*Cassington Quarry, Section 73 Application, Hydrological Assessment*', (September 2019) document ref. HN/CASS/HA/001/19. (attached as Appendix 2).

Regional Geology

3.1.2 The area encompassing the Site is underlain by solid strata of Jurassic Oxford Clay. A borehole drilled immediately to the east of the Plant Area records a thickness for the Oxford Clay of some 10m in the locality.

3.1.3 Within lower lying areas to the south and northeast of the Site, the Oxford Clay strata are overlain by river terrace sand and gravel deposits and/or alluvium. These comprise extensive shallow and laterally continuous deposits, tracing both the present day and historic routes of the principal drainage channels passing through the area.

3.1.4 Other areas of more isolated sand and gravel deposition are identified on areas of higher ground forming the flanks of the main valley channels. These are higher level Second and Fourth terrace deposits, which can remain in continuity with the main terrace deposits, where in sufficiently close proximity.

Local Geology

3.1.5 BGS mapping indicates that the Site area is located on the northern edge for the First Terrace sand and gravel deposits (covered by alluvium), across the Oxford Clay deposits to the southern limit of the Second Terrace deposits.

3.1.6 A detailed trial pitting exercise (referenced from document *ref. HN/CASS/HA/001/19.)* undertaken across the Site shows the sand and gravel deposits extend across the full area, increasing from a depth of approximately 3m on the southern boundary, reducing to 1.2m on the northern boundary.

3.1.7 Sand and gravel deposits within Cassington Quarry have largely been removed, with the worked areas restored to a series of larger open waterbodies. During extraction, these were lined with basal clays/overburden along the southern flank to prevent draw-down effects which could negatively impact on the SSSI's to the south.

3.1.8 Sand and gravel deposits to the south (overlain by an alluvium covering) is present as an extensive area forming the floodplain associated with the River Thames and the Pixey & Yarnton Meads Site of Special Scientific Interest (SSSI).

3.1.9 Geological mapping data shows that the First Terrace, sand and gravel deposits, to bulge out against the underlying Oxford Clay to the north of the Site. Isolated areas of Second and Fourth Terrace deposits are recorded on the higher ground areas to the south and northwest of Yarnton respectively. Both these areas are expected to be separated from the Site by the foundations and drainage infrastructure. Areas of former sand and gravel deposition to the west and east of the Site have also both been worked and restored in accordance with the approved restoration plan. The western area of the wider Cassington Quarry development has been lined/backfilled with inert material and the eastern area (mineral washing lagoons) lined/infilled with silt as part of the mineral washing process.

3.2 Hydrology

3.2.1 The hydrological setting of Cassington Quarry and the application Site area has been based on extracts from the 'Cassington Quarry, Section 73 Application, Hydrological Assessment, (September 2019) document ref. HN/CASS/HA/001/19 (attached as Appendix 2).

Water Framework Directive (WFD) River Basin District

3.2.2 The Site is located within the Gloucestershire and the Vale Catchment of the Thames River Basin District. The Gloucestershire and the Vale Catchment comprises the most western area within the Thames River Basin District and is drained by a series of generally northwest – southeast oriented watercourses, linking into the main west-east flowing River Thames, running through the southern section of the catchment area. Surface water quality within the Gloucestershire and the Vale Catchment area is generally regarded as 'good', although the section of the River Thames in the vicinity of the Site over all status is classified as 'Moderate' which is primarily attributable to poor water quality identified as release from sewage treatment works.

Surface Watercourses

3.2.3 The principal watercourse with regard to the drainage systems in proximity to the Site is the Kingsbridge Brook. This receives drainage from both within the Site and the flood plain to the south of the A40. Drainage from these areas is focussed to a main tributary that passes between the water management area and restored Stage 2 lakes area of the wider Cassington Quarry development. This then links into the Kingsbridge Brook at the eastern boundary of the Site. Incident rainfall falling in proximity to the plant area will feed towards the south, being collected in drainage around the "Long Ponds" and subsequently connecting into the aforementioned local drainage network.

Surface Waterbodies

3.2.4 A total of nine water features are recorded on OS mapping data within 500m radius of the Plant Area. The majority are located within the Cassington Quarry development and relate to

the former extraction operations undertaken at Cassington Quarry (restored areas to open water and former silt processing areas).

3.2.5 The two ponds located along the southern flank (referred to as the 'Long Ponds') are natural features excavated into the sand and gravel aquifer. The water levels within the ponds are expected to be maintained by a combination of groundwater and runoff input from the adjacent lands. Water accumulating within the ponds flows via a buried pipe into the wider drainage system to the east.

3.2.6 A single isolated pond feature is located some 350m to the northeast of the Plant Area. This is situated on the edge of the sand and gravel deposit as shown by BGS mapping data and to the east of an area of former infill.

3.2.7 Based on the local topography, anticipated extent/thickness of the sand and gravel deposit, the presence of the railway/associated foundations and drainage that separates the two areas, the pond is not expected to be hydraulically linked to the Plant Area.

Flooding

3.2.8 The majority of the Plant Area Site is located within the EA Flood Zone 1 area, 'low risk of flooding – less than 0.1%'. A small area of the south eastern section falls in a Flood Zone 2 area (0.1% risk of flooding) and a very minor area within a Flood Zone 3 area (1% risk of flooding). However, these areas are incorporated pond areas in the final restoration landform.

3.2.9 A reproduction of the local EA fluvial flood mapping data has highlighted an Annual Exceedance Probability of 1% (Return Period of 1:100-years: Flood Risk Zone (FRZ) 3 and AEP 0.1% (Return Period of 1:1,000-years, FRZ2). The flood modelling data used for preparation of the flood plain maps shows the predicted 1% AEP flood level data (plus 70% allowance for climate change) as some 59.79maOD in the aforementioned area to the southeast of the Site. Similarly, the 0.1% AEP data predicts a level of some 59.71maOD for the same area.

3.2.10 Flood risk and flood modelling storage capacity modelled in the 'Hydrological Assessment (September 2019) document ref. HNCASS/HA/001/19, has indicated that the Plant Site area will provide an increase in storage capacity across the site for flood levels up to and exceeding the maximum predicted flood elevations (in this case 1% flood risk plus 70% climate change allowance. (see Table 7 of the Hydrological Assessment in Appendix 2).

3.2.11 Incorporation of ponds within the final restoration design as per drawing ref: C4/HAN/05/04-constructed in continuity with sand and gravel deposit so the south will provide attenuation capacity for control of run-off. Ponds will provide an increase in flood storage capacity compared to existing landform. Direction of run off to the ponds will provide adequate control for runoff water to prevent an increase in local flood risk. Based on the incorporation of the pond areas within the final restoration landform, planning controls/further mitigation are considered unnecessary with regard to the potential for post-restoration impact upon extant flood risk in the locality.

3.2.12 Examination of the EA pluvial flood risk mapping data indicates the extant Site to be at low risk of surface flooding from rainfall.

3.3 Hydrogeology

3.3.1 The hydrogeological setting of Cassington Quarry and the application Site area has been based on extracts from the 'Cassington Quarry, Section 73 Application, Hydrological Assessment, (September 2019) document ref. HN/CASS/HA/001/19 (attached as Appendix 2) and the Hydrogeological Risk Assessment (HRA, 2021) under document ref. 4656-CAU-XX-XX-RP-V-0305

Aquifer Characteristics

3.3.2 The Site is not located within any EA defined Source Protection Zones (SPZs). The superficial sand and gravel deposits (underlying and encompassing the Plant Area) are designated by the EA as a 'Secondary A Aquifer' (formerly referred to as 'minor aquifers'). These are defined as permeable layers capable of supporting local abstraction and in some cases providing a component of baseflow to local watercourses. The 2021 HRA (document ref. 4656-CAU-XX-XX-RP-V-0305) states that the groundwater environment is considered to be sensitive due to the present of the SSSI lagoons located to the south of the Plant Area.

3.3.3 The underlying solid strata of the Oxford Clay is regarded as non-aquifer ('unproductive strata' under the EA classification scheme), possessing low permeability and negligible potential for water supply or river base flow.

3.3.4 The sand and gravel deposit encompassing the Site comprises an unconfined aquifer fed primarily from incident rainfall (autogenic recharge).

3.3.5 Indicative values for long-term average effective rainfall available for recharge to the local aquifer system (that part of rainfall remaining after accounting for reductions attributable to evaporation, evapotranspiration and soil moisture deficit) has been estimated at some 132 millimetres per annum (mm/a; table 6) for agricultural areas and 6.8mm/a for open water areas.

3.3.6 Examination of the local topography indicates that recharge to the aquifer within the Plant Area, from runoff falling on areas of adjacent Oxford Clay outcrop (allogenic recharge), is unlikely to provide a significant contribution to the local aquifer resource.

Water Abstractions

3.3.7 Details of licensed abstractions (2km boundary from Site area) is shown in Table 3 below. There are no Private Water Supplies registered within 2km of the site boundary.

Table 3 - Licensed Abstractions

Licence Number	Licence Holder	Source	Purpose
28/39/16/0078	Thames Water Utilities Limited	River Thames (non tidal)	Water supply

Groundwater Flow

3.3.8 The near surface superficial deposits principally comprise sands and gravels overlain by alluvium. Groundwater movement through the deposit occurs within the interconnected system of pore-spaces as intergranular groundwater flow. The rate of transfer for groundwater through the superficial aquifer will depend on the gradient on the water table, the cross-sectional area (taking into account backfilled areas) and the hydraulic conductivity of the deposit.

3.3.9 In areas where the sand and gravel is overlain by alluvium (generally clayey/silt composition), it is likely that a degree of isolation will be recorded between the immediate surface and underlying groundwater system, reducing the free percolation of rainfall to groundwater.

3.3.10 The foregoing is balanced by the established network of relatively deep drainage channels installed in the locality, which will cut through the alluvium cover, allowing transfer to/from the surface water and groundwater systems.

3.3.11 The unproductive strata of the Oxford Clay will not support groundwater flow and therefore forms the base of the hydrogeological system present at the site.

3.3.12 In terms of the impacts of restoration activities on the extant superficial aquifer permeability and associated alteration in groundwater movement, it is considered that the placement of infill material will have negligible effect on groundwater levels and movement.

Groundwater Quality

3.3.13 Preliminary risk screening in the Hydrogeological Assessment (HRA, 2021) indicates that the Plant Area is not particularly sensitive in regard to groundwater quality, being surrounded by areas of former infill and lined waterbodies and expected minimal movement of groundwater. Waste Acceptance procedures and appropriate controls will be implemented to ensure there is no unacceptable risk to the local water environment. Groundwater receptors are discussed further in Section 3.5 of this report.

3.3.14 Following restoration, groundwater movement through the area encompassing the Plant Area will be low and the site has been shown to be isolated from other water dependant site and/or users by areas of former infill and/or lined open water bodies.

3.4 Man-made subsurface pathways

3.4.1 There are number of drains in and around the site boundary forming a drainage infrastructure where rain falling onto the plant area feeds towards the south and collected in drainage around the long ponds. An existing surface drain passes from the eastern boundary of the site and water accumulation within the site ponds flows via buried pipework into the wider drainage system to the east.

3.5 Receptors and Compliance points

3.5.1 The nearest receptors that will need to be considered within the risk assessments are described below.

Groundwater

3.5.2 There are no significant pathways present at the site due to the small thickness of the remaining sands and gravels. The site is located on unproductive strata. Localised groundwater flow will occur in the remaining sands and gravels and alluvium deposits surrounding the plant site, flowing towards the ponds ('long ponds') located on the southern flank and eventually flowing into the Kingsbridge brook via the drainage network.

3.5.3 The superficial sand and gravel deposit (underling and encompassing the Plant Area) are designated by the EA as a 'Secondary A aquifer'. The underlying solid strata of the Oxford Clay is regard as non-aquifer, there is low permeability and negligible potential for water supply or river base flow. By definition the inert nature of the wastes accepted, will not be capable of generating a leachate with the potential to cause pollution and therefore it is considered that there will be no impacts on the surrounding potential groundwater receptors.

Surface Water

3.5.4 The Site is within the River Thames valley, and associated with the flood plain of the River Thames. There is one abstraction identified in the locality, water supply from the River Thames. The main receptor is considered to be the Kingsbridge Brook to the east of the plant site prior to this converging with the River Thames at some distance from the site. The long ponds adjacent to the southern site boundary are considered to be predominantly groundwater fed either via flow within residual sand and gravel corridors or via incident rainfall/run off from the adjacent areas. There is the potential for a component of flow to be derived from groundwater movement with the placed restoration materials.

3.5.5 There are a total of nine water features are recorded on OS mapping data within the survey radius. There are water features located within the majority of the site boundary and former extraction operations. The two ponds located along the southern flank and an isolated feature located some 350m to the northeast of the Plant Area.

3.5.6 By definition the inert nature of the wastes accepted, will not be capable of generating a leachate with the potential to cause pollution and therefore it is considered that there will be no impacts on the surrounding surface water features.

Amenity (Nuisance and Health Issues)

3.5.7 Amenity issues that may affect receptors from this type of operation are nuisance caused by dust, noise or mud deposited on roads, impacting greater on human receptors. The nearest residential properties are approximately 350m to the north of the site at Mead Far and properties located 600m north to the edge of Yarnton.

3.5.8 The local receptors to the site (within 1000 m) are identified on drawing 4656-CAU-XX-XX-DR-V-1801, with their direction and distance from the site tabulated in Table 1. The effect of nuisance factors on these receptors have been risk assessed through the Amenity and Accident Risk Assessment (report ref. 4656-CAU-XX-XX-RP-V-0302).

Habitats

3.5.9 A search of the surrounding area using the DEFRA Magic Maps website1 has identified there is a Site of Special Scientific Interest (SSSI), a Special Area of Conservation (SAC) and a Local Wildlife Site (LWS) within 1km of the application site boundary:

- Pixey and Yarnton Meads SSSI
- Oxford Meadows SAC
- Oxey Mead LWS

3.5.10 The published 'operations likely to damage the special interest' list indicates that the site is only sensitive to operations within the SSSI itself, as no off-site activities are mentioned. It is therefore unlikely that the proposed activities at the Cassington Quarry will have an impact on these SSSI's.

4.0 POLLUTION CONTROL MEASURES

4.1 Site Engineering

Basal and side slope engineering

4.1.1 The site will be situated within a void produced by the excavation of sand and gravels and will operate as a recovery activity. Consequently, this activity does not fall within the requirements of the Landfill Directive and therefore no engineering is proposed due to the nature of the wastes to be accepted.

Capping

4.1.2 There is no capping required as Cassington Quarry Plant Area as the site will be restored. The restoration landform will comprise a generally sloping landform to the south, comparable to pre-worked elevations and created through the placement of inert materials and capped with indigenous retained soils. Placement of materials will be in accordance with the cross sectional profile as shown in drawing ref C4/HAN/05/7 'Cassington Quarry, Cross Section A-A, B-B and C-C'.

4.2 Restoration

4.2.1 Drawing C4/HAN/05/4shows the final post restoration landform. Due to the nature of the inert waste infilled at the site, settlement will be negligible. No boulders, rocks, stones or other deleterious material shall be placed close to the surface of the refilled excavations and the top of the fill shall be soil forming materials. Upon restoration, areas of the site that were partially restored with waste returned to agricultural use. Placement of materials will be in accordance with the cross sectional profile as shown in drawing ref C4/HAN/05/7 'Cassington Quarry, Cross Section A-A, B-B and C-C'.

4.2.2 Schemes for regular monitoring of groundwater quality and landfill gas concentrations will be developed in the aftercare period where necessary to provide evidence to enable permit surrender.

4.3 Surface Water Management

4.3.1 Surface water will be monitored in line with the requirements of an environmental permit for the water discharge. Water samples will be taken on a regular basis to ensure there are no breach in parameters.

4.3.2 Surface water monitoring will be undertaken up and down gradient of the site where is a pathway from the recovery activity to the surface water. His will continue into the approved aftercare scheme for the site (referenced Cassington Quarry Stage 10 – Five Year Outline Aftercare Scheme) will be implemented and will begin when restoration of the whole area is complete and will continue for a period of 5 years (as per the planning permissions for the site issued by Oxfordshire County Council).

4.4 Post closure controls (Aftercare)

4.4.1 The proposed after-use of the site, post-restoration will be recreational use.

4.4.2 The finished landform will be restored to grassland with perimeter tree and shrub planting and areas of open water in the south-eastern section (as shown on drawing referenced C4/HAN/05/4C). The open water complex in the south-eastern part of the application site (plant area) will include lake shallows, reed beds and blocks of tree and shrub planting, to create a varied habitat for local wildlife.

4.4.3 The approved aftercare scheme for the site (referenced Cassington Quarry Stage 10 – Five Year Outline Aftercare Scheme) will be implemented and will begin when restoration of the whole area is complete and will continue for a period of 5 years (as per the planning permissions for the site issued by Oxfordshire County Council).

4.4.4 Schemes for regular monitoring of surface water quality, groundwater quality and landfill gas concentrations will be developed where necessary to provide evidence to enable permit surrender.

Groundwater Monitoring

4.4.5 A large network of piezometers are currently installed and monitored in the vicinity of the Cassington Quarry site providing groundwater data. To assist in future permit surrender, groundwater monitoring data will be collected to assess the groundwater quality at the Plant Site Area at Cassington Quarry and as part of proposals detailed in the approved aftercare scheme for the site. It is considered that the existing piezometers locations will provide adequate groundwater data, the Hydrogeological Risk Assessment (HRA) prepared under document ref. 4656-CAU-XX-XX-RP-V-0305 confirms that no additional groundwater monitoring is proposed.

Landfill gas generation

4.4.6 The site will accept inert waste only until the end of its life. Positive extraction will not be required at Cassington Quarry Plant Area as the inert wastes are stable, however gas monitoring will be reviewed (see following section).

Landfill gas monitoring

4.4.7 Landfill gas management will not be required due to the nature of wastes to be accepted, however monitoring will be required in accordance with EA Inert Waste Guidance 'Standard and Measure for the Deposit of Inert Waste on Land. Ground gas data will be collected to establish levels of methane and carbon dioxide which could be present.

4.4.8 The long-term gas monitoring system will be reviewed as per the approved aftercare scheme for the site (referenced Cassington Quarry Stage 10 – Five Year Outline Aftercare Scheme) will be implemented and will begin when restoration of the whole area is complete and will continue for a period of 5 years (as per the planning permissions for the site issued by Oxfordshire County Council).

4.4.9 Gas infrastructure monitoring boreholes will be installed within the waste at a frequency of no less than 2 boreholes per hectare, with a minimum of 4 boreholes at the site. The site measures at 5.4 hectares , in line with the EA Inert Waste Guidance 'Standard and Measure for the Deposit of Inert Waste on Land, it is proposed to install 11 gas monitoring wells at the Cassington Quarry Plant Area. Gas monitoring infrastructure will be installed as part of the aftercare period when the site has ceased accepting waste for restoration. Gas monitoring data will be recorded for a minimum of 2 years at a quarterly frequency to confirm that the waste is chemically stable.

Leachate monitoring

4.4.10 The Hydrogeological Risk Assessment (HRA) prepared under document ref. 4656-CAU-XX-XX-RP-V-0305 confirms that the permitted materials accepted at the site will be strictly inert as classified under the Landfill Directive. The HRA concludes that as a result, no leachate monitoring is required.

5.0 MONITORING

5.1 Weather

5.1.1 Any regular meteorological information required during site operations will be obtained from a weather station or local meteorological station. Any meteorological data necessary for the review of post-closure monitoring data will be collected as part of the monitoring exercise.

5.2 Gas Monitoring Infrastructure

5.2.1 The site will accept inert waste only. Inert wastes are stable and free of biodegradable or putrescible fractions, and therefore do not produce landfill gas which would otherwise require control by site engineering or positive extraction. Therefore, as part of the aftercare phase, it is not proposed to install gas monitoring infrastructure.

5.3 Gas Monitoring

5.3.1 The long-term gas monitoring system will be reviewed as per the approved aftercare scheme for the site (referenced Cassington Quarry Stage 10 – Five Year Outline Aftercare Scheme) will be implemented and will begin when restoration of the whole area is complete and will continue for a period of 5 years (as per the planning permissions for the site issued by Oxfordshire County Council).

5.3.2 The site measures at 5.4 hectares , in line with the EA Inert Waste Guidance 'Standard and Measure for the Deposit of Inert Waste on Land, it is proposed to install 11 gas monitoring wells at the Cassington Quarry Plant Area. Gas monitoring infrastructure will be installed as part of the aftercare period when the site has ceased accepting waste for restoration. Gas monitoring data will be recorded for a minimum of 2 years at a quarterly frequency to confirm that the waste is chemically stable.

6.0 SITE CONDITION REPORT

6.1 Introduction to the SCR

Site Details

6.1.1 Site details, including information about the surrounding area of the site, are provided in Section 1.2 of this report.

Outline of proposed development

6.1.2 Details of the proposed development is included in Section 2.2 of this report.

Any former land-uses that may give rise to potential source of non-waste related contamination

6.1.3 Former land-uses that may give rise to potential sources of pollution were investigated by reviewing historical maps and Environment Agency pollution records. The findings are presented under 'Historical development' in Section 2.1 of this report.

6.1.4 Potential contaminants arising from the proposed activities will relate in the main to the waste to be deposited, which are described in Section 2.2. The acceptance criteria for the inert materials that will be recovered at the site will dictate the contaminant source, and waste acceptance procedures will be in place to ensure only strictly inert wastes are deposited.

Sources of Information

6.1.5 Other sources of information which have been reviewed for data on the pollution sources and receptors around the site include:

'*Cassington Quarry, Section 73 Application, Hydrological Assessment' (September 2019),* document ref. HN/CASS/HA/001/19 (attached as Appendix 2)*; and,*

Cassington Quarry Hydrogeological Risk Assessment, (June 2021), document ref.4656-CAU-XX-XX-RP-V-0305, produced by Caulmert Limited.

Geology and Hydrogeology

6.1.6 The geology, hydrology and hydrogeology of the area of the site are described in detail in Sections 3.1, 3.2 and 3.3 of this report.

Archive search and land-use chronology

6.1.7 See Section 3.1 of this report.

Relevant information relating to potential contaminants

6.1.8 See Section 2.1 of this report.

Any history of incidents

6.1.9 Any information relating to the historical development and incidents are detailed in Section 2.2 of this report.

6.2 Objectives of the SCR and Context within EPR Regime

6.2.1 The Environmental Permitting Regulations (EPR) 2016 require that a permit application is accompanied by a Site Condition Report (SCR), which describes the condition of the whole Site, not just the area where the recovery activities are taking place. In particular, operators are required to "identify any substances in, on or under land which may constitute a pollution risk".

6.2.2 This section attempts to provide a factual "baseline" account of the land that may later be compared against the findings of the Completion Report or the results of other investigations. It allows contaminants that were present on the site prior to the issue of the permit to be distinguished from those that occurred as a result of activities undertaken under the permit. The majority of this information is presented in Sections 1, 2 and 3 of this report.

Description of General Approach

6.2.3 This Site Condition Report provides the details on the condition of the land at the time prior to issue of the permit, with reference to different types of contaminants to be considered, data collected from any site investigations, the results of the investigations and any laboratory analysis, and also reference to any on-site observations, in-situ testing results and other data, such as monitoring data, that has been collected at the site to build an overall picture of the condition of the land prior to issue of the permit. The limitations or constraints on the findings is also discussed and a concluding proposal of baseline conditions for the site presented.

Different types of contaminants to be considered

6.2.4 The site has historically been quarried for sand and gravel. The application site was the former 'Plant Area' at Cassington Quarry, which was utilised as a processing area for previous restoration activities in the wider restored quarry development. Much like the surrounding environment, the Plant Area was extracted of sand following mineral extraction.

6.2.5 Due to the nature of the extracted natural deposits, sand and gravel, it is very unlikely there are contaminants present in the ground related to the excavation activities. Any possible leaks or spills of fuels/oils associated with the mobile plant and vehicles used during the processing operations would have been minimal/negligible due to the strict plant maintenance procedures in place, and any leaks/spills would have been cleaned up immediately so as to not impact on the environment.

6.2.6 No other contaminants have been identified that are likely to be present at the site.

Description of site investigation and related work activities

6.2.7 Information presented in Section 3.2 and Section 3.3 of this report outlines the current conditions for groundwater and surface water at the site. A detailed trial pitting exercise (referenced from the '*Cassington Quarry, Section 73 Application – Revision to approved Restoration Scheme, Hydrological Assessment*', September 2019 document ref. HN/CASS/HA/001/19 in Appendix 2*)* undertaken across the Site showed the sand and gravel deposits extend across the full area, increasing from a depth of approximately 3m on the southern boundary, reducing to 1.2m on the northern boundary. No soil quality testing, however, was conducted during this investigation.

6.2.8 A site investigation has not been considered necessary as part of this permit application to establish baseline soil conditions. A review of the plant area history has established that there has been no deposit of waste and no landfilling operations in the area. The operator has confirmed there are no records of any pollution incidents, leaks or spills of hazardous substances in the area, or any visual evidence of contamination in the ground.

6.3 Conclusions

6.3.1 In consideration of the findings of this Site Report, it has been concluded that the environmental information included provides for a good estimate of baseline conditions at the site. The site is very unlikely to have contamination within the ground due to the nature of the sand and gravel extraction and processing operations which posed a very low to negligible risk of pollution to the environment and were managed in line with an environmental management system.

7.0 REFERENCES

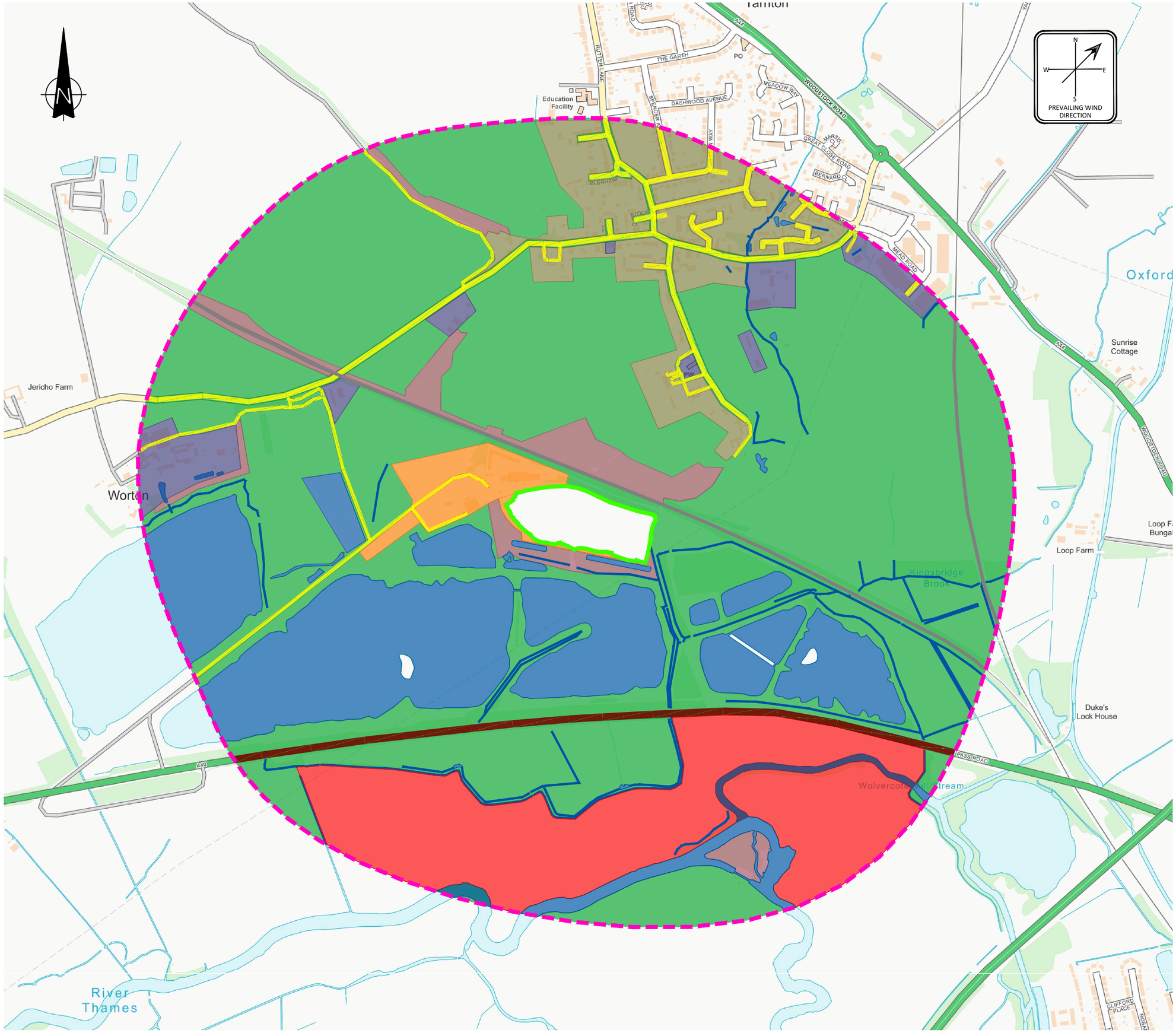
1. Environment Agency, Updated 21st April 2021 'Landfill Operators: environmental permits. What to include in you environmental setting and site design report', published 30th January 2020.

2. The Environmental Permitting (England and Wales) Regulations 2016. Found at: www.legislation.gov.uk.

3. Environment Agency, 2018. The Environment Agency's approach to groundwater protection, Version 1.2, dated February 2018.

DRAWINGS

4656-CAU-XX-XX-DR-V-1801	**Sensitive Receptors Plan**
C4/HAN/05/4	**Revised Restoration Scheme for Former Plant Site**
W92M/133	**Composite Restoration Scheme**



LEGEND

- PERMIT BOUNDARY
- 1000m OFFSET
- SURFACE WATER
- WOODLAND
- COMMERCIAL
- INDUSTRIAL
- RESIDENTIAL
- MAJOR ROAD
- MINOR ROAD
- RAIL
- AGRICULTURAL
- EDUCATIONAL
- SSSI AND SAC DESIGNATION

REV					
P03	PERMIT BOUNDARY UPDATED	EJD	KB	KB	04.06.21
P02	PERMIT BOUNDARY UPDATED	EJD	KB	KB	23.04.21
P01	ISSUED FOR INFORMATION	EJD	SB	SB	20.04.21
REV	MODIFICATIONS	BY	RE	AP	DATE

PURPOSE OF ISSUE: FOR INFORMATION

STATUS: S2

CLIENT: Hanson HEIDELBERGCEMENT Group

PROJECT: CASSINGTON QUARRY

TITLE: SENSITIVE RECEPTORS PLAN

DESIGNED BY	DRAWN BY	REVIEWED BY	AUTHORISED BY
EJD	EJD	SB	SB

DATE	SCALE @ A3	JOB REF:	REVISION
12.04.2021	1:10000	4656	P03

DRAWING NUMBER: 4656-CAU-XX-XX-DR-V-1801

Caulmert engineering environmental planning

WWW.CAULMERT.COM

Registered Office: InTec, Parc Menai, Bangor, Gwynedd, LL57 4FG Company Registered No: 06716319

Key:

- Cross Sections
- Fencing and Gates
- Proposed Restoration Contours
- ExistingConsent Area
- Existing Tree and Shrub Vegetation
- Areas to be Restored to Agricultural Grassland
- Existing Water Bodies
- Proposed New Pond Complex
- Proposed Tree and Shrub Planting
- Lake Shallows/ Reed Bed
- Areas to be Restored to Conservation Grassland

Anglo-Saxon Burial Ground

Path

Dismantled

Drain

Drain

(DRY SILT

PIPE INVERTS 1–58.2 2–58.2 3–58.2

PIPE W 58.25

WL 58. (17/4/

BH

58.73

59.15

64.0 63.0 62.0 61.0 60.0 59.0 59.0

rev:	date:	details:
C	04/06/19	(SD)Addition of Fence line and pond
B	22/05/19	(SD)Addition of Cross Sections
A	13/05/19	(SD)Addition of Proposed Trees

corylus Planning & Environmental Ltd.
The Old Dairy
Yanworth
Cheltenham
Gloucestershire
GL54 3LQ
tel: 01285 721072

client: Hanson

project: Cassington Quarry

title: Revised Restoration Scheme For Former Plant Site

scale:	date:	drawn by :	checked by:	size:
1:2000	13/05/19	SD	AW	A3

Project ref :	dwg no:	rev:
C4/HAN/05	C4/HAN/05/4	C

0 m 40 m 80 m 120 m 160 m 200 m

Scale Bar 1: 2000

KEY:

- S73 planning boundary
- Land not in Hanson control
- Lake margin/amenity grassland
- Agricultural land
- Woodland/plantations/scrub
- Reed beds
- Shallow water margins
- Deeper water
- Restoration contours

ALL LEVELS IN METRES ABOVE ORDNANCE DATUM

Hanson HEIDELBERGCEMENT Group

Site: Cassington Quarry

Title: Composite Restoration Scheme

Scale	Date	Drawing No.
1:5000 @ A3	Sept '11	W92m/133
Drawn by: AC	Checked by: DMcD	

APPENDIX 1

Cassington Quarry Ecology Report, Final, V2.0 (November 2015)

Cassington Quarry

Ecology Report

Produced for Hanson Aggregates UK

By Applied Ecology Ltd

November 2015

Document Control:

Version	Date	Version Details	Prepared by	Checked by	Approved by
1.0	11.11.15	1.0	PY/DP	DP	DP
2.0	11.11.15	2.0	DP	DP	DP

Prepared for: Hanson Aggregates UK

Title: Cassington Quarry – Ecology Report

Project number: AEL1044

Document version: 2.0

Document status: Final

Document date: 11.11.15

Signed on behalf of Applied Ecology Ltd:

Dr Duncan Painter

Director

APPLIED ECOLOGY LTD

St. John's Innovation Centre
Cowley Road
Cambridge
CB4 0WS

Tel: 01223 422 116
Fax: 01223 420 844
Mobile: 07725 811 777
Email: info@appliedecology.co.uk

Contents

1 Introduction

Background

1.1 Applied Ecology Ltd was appointed by Hanson Aggregates UK to provide ecological information to support an application to Oxford County Council (OCC) to extend an existing planning permission for gravel extraction and processing at Cassington Quarry in Oxfordshire.

1.2 The ecological supporting information required by OCC was agreed at a site meeting on 15 May 2015 with OCC Ecologist Planner Tamsin Atley and Applied Ecology as follows:

- Phase 1 habitat mapping of future extraction, processing and significant restoration areas;
- Completion of great crested newt eDNA testing of five separate waterbodies within the site;
- Reptile survey of a restored lakeside grassland located to the west of the quarry to understand its potential suitability as a receptor area in the future.

1.3 This report summarises the results of this survey work completed over the period May-September 2015.

1.4 The location of the site and the survey area components are shown by **Figure 1.1**.

Legislation & Planning

Legislation

1.5 The Wildlife and Countryside Act 1981 (as amended) provides the main legal framework for nature conservation and species protection in the UK. The Site of Special Scientific Interest (SSSI) is the main statutory nature conservation designation in the UK. Such sites are notable for their plants, or animals, or habitats, their geology or landforms, or a combination of these. Natural England is the key statutory agency in England for advising Government, and for acting as the Government's agent in the delivery of statutory nature conservation designations.

1.6 Designation of a SSSI is a legal process, by which sites are notified under the Wildlife and Countryside Act 1981. The 1981 Act makes provision for the protection of sites from the effects of changes in land management, and owners and occupiers receive formal notification specifying why the land is of special scientific interest, and listing any operations likely to damage the special interest.

1.7 The Countryside and Rights of Way Act 2000, and The Natural Environment and Rural Communities (NERC) Act 2006, provide supplementary protected species legislation. Specific protection for badgers *Meles meles* is provided by the Protection of Badgers Act 1992.

Habitats and Species of Principal Importance in England

1.8 The Natural Environment and Rural Communities (NERC) Act came into force on 1 October 2006. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list has been drawn up in consultation with Natural England, as required by the Act.

1.9 The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the Natural Environment and Rural Communities Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

Habitats of Principal Importance

1.10 Fifty-six habitats of principal importance are included on the S41 list. These are all the habitats in England that were identified as requiring action in the UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. They include terrestrial habitats such as upland hay meadows to lowland mixed deciduous woodland, and freshwater and marine habitats such as ponds and sub-tidal sands and gravels.

Species of Principal Importance

1.11 There are 943 species of principal importance included on the S41 list. These are the species found in England which were identified as requiring action under the UK BAP and which continue to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework. In addition, the Hen Harrier *Circus cyaneus* has also been included on the list because without continued conservation action it is unlikely that the Hen Harrier population will increase from its current very low levels in England.

1.12 In accordance with Section 41(4) the Secretary of State will, in consultation with Natural England, keep this list under review and will publish a revised list if necessary.

National Planning Policy Framework

1.13 The National Planning Policy Framework (NPPF) was published in March 2012 and replaces previous planning policy guidance (PPS 9) on biodiversity. NPPF states the following in relation to biodiversity and planning:

1.14 "When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:

- *if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*
- *proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an*

adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest;

- *development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;*
- *opportunities to incorporate biodiversity in and around developments should be encouraged;*
- *planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and*
- *the following wildlife sites should be given the same protection as European sites:*
  - *potential Special Protection Areas and possible Special Areas of Conservation;*
  - *listed or proposed Ramsar sites; and*
  - *sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.*

1.15 *The presumption in favour of sustainable development does not apply where development requiring appropriate assessment under the Birds or Habitats Directives is being considered, planned or determined."*

AEL1044_006-00_sitelocation_20151105 A4 11/11/2015

Cassington

Site location

site boundary

potential reptile receptor area

Figure 1.1

Map Scale @ A4: 1:12,000

Surveyed by: N/A	
Survey date: N/A	
Drawn by: PL	
Checked by: DP	
Status: Final	

Applied Ecology Ltd

2 Habitats

Survey Approach

2.1 A standard Phase 1 habitat survey of the agreed areas of the site was completed by an ecologist from Applied Ecology Ltd on 15 May 2015.

2.2 All ground to be mapped was walked and carefully investigated. All habitats present were mapped according to standard Phase 1 habitat survey categories[1] and described in terms of their associated native plant species. Non-native (ornamental) plant species were not recorded in detail.

2.3 Notes were made of the key habitats and features and, where appropriate, a list of the plant species present and an estimate of their individual relative abundance was recorded according to the DAFOR scale.

2.4 The surveyors also searched for the presence of habitats of biodiversity importance, and/or habitats protected by UK legislation.

Survey Findings

2.5 The Phase 1 map is shown by **Figure 2.1**.

2.6 The largest habitat area was located in the centre of the site and comprised the former sand and gravel processing area which was dominated by large areas of bare ground and ephemeral/short perennial vegetation (target notes 1-3). The vegetation was characterised by typical bare ground pioneer species including (Target note 1): rosebay willowherb *Chamerion angustifolium*, creeping thistle *Cirsium arvense*, squirreltail fescue *Vulpia bromoides*, annual meadow-grass *Poa annua*, selfheal *Prunella vulgaris*, procumbent pearlwort *Sagina procumbens*, greater plantain *Plantago lanceolata*, hard rush *Juncus inflexus*, creeping bent *Agrostis stolonifera*, field forget-me-not *Myosotis arvensis*, perforate St. John's-wort *Hypericum perforatum* and prickly oxtongue *Picris echoides*.

2.7 Topsoil storage bunds were present around the perimeter of the site which to the north was dominated by tall ruderal vegetation and scattered scrub, and to the south by recently established semi-improved grassland. Grass species present included (Target note 2): red fescue *Festuca rubra* and Yorkshire-fog *Holcus lanatus,* and forbs were represented by creeping thistle *Cirsium arvense*, wild strawberry *Fragaria vesca*, field forget-me-not *Myosotis arvensis*, common ragwort *Senecio jacobaea*, wood avens *Geum urbanum*, creeping buttercup *Ranunculus repens*, common nettle *Urtica dioica*, foxglove *Digitalis purpurea*, dogwood *Cornus sanguinea*, dog rose *Rosa canina*, gorse *Ulex europaeus* and spear thistle *Cirsium arvense*.

2.8 To the south of the topsoil bunds were two densely vegetated linear ponds (referred to hereafter as the Long Ponds) surrounded by broadleaved woodland. The waterbodies supported mixed swamp vegetation characterised by (Target note 3): common reed *Phragmites australis*, greater pond-sedge *Carex riparia*, reed sweet-grass *Glyceria maxima*,

water mint *Mentha aquatica*, gipsywort *Lycopus europaeus*, purple-loosestrife *Lythrum salicaria*, and greater reed mace *Typha latifolia*.

2.9 To the east of the gravel extraction area was a triangular field (referred to hereafter as the pylon field) that was comprised of mainly unmanaged semi-improved neutral grassland, with some evidence of rabbit grazing. Rabbit grazing was more prevalent to the east of the field and here the sward was dominated by (Target note 4): Yorkshire-fog *Holcus lanatus*, creeping bent *Agrostis stolonifera* and red fescue *Festuca rubra*, with rare occurences of squirreltail fescue *Vulpia bromoides*. Forbs were dominated by creeping cinquefoil *Potentilla reptans* and ground-ivy *Glechoma hederacea*, with occasional common ragwort *Senecio jacobaea*, field forget-me-not *Myosotis arvensis*, germander speedwell *Veronica chamaedrys*, perforate St John's-wort *Hypericum perforatum*, lesser burdock *Arctium minus*, hoary willowherb *Epilobium parviflorum*, wild teasel *Dipsacus fullonum*, great willowherb *Epilobium hirsutum* and areas of abundant common nettle *Urtica dioica*. Vegetated topsoil bunds supporting tall ruderal vegetation, with dense and scattered scrub were present around the periphery of the field.

2.10 To the west of the field (Target note 5) the grassland was rank and dominated by false oat-grass *Arrhenatherum elatius,* with abundant cock's-foot *Dactylis glomerata* and Yorkshire-fog*,* and occasional common bent *Agrostis capillaris.* Forbs were represented by creeping cinquefoil*,* glaucous sedge *Carex flacca,* creeping buttercup *Ranunculus repens,* dove's-foot crane's-bill *Geranium molle,* common nettle *Urtica dioica,* spear thistle *Cirsium arvense,* hoary ragwort *Senecio erucifolius*, bristly oxtongue *Picris echoides,* ivy-leaved speedwell *Veronica hederifolia* and rare occurrences of bramble *Rubus fruticosus* and silverweed *Potentilla anserina.*

2.11 To the west of the site was a shallow water area partially backfilled interim restoration area mapped as standing water and bounded to the west by a narrow strip of semi-improved neutral grassland and to the north by a large top-soil bund covered mainly in in tall ruderal vegetation dominated by hemlock *Conium maculatum* with less frequent nettle and occasional elder *Sambucus nigra*. The area is known as the Cresswell Field.

Overview

2.12 The majority of the habitats present had been formed/heavily influenced by relatively recent historic sand and gravel processing activity and were common place habitats of relatively low nature conservation and biodiversity interest. The broadleaved woodland and swamp vegetation to the south of the gravel processing site was of elevated biodiversity interest by virtue of being a relatively old and undisturbed habitat area.

Cassington

Phase 1 Habitat Survey

- site boundary
- broad-leaved semi-natural woodland
- mixed plantation woodland
- dense scrub
- semi-improved neutral grassland
- poor semi-improved neutral grassland
- standing water
- swamp
- marginal vegetation
- tall ruderal
- ephemeral/short perennial
- bare ground
- hard standing
- wet ditch
- line of trees
- species-poor intact hedge
- individual tree (indicative location)
- scattered scrub
- target notes

Figure 2.1

Map Scale @ A4: 1:6,000

Surveyed by: RH	
Survey date: 15/5/15	
Drawn by: PL	
Checked by: DP	
Status: Final	

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3 Protected Species

Great Crested Newt

3.1 Five eDNA test kits supplied by ADAS were used to collect samples of water from around the perimeter of five waterbodies within the site on 9 June 2015. The survey methodological approach described by ADAS was followed, with the samples being analysed for great crested newt (GCN) DNA by ADAS. Sampling was completed by a licenced GCN surveyor from Applied Ecology Ltd.

3.2 The locations of the waterbodies that were sampled are shown by **Figure 3.1**.

3.3 GCN DNA was confirmed as being present in two of five waterbodies – waterbody 2 and 3. No evidence of GCN presence was found in waterbodies 1, 4 and 5.

3.4 Waterbody 2 was a heavily shaded pond towards the end of its hydroseral succession that was once hydrologically connected to a larger gravel lake. It had a calculated Habitat Suitability Index (HSI) of 0.57 (below average suitability for GCN).

3.5 Waterbody 3 was a large linear pond that was choked with emergent aquatic vegetation and had an HSI of 0.65 (average suitability). Fish were seen in the waterbody during the eDNA sample collection, and have been reported as being present by previous GCN survey. The presence of GCN in this waterbody is unusual as fish and GCN do not normally coexist. However, it is conceivable that the dense aquatic vegetation provides sufficient cover for GCN efts to avoid predation by fish.

3.6 The implications of the presence of GCN for future extraction and restoration are discussed in Chapter 4.

3.7 The eDNA test results are provided in **Appendix 1**.

Reptiles

3.8 The grass dominated soil bunds around the gravel processing area, and the grassland of the pylon field to the east have the potential to support populations of common species of reptiles which could be adversely impacted by soil bund removal as part of future gravel extraction and restoration.

3.9 In order to identify a suitable receptor area in which reptiles from the processing area and pylon field could be relocated prior to construction, a reptile survey of a strip of lakeside grassland located to the west of the quarry was completed over the period 19th May to 18th September 2015.

3.10 The area in question is shown as a potential reptile receptor area on **Figure 1.1** and consists primarily of infrequently managed semi-improved grassland that is subject to a flower meadow management regime.

3.11 A total of 40 artificial reptile refugia (0.5 x 1m) sheets of roofing felt were set out across the potential receptor area on 19th May 2015, and were checked on two occasions in June (9th

and 24th) and five in September 2015 (4th, 8th, 11th, 14th and 18th) in weather conditions that were suitable for reptiles to be using the mats on all but one occasion[1].

3.12 A maximum of two sub-adult grass snakes *Natrix natrix* were found under two separate but closely located refugia during the survey with all sightings being in September. The snakes were seen under the same mats on each occasion suggesting that the same two individual animals were seen on each occasion. A sloughed grass snake skin was present under one of the same mats on June 24th but no live animals were seen on that occasion.

3.13 It can be concluded that the potential reptile receptor area currently supports a small population of grass snake, but does not appear to support other reptile species.

Other Taxa

3.14 The vegetated soil bunds around the extraction area, pylon field and at the northern end of the Creswell Field have the potential to support badger setts, albeit no obvious signs of badger digging (only rabbit) was evident during the walkover survey completed on 15 May. A precautionary follow-up survey to check for the presence of badger in advance of bund removal is suggested.

3.15 No trees or man-made structure of value to roosting bats are present within the extraction and restoration areas.

3.16 The scrub vegetation within the extraction and restoration areas and the bare ground / ephemeral short perennial vegetation of the extraction area have the potential to support nesting birds, but not in numbers or a species assemblage that is likely to confer those parts of the site with significant ornithological interest. The shallow water siltation lagoon (Creswell Field) to the west may also be used by small numbers of wading birds for feeding, but the lagoon is seasonally dry and its value to wetland birds is transient.

[1] During the June 24th air temperature was 21.0^{0}C which is outside the optimum range of 10-20^{0}C

Cassington

GCN tested ponds

site boundary

pond number

Figure 3.1

Map Scale @ A4: 1:4,500

Surveyed by: DP	
Survey date: 9/6/2015	
Drawn by: PL	
Checked by: DP	
Status: Final	

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4 Impact Assessment & Mitigation Planning

Background

4.1 The following development assumptions have been made (and are agreed with Hanson Aggregates) in order to assess potential impacts on ecological receptors. The development assumptions are based on direction from Hanson Aggregates and review of the approved site restoration plan provided in **Appendix 2** of this report:

- Gravel extraction from the gravel processing area will involve removal of all perimeter soil bunds, but will retain and protect the woodland and waterbodies to the immediate south of the site within the red line boundary shown on **Figure 2.1**).
- Restoration of the gravel processing area will involve creation of an angling lake (circa 3.28 ha) with perimeter semi-improved grassland (circa 1.88 ha), woodland and scrub (circa 2.20 ha)
- The pylon field will be impacted by soil bund removal and general site "restoration" back - the field is not currently permitted for extraction of aggregates.
- The Creswell Field area will be restored back to agricultural land.

Great Crested Newt

4.2 The development proposals will result in the loss of terrestrial habitats that are of potential value to great crested newt (GCN). No adverse (direct or indirect) impacts on waterbodies known to support GCN would occur as a result of the development.

4.3 Natural England's risk calculator tool (provided within NE's method statement template for GCN European Protected Species (EPS) licence applications) has been run to assess the potential impacts of the above proposals on GCN given their confirmed presence in waterbodies 2 and 3.

4.4 The risk calculator tool has been run for the three development scenarios:

- Gravel extraction from the gravel processing area
- Restoration of the pylon field
- Restoration of Creswell Field (siltation lagoon)

Gravel Processing Area

4.5 The majority of the gravel extraction area (6.06 ha) is comprised of bare ground/short ephemeral vegetation of negligible shelter value to terrestrial GCN. The vegetated bunds (1.30 ha) have shelter value to GCN particularly when they are located within close proximity to the two GCN waterbodies.

4.6 As highlighted in the NE risk assessment table below, the proposed gravel extraction involving the removal of the soil bunds is likely to result in an offence with respect to GCN (amber risk) as it would result in the removal of habitat used by GCN for shelter.

Processing area	**Likely effect (select one for each component; select the most harmful option if more than one is likely; lists are in order of harm, top to bottom)**	**Notional offence probability score**
Great crested newt breeding pond(s)	No effect	0
Land within 100m of any breeding pond(s)	0.1 - 0.5 ha lost or damaged	0.5
Land 100-250m from any breeding pond(s)	0.1 - 0.5 ha lost or damaged	0.1
Land >250m from any breeding pond(s)	0.1 - 0.5 ha lost or damaged	0.005
Individual great crested newts	No effect	0
	Maximum:	0.5
Rapid risk assessment result:	**AMBER: OFFENCE LIKELY**	

4.7 **Figures 3.1** and **3.2** show the extent of newt friendly terrestrial habitats that are currently present within the site, and the extent of newt friendly habitat that would be created as a result of the approved restoration. In summary, the restoration of the site would result in a net increase of 0.9 ha of newt friendly habitat within range of the GCN population centred on waterbodies 2 and 3.

Pylon Field

4.8 No adverse impacts on GCN are predicted to occur as a result of the pylon field development given the overall scale of the development and its distance from known GCN ponds.

Pylon field	**Likely effect (select one for each component; select the most harmful option if more than one is likely; lists are in order of harm, top to bottom)**	**Notional offence probability score**
Great crested newt breeding pond(s)	No effect	0
Land within 100m of any breeding pond(s)	No effect	0
Land 100-250m from any breeding pond(s)	No effect	0
Land >250m from any breeding pond(s)	1 - 5 ha lost or damaged	0.04
Individual great crested newts	No effect	0
	Maximum:	0.04
Rapid risk assessment result:	**GREEN: OFFENCE HIGHLY UNLIKELY**	

Cresswell Field

4.9 No adverse impacts on GCN are predicted to occur as a result of the Cresswell Field development given the overall scale of the development and its distance from known GCN ponds.

Cresswell Field (siltation lagoon)	Likely effect (select one for each component; select the most harmful option if more than one is likely; lists are in order of harm, top to bottom)	Notional offence probability score
Great crested newt breeding pond(s)	No effect	0
Land within 100m of any breeding pond(s)	No effect	0
Land 100-250m from any breeding pond(s)	No effect	0
Land >250m from any breeding pond(s)	1 - 5 ha lost or damaged	0.04
Individual great crested newts	No effect	0
	Maximum:	0.04
Rapid risk assessment result:	**GREEN: OFFENCE HIGHLY UNLIKELY**	

Summary

4.10 A Natural England EPS licence will be required to legally enable the extraction of gravel / removal of the soil bunds from the gravel processing area site.

4.11 The EPS licence application will need to be informed by a full GCN population assessment of waterbodies 2 and 3. The earliest this survey could be completed is in the spring 2016 (mid-March to mid-June), with three of the required six survey visits being undertaken between mid-April and mid-May.

4.12 The restoration of the gravel extraction area (see **Appendix 1**) would result in an increase of 0.9 ha of newt friendly terrestrial habitat within newt commuting range of two confirmed GCN waterbodies, and would result in no loss or damage of any GCN breeding pond. In light of this, Natural England are highly likely to grant an EPS licence for the extraction, as the integrity of the local GCN population would not be significantly adversely impacted in the long-term, and could be enhanced with some simple habitat management and creation that could be completed as minor tweaks to the approved restoration plan (see para 4.14 below).

4.13 The EPS licence mitigation strategy for GCN would need to be based on the following mitigation approach:

- Erection of a semi-permanent newt proof fence around the entire perimeter of the gravel extraction area – fence to be kept in situ and maintained for the duration of the extraction and restoration phases and prevent GCN from
- Erection of Temporary Amphibian Fencing (TAF) around the vegetated soil bunds within the perimeter fence and all land within 50m of the newt ponds (including bare ground and ephemeral/short perennial) to contain GCN to enable their capture and effective depletion monitoring.

- Capture and relocation of newts and other herpetofauna from within the TAF compartments using a combination of pitfall traps and artificial felt refugia (trap numbers to be dictated by the size of the GCN population. Trapping to take place over the period March to October, with (ideally) the main focus of trapping effort taking place in the spring and/or autumn.
- Trapping to be completed over a period of 30, 60 or 90 nights in suitable weather (overnight temperatures of 5^{o}C or higher and damp ground). Number of trapping nights to be dictated by the size of the GCN population (to be confirmed).
- Enhancement of the woodland area to the immediate south of the extraction area by the placement of habitat piles, tree thinning and scrub planting to enable the woodland to be used a GCN receptor area.

4.14 In addition to the approved landscape restoration strategy, it is recommended that measures are implemented to improve the GCN habitat value of waterbody 2 by selective tree removal and silt excavation, and consideration given to creating a new fish free pond somewhere within 100m of waterbody 2 and 3 if practical to do so.

Reptiles

4.15 A reptile survey of the extraction area and the pylon field should be completed in advance of works to these areas to verify reptile presence, approximate numbers and locations. The survey should (ideally) be completed over the period April-mid June or September.

4.16 The proposed reptile receptor area that has been subject to reptile survey in 2015 is suitable for a reptile receptor as it currently supports only a small population of grass snake and could be enhanced further for reptiles by relaxing the annual grass cutting regime such that peripheral areas of the grassland are only cut on a two year rotation, and providing more habitat piles in peripheral areas.

4.17 If found to be present within the gravel processing area and/or the pylon field in significant numbers, reptiles should be captured and relocated to the receptor area as part of the GCN mitigation. If present in the pylon field, the areas of grassland supporting reptiles (if likely to be impacted by bund removal and general restoration) should be contained within TAF and reptiles captured and relocated to the receptor area. Potential reptile habitat within the gravel processing site would already be contained as part of the GCN mitigation approach.

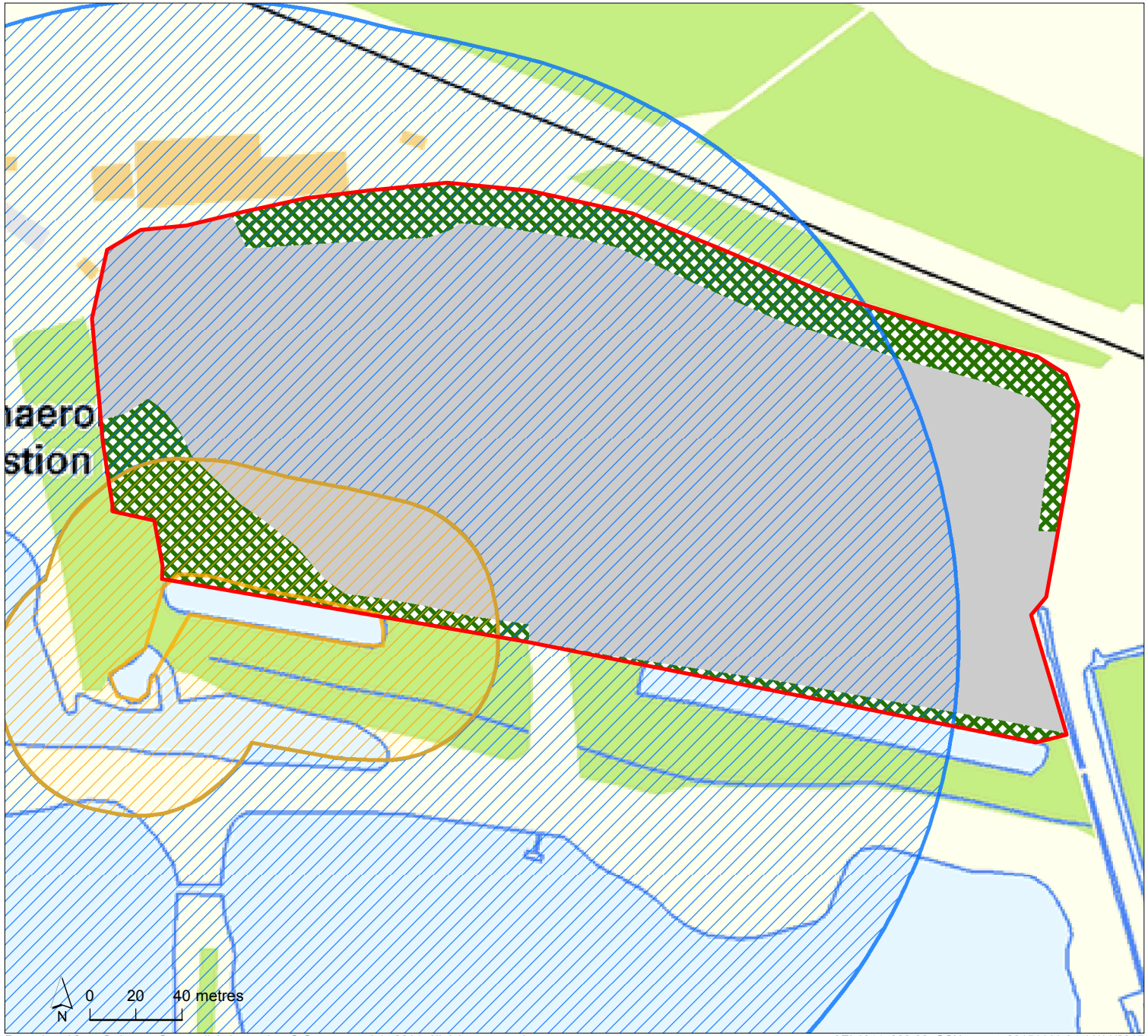
4.18 Artificial reptile refugia should be set out across both areas to assist in reptile capture. Reptile capture should continue until reptiles are no longer being encountered under refugia in suitable weather conditions (air temperatures of between 10-20^{o}C, dry conditions (not heavy rain) or strong winds). Reptile capture to take place over the period March to October, with (ideally) the main focus of trapping effort taking place in the spring and/or autumn.

Other Taxa

4.19 A check for the presence of badger setts in vegetated soil bunds should be completed in advance of soil bund removal. Ideally the checks should be completed in the winter months when ground vegetation has died back.

4.20 In the event that a badger sett is found in a bund, it will need to be closed under the auspices of a NE licence during the period July to November.

4.21 Any vegetation clearance to enable development should be completed outside of the bird nesting period during September to February.



Cassington

Site 2 current GCN habitat areas

- site boundary
- immediate GCN terrestrial habitat <50m
- intermediate GCN terrestrial habitat 50m - 250m
- GCN habitat (1.30 hectares)
- Non-GCN habitat (6.06 hectares)

Figure 3.2

Map Scale @ A4: 1:2,500

Surveyed by: N/A	
Survey date: N/A	
Drawn by: PL	
Checked by: DP	
Status: Final	

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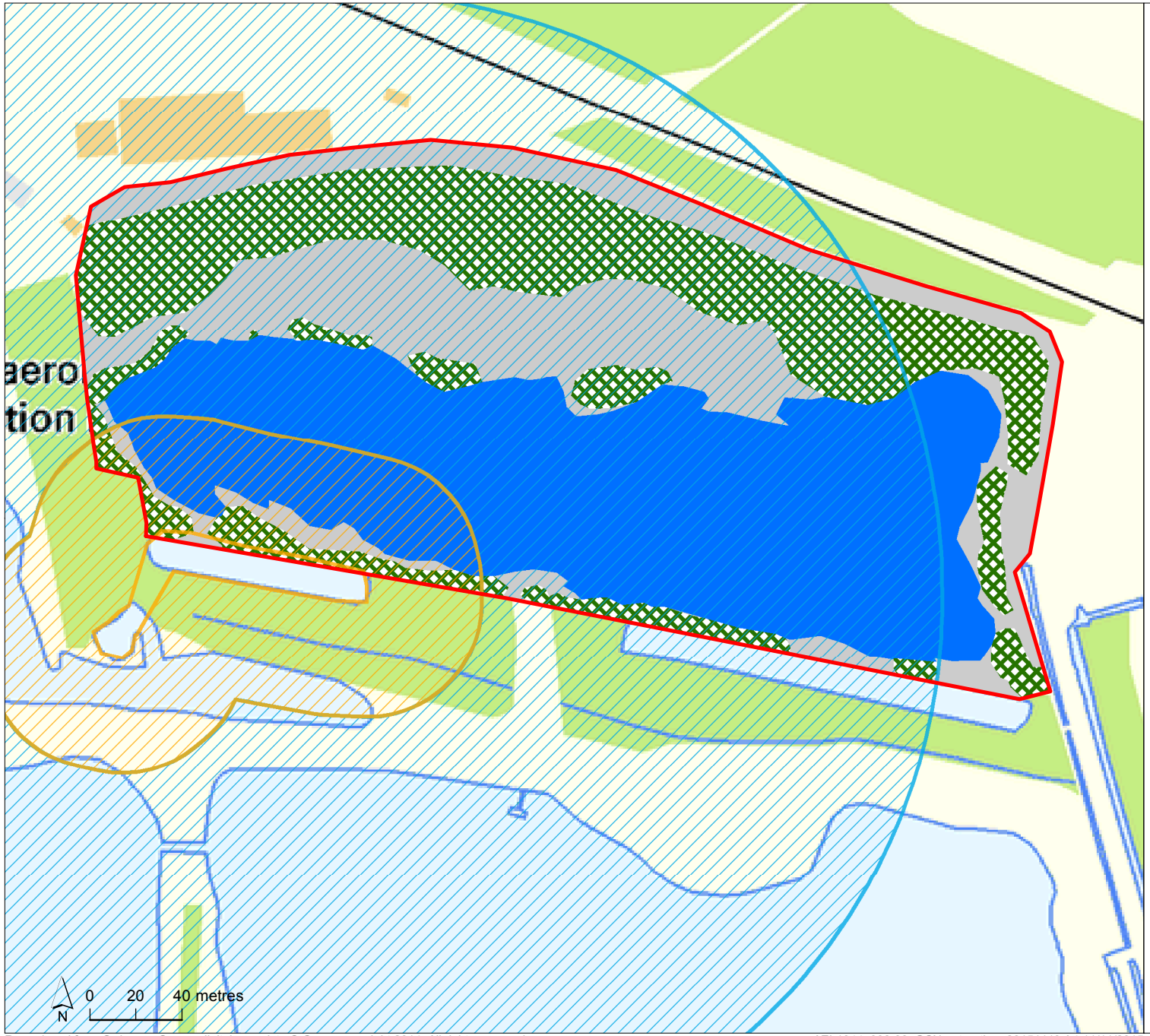

Cassington

Site 2 restoration
GCN habitat areas

- site boundary
- immediate GCN habitat <50m
- intermediate GCN habitat 50m - 250m
- GCN habitat (2.20 hectares)
- standing water (3.28 hectares)
- Non-GCN habitat (1.88 hectares)

Figure 3.3

Map Scale @ A4: 1:2,500

Surveyed by: N/A	
Survey date: N/A	
Drawn by: PL	
Checked by: DP	
Status: Final	

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Appendix 1
eDNA test results

Dr Duncan Painter
Applied Ecology Ltd
St Johns Innovation Centre,
Cowley Rd
Cambridge
CB40WS

ADAS Wolverhampton HQ
Pendeford House
Pendeford Business Park
Wobaston Road
Wolverhampton
WV9 5AP

Tel: 01159 516747
Fax: 01159 516415
Email: Helen.Rees@adas.co.uk

www.adas.co.uk

Sample/Report ID: 2015-858 | Condition on Receipt: Good | Visual Inspection of Volume: Passed

Client Identifier: Cassington Long Pond West (3) | Description: 6x50mL - pond water samples in preservatives

Date of Receipt: 22/06/15 | Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Positive	Real time PCR	30/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	01/07/15	Date of issue:	01/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

Dr Duncan Painter
Applied Ecology Ltd
St Johns Innovation Centre,
Cowley Rd
Cambridge
CB40WS

ADAS Wolverhampton HQ
Pendeford House
Pendeford Business Park
Wobaston Road
Wolverhampton
WV9 5AP

Tel: 01159 516747
Fax: 01159 516415
Email: Helen.Rees@adas.co.uk

www.adas.co.uk

Sample/Report ID: 2015-859 | Condition on Receipt: Low Sediment | Visual Inspection of Volume: Passed

Client Identifier: Cassington Long Pond East (2) | Description: 6x50mL - pond water samples in preservatives

Date of Receipt: 22/06/15 | Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	01/07/15	Date of issue:	01/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

Dr Duncan Painter
Applied Ecology Ltd
St Johns Innovation Centre,
Cowley Rd
Cambridge
CB40WS

ADAS Wolverhampton HQ
Pendeford House
Pendeford Business Park
Wobaston Road
Wolverhampton
WV9 5AP

Tel: 01159 516747
Fax: 01159 516415
Email: Helen.Rees@adas.co.uk

www.adas.co.uk

Sample/Report ID: 2015-860
Condition on Receipt: Medium Sediment
Visual Inspection of Volume: Passed
Client Identifier: Cassington Small Pond (1)
Description: 6x50mL - pond water samples in preservatives
Date of Receipt: 22/06/15
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Positive	Real time PCR	26/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	01/07/15	Date of issue:	01/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

Dr Duncan Painter
Applied Ecology Ltd
St Johns Innovation Centre,
Cowley Rd
Cambridge
CB40WS

ADAS Wolverhampton HQ
Pendeford House
Pendeford Business Park
Wobaston Road
Wolverhampton
WV9 5AP

Tel: 01159 516747
Fax: 01159 516415
Email: Helen.Rees@adas.co.uk

www.adas.co.uk

Sample/Report ID: 2015-862 | Condition on Receipt: Good | Visual Inspection of Volume: Passed

Client Identifier: Cassington Ditch (4) | Description: 6x50mL - pond water samples in preservatives

Date of Receipt: 22/06/15 | Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	01/07/15	Date of issue:	01/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

Dr Duncan Painter
Applied Ecology Ltd
St Johns Innovation Centre,
Cowley Rd
Cambridge
CB40WS

ADAS Wolverhampton HQ
Pendeford House
Pendeford Business Park
Wobaston Road
Wolverhampton
WV9 5AP

Tel: 01159 516747
Fax: 01159 516415
Email: Helen.Rees@adas.co.uk

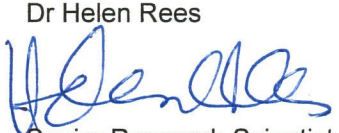
www.adas.co.uk

Sample/Report ID: 2015-863 | Condition on Receipt: Medium Sediment | Visual Inspection of Volume: Passed

Client Identifier: Cassington Silt Lake | Description: 6x50mL - pond water samples in preservatives

Date of Receipt: 22/06/15 | Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	29/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Team Leader: Biotechnology
Date of preparation:	01/07/15	Date of issue:	01/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

OXFORDSHIRE COUNTY COUNCIL

APPROVED

DATE: 7/2/2012
APPLICATION No: Condition 6 of Planning Permission10/01929/CM

KEY:

- S73 planning boundary
- Land not in Hanson control
- Lake margin/amenity grassland
- Agricultural land
- Woodland/plantations/scrub
- Reed beds
- Shallow water margins
- Deeper water
- Restoration contours

ALL LEVELS IN METRES ABOVE ORDNANCE DATUM

Hanson HEIDELBERGCEMENT Group

Title: Cassington Quarry	
Title: Composite Restoration Scheme	
Scale: 1:5000 @ A3	Date: Sept '11
Drawn by: AC	Checked by: DMcD
Drawing No.: W92m/133	

Appendix 2
Landscape Restoration Plan

APPENDIX 2

Cassington Quarry Hydrological Assessment, Final Report, HN/CASS/HA/001/19

OXFORDSHIRE COUNTY COUNCIL

APPROVED

DATE: 15/04/2020
APPLICATION No: 19/02521/CM (MW.0111/19)

Hanson Aggregates Europe Limited

Cassington Quarry

Yarnton, Oxfordshire

Section 73 Application - Revision to approved Restoration Scheme

Hydrological Assessment

Final Report
September 2019

Hanson Aggregates Europe Limited
The Ridge
Chipping Sodbury
BS37 6AY
Tel: 01454 316 000
Email: enquiries@hanson.biz

Hanson Aggregates Europe Limited

Cassington Quarry

Yarnton, Oxfordshire

Section 73 Application - Revision to approved Restoration Scheme

Hydrological Assessment

Final Report

September 2019

Document History				
Date	Version No.	BCL Ref.	Comments	Issued to
Sept 19	01	HN/CASS/HA/001/19	Final report	Client

Report Prepared By	Report Checked By
Paul Burfitt B.Sc. M.Sc. Principal Hydrogeologist & Director	Henry Lister B.Sc M.Sc. Principal Hydrogeologist & Director

BCL HYDRO
BCL Consultant Hydrogeologists Limited

Technology Centre, Wolverhampton Science Park, Glashier Drive, Wolverhampton
West Midlands, WV10 9RU. Tel: 01902 824111, Fax: 01902 824112
email: info@bclhydro.co.uk, web: http://www.bclhydro.co.uk
Registered Office: 33, Wolverhampton Road, Cannock, West Midlands, WV11 1AP
Registered in England & Wales. Company Registration Number: 4043373

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Appendices

BCL CONSULTANT HYDROGEOLOGISTS' EXPERIENCE & QUALIFICATIONS

BCL is an independent consultancy specialising in all aspects of hydrogeology and hydrology as they relate to minerals extraction, waste disposal, water supply and related industries.

Paul Burfitt (the author of this report) holds a first degree [Geophysics (Geology)] conferred by Liverpool University, 1992 and a Master of Science Degree [Hydrogeology], Birmingham University, 1998. Paul Burfitt has worked in the field of Earth Sciences since 1992 and as a Hydrogeologist since 1998.

BCL has provided specialist services, advice and reporting to the extractive, waste and related industries since 2000. During this time BCL has worked on projects for over 225 quarries/related sites throughout the British Isles.

Project work undertaken by BCL has included:

- Installation and management of water environment information collection systems;
- Data interpretation;
- Conceptualisation of hydrological/hydrogeological systems;
- Design of surface and groundwater drainage schemes;
- Identification of potential impacts relating to proposed development;
- Formulation of mitigation measures;
- Management and undertaking of operational impact monitoring and impact assessment;
- Review and auditing of contingency mitigation schemes.

1 INTRODUCTION

1.1 Background

1.1.1 Hanson Aggregates Europe Limited (Hanson) have prepared a Section 73 (S73) planning application seeking to revise the approved restoration scheme for a section of the working area at Cassington Quarry, Yarnton, Oxfordshire (the "Site").

1.1.2 The application is being made to amend the restoration scheme for the final section of extraction being undertaken at the Site. This is located within the former processing plant area (hereafter referred to as the "Plant Area" – ***figure 1***).

1.1.3 The approved restoration for the Plant Area is for the creation of a large lake with grassland and tree planted margins. The proposed revised scheme is for restoration to a combination of agricultural grassland, conservation grassland and marginal smaller pond areas. This will involve the importation of some 137,00m³ of inert fill, with replacement of indigenous retained soils, to create the proposed landform. Under the revised proposals the majority of the site will be restored to original (or near original) ground levels.

1.1.4 Woodland planting will be formed along the northern edge of the Plant Area (south of the adjacent railway) and the ponds and wetland areas will be created along the lower elevation southern margins.

1.1.5 The Plant Area comprises the final section of extraction within the wider Cassington Quarry site. The majority of the Site (to the west, south and east of the Plant Area) has previously been restored to a combination of lined open waterbodies and/or inert infill areas for agricultural use (***figure 2***).

1.1.6 The S73 Application has been produced by Corylus Planning and Environmental Limited (Corylus - agents acting for Hanson). Following screening of the proposed application with the Mineral Planning Authority, Corylus have commissioned BCL Consultant Hydrogeologists Limited (BCL) to undertake a Hydrological Assessment (HA) to assess any potential effects the proposed amended restoration scheme may have on the water environment. The results of the assessment are presented within this report.

2 APPROACH TO ASSESSMENT

2.1 Scope of Assessment

2.1.1 The scope of the Assessment has been informed by a Screening Opinion (SO), provided by Oxfordshire County Council following the formal request made by Corylus during February 2019 (SO dated 20th March 2019).

2.1.2 The SO considers the existing land uses/activities in the area surrounding the proposed development and the proposed change in restoration. Taking these into account, the SO states that the proposed application does not require a formal Environmental Impact Assessment to be undertaken.

2.1.3 The SO does however require an assessment to be conducted of the potential for effect on the local hydrological system, to ensure no adverse impact on the Pixey and Yarnton Meads Site of Special Scientific Interest (SSSI). This site forms part of the Oxford Meadows Special Area of Conservation (SAC) and is located some 450 metres (m) to the south of the Plant Area at the closest approach (***figure 3***).

2.2 Methodology for assessment

2.2.1 Approach and calculation methodologies referenced as part of this assessment are listed at ***Appendix 1***. The Assessment process has involved:

- Baseline characterisation of the local water environment, describing the nature of (and interactions between) groundwater and surface-water systems operating within and around the Site;
- Assessment of the proposed altered restoration upon that environment;
- Where significant potential impacts have been identified, alterations to the project design and / or specific mitigation measures have been adopted to eliminate, reduce or compensate for those potential impacts, and;
- Description of residual impacts.

2.3 Information Sources

2.3.1 Published and site-specific data sources referenced as part of this assessment are listed at ***Appendix 1.***

2.4 Site Reconnaissance

2.4.1 The assessment has been conducted following a walkover study conducted by BCL in April 2019 and the results of a recent pumping test conducted by BCL for the Stage 4 Lake (located immediately to the south of the Plant Area), as part of an abstraction licence application made for the site (May 2019).

3 BASELINE CONDITIONS

3.1 Site Setting

3.1.1 Site Location

3.1.1.1 Cassington Quarry is located immediately to the north of the A40 Northern Bypass between Oxford and Witney in Oxfordshire. The Site is situated approximately 1km south of the village of Yarnton, within the River Thames valley (*figure 1*).

3.1.1.2 The Plant Area is located within the wider Cassington Quarry landholding, and is centred upon National Grid Reference (NGR) SP 47444 11248.

3.1.1.3 In the vicinity of the Plant Area, the A40 defines the southern boundary of the main Cassington Quarry site, with the northern boundary defined by a section of the Oxford – Evesham railway.

3.1.2 Topography

3.1.2.1 The area encompassing the Site is of generally low relief, being primarily associated with the flood plain of the River Thames. Ground elevations within the Site generally vary between 62 metres above Ordnance Datum (maOD) at the west, reducing to some 58maOD in the east. Land elevation for the area of floodplain to the south of the Site (and A40) resides at some 58 – 59maOD.

Land elevations increase immediately to the north of the Site, rising to a local high of some 96maOD at Frogwelldown Lane, west of Yarnton.

3.1.2.2 In proximity to the Plant Area the landform is dominated by a series of large, interconnected lakes, subdivided by a series of causeways. The eastern most waterbodies comprise the silt settlement/water circulation system and a number have now been infilled, to form conservation areas (reed beds and woodland) in accordance with the approved restoration plan.

3.1.2.3 The two large lakes to the south of the Plant Area (the Stage 4 Lake to the east and the Stage 5/6/7 Lake to the West – *figure 2*) facilitate movement of water through the Site to the east, with outfall to the existing surface drainage passing from the eastern boundary of the Stage 4 Lake.

3.1.2.4 Within the Plant Area the soils, overburden and upper level gravels have been removed to create a level platform of exposed sand and gravel, to provide foundations for the operation of the mineral processing plant and stocking area. Survey of the Plant Area shows the land elevation to vary from some 63maOD in the west to some 60maOD at the east (*figure 2*). The landform rises steeply at the northern boundary, to the predevelopment ground level at some 66maOD (although this is partly obscured by the presence of a soil storage bund placed along the northern boundary to some 69maOD).

3.1.3 Land Use

3.1.3.1 Land use in the area beyond the Site boundary is dominated by agriculture, predominantly livestock grazing, with some arable. Limited areas of woodland are identified - to the north of the railway, north of the Plant Area and within the area running along the southern boundary of the Plant Area.

3.1.3.2 Other developments in the locality include an Anaerobic Digestion Facility located to the west of the Plant Area and a material recycling operation occupying a series of barns to the northwest of the Plant area.

3.1.3.3 The closest domestic property is located some 300m to the northeast of the Plant Area at the closest approach. This is separated from the Plant Area by the railway defining the northern boundary of the Site.

3.1.4 Ecological Designations

Statutorily Protected Sites of Ecological Importance

3.1.4.1 Details of the location for designated areas of ecological importance in the vicinity of the Site have been obtained from Natural England (NE) and are reproduced at ***figure 3***.

3.1.4.2 The Pixey and Yarnton Meads SSSI is the only protected site located within a 1km radius of the Plant Area. The SSSI is located on the floodplain associated with the River Thames and is integrally linked to the local hydrological and hydrogeological system. The site forms part of the larger Oxford Meadows Special Area of Conservation (SAC), that includes additional meadow areas to the west (Cassington Meadows SSSI) and south (Wolvercote Common and Port Meadows SSSI).

3.1.4.3 The Pixey and Yarnton Meads SSSI comprises an important area of ancient hay meadows, supporting a range of diverse flora, some of which are thought to be confined in the UK to Oxfordshire only. The site is managed using traditional (low intensity) agricultural practices.

3.1.4.4 Hanson operate an extensive programme of groundwater and surface water monitoring for the area encompassing the Site. This includes a series of installations within the SSSI, which provide an ongoing means for assessing any quarry related effects in proximity to the protected site.

Table 1 Statutorily Protected Sites

Site Name	Distance* and Direction from Proposed Development	Designation	Summary Description
Pixey and Yarnton Meads SSSI	450m to the south-southeast at the closest approach (separated from the Plant Area by the Stage 4 Lake)	Ancient meadows reliant on flooding of flood plain in winter.	Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC).

3.2 Geological Setting

3.2.1 Background

3.2.1.1 The geology within and surrounding the Site has been characterised by reference to the following:

- British Geological Survey (BGS) mapping data and publications;
- Geological & Hydrogeological reports made in support of planning applications for both the Site and other nearby developments, and;
- Mineral evaluation trial pitting undertaken within the Site;
- Geological and hydrogeological papers prepared in relation to the Yarnton and Pixey Meads SSSI.

3.2.2 Regional Geology

3.2.2.1 The area encompassing the Site is underlain by solid strata of Jurassic Oxford clay (extract of local geological map provided at ***figure 4***). A borehole drilled immediately to the east of the Plant Area records a thickness for the Oxford Clay of some 10m in the locality (***Appendix 1***).

3.2.2.2 Within lower lying areas to the south and northeast of the Site, the Oxford Clay strata are overlain by river terrace sand and gravel deposits and/or alluvium. These comprise extensive shallow and laterally continuous deposits, tracing both the present day and historic routes of the principal drainage channels passing through the area.

3.2.2.3 Other areas of more isolated sand and gravel deposition are identified on areas of higher ground forming the flanks of the main valley channels. These are higher level Second and Fourth terrace deposits, which can remain in continuity with the main terrace deposits where in sufficiently close proximity.

3.2.3 Local Geology

3.2.3.1 The BGS mapping data for the locality shows the Plant Area to be located on the northern edge of the First Terrace sand and gravel deposit (covered by alluvium), bridging across the Oxford Clay outcrop to the southern limit of the Second Terrace deposit.

3.2.3.2 A detailed trial pitting exercise undertaken across the Plant Area shows the sand and gravel deposit to extend across the full area, increasing from a depth of some 3m on the southern boundary, reducing to 1.2m on the northern boundary (Hanson drawing WM92M/138, ***appendix 2***).

3.2.3.3 The sand and gravel deposits within the Site to the south of the Plant Area have been largely removed, with the worked areas restored to a series of large open waterbodies. During extraction, these were lined with basal clays/overburden along the southern flank, to prevent drawdown effects causing negative impact on the SSSI to the south.

3.2.3.4 To the south of the Site, the sand and gravel deposit (overlain by alluvium covering) is present as an extensive area forming the floodplain associated with the River Thames (and Pixey and Yarnton Meads SSSI).

3.2.3.5 The geological mapping data shows the First Terrace sand and gravel deposit to pinch out against the underlying Oxford Clay to the north of the Site. Isolated areas of Second and Fourth Terrace deposition are recorded on the higher ground areas to the south and northwest of Yarnton respectively. Both these areas are expected to be separated from the Site by the foundations and drainage infrastructure related to the railway that defines the northern boundary of the Site.

3.2.3.6 Areas of former sand and gravel deposition to the west and east of the Plant Area have also both been worked and restored in accordance with the approved restoration plan. The western area (Stage 10) has been lined/backfilled with inert material and the eastern area (mineral washing lagoons) lined/infilled with silt as part of the mineral washing process (***figures 2 & 5***).

3.3 Meteorological Setting

3.3.1 Long Term Area Averages

3.3.1.1 The Standard Average Annual Rainfall (SAAR) for the area encompassing the Site, for the period 1961 to 1990 (SAAR6190) as obtained from the CEH FEH online rainfall model, is 622mm.

3.3.1.2 Potential transpiration data for the locality has been obtained from MAFF Technical Bulletin 34 (Area 26) and these are given below at ***table 2***.

Table 2 Area Long Term Average Monthly Rainfall and Potential Transpiration													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
Area Average Rainfall	64	49	49	49	62	52	61	74	63	61	74	68	726
Potential Transpiration	1	10	30	55	80	91	92	75	44	20	5	0	503

3.3.2 Local Data

3.3.2.1 Local rainfall data has been obtained from the EA for the Eynsham Rain Gauge, located at NGR: 444440 208670 some 4km southwest of the Plant Area, at an elevation of some 60maOD. The relative close proximity and similar elevation of the station to the Plant Area indicate that the data can be considered representative of rainfall expected at the Site.

3.3.2.2 The Eynsham Rain Gauge has been in operation since 1982. The long-term average monthly data for period 1982 – 2018 are presented at ***table 3***. The full monthly total data are presented in tabular form at ***appendix 3***.

Table 3 EA Eynsham Rain Gauge - Long Term monthly average data													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Monthly total (mm)	51.8	37.5	40.8	44.8	54.4	46.7	45.8	50.8	44.1	60.0	60.7	60.5	598

3.3.3 Effective Rainfall

3.3.3.1 Long-term monthly average rainfall and potential evaporation statistics (Eynsham Rain Gauge data, corrected using the Potential Transpiration data presented at ***table 2***) have been used to derive estimates of monthly average effective rainfall[1].

3.3.3.2 Calculation has been performed to provide estimates for assumed grass cover (the proposed amended restoration) and open water (the current approved restoration) using methods described by Grindley[2] and EA R&D Handbook W6-043/HB[3]. The calculated data are presented at ***table 4***.

3.3.3.3 Although the presented data use historic transpiration data, it is clear that the open water figures indicate a higher rate of transfer from the surface water environment to atmosphere, than the grassland scenario.

1 The proportion of rainfall available for runoff and groundwater recharge after accounting for evapotranspiration and satisfaction of soil moisture deficit.

2 "The Calculation of Actual Evaporation and Soil Moisture Deficit over Specified Catchment Areas", Grindley J, November 1969, Hydrological Memorandum 38, Meteorological Office, Bracknell, UK.

3 "Estimation of Open Water Evaporation, Guidance for Environment Agency Practitioners", R&D Handbook W6-043/HB, J W Finch and R L Hall, October 2001.

Table 4 Derivation of Effective Rainfall for Differing Surfaces													
Permanent Grassland (rc = 75mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Rf	52	38	41	45	54	47	46	51	44	60	61	61	598
Pe	1	10	30	55	80	91	92	75	44	20	5	0	503
rf-Pe	51	28	11	-10	-26	-44	-46	-24	0	40	56	61	95
dPsmd	0	0	0	10	26	44	46	24	-0	-40	-56	-55	
dAsmd	0	0	0	10	26	44	29	4	0	-40	-56	-17	
Asmd	0	0	0	10	36	80	126	151	150	110	55	0	718
Psmd	0	0	0	10	36	80	109	113	113	73	17	0	551
Ae	1	10	30	55	80	91	75	55	44	20	5	0	466
ERF	51	28	11	0	0	0	0	0	0	0	0	43	132
Open Water													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Correction Constants	1.4	1.1	0.9	1.0	0.9	1.0	1.2	1.4	1.5	2.0	2.3	2.0	
Ae	1.4	11.4	27.6	52.3	72.8	92.8	114.1	102.8	64.7	39.8	11.5	0.0	591.1
ERF	50.4	26.1	13.2	-7.5	-18.4	-46.1	-68.3	-52.0	-20.6	20.2	49.3	60.5	6.8
rc: Root Constant, Rf: Rainfall, Pe: Potential Evaporation, Psmd: Potential Soil Moisture Deficit. Asmd: Actual Soil Moisture Deficit, Ae: Actual Evaporation, ERF: Effective Rainfall. All units other than correction constants are millimetres.													

3.4 Hydrological Setting

3.4.1 Background

3.4.1.1 Information concerning the hydrology of the Study Area has been obtained from:

- Ordnance Survey digital mapping data.
- CEH/FEH Webservice flow and catchment characteristics data.
- Site-specific water features survey and flow assessments undertaken by BCL.

3.4.2 Water Framework Directive (WFD) River Basin District

3.4.2.1 The Site is located within the Gloucestershire and the Vale Catchment of the Thames River Basin District.

3.4.2.2 The Gloucestershire and the Vale Catchment comprises the most western area within the Thames River Basin District and is drained by a series of generally northwest – southeast oriented watercourses, linking into the main west-east flowing River Thames, running through the southern section of the catchment area.

3.4.2.3 Surface water quality within the Gloucestershire and the Vale Catchment area is generally regarded as good, although the section of the River Thames in the vicinity of the Site is classified as Moderate overall status, this status being primarily attributable to poor water quality water identified as release from sewage treatment works.

3.4.3 WFD Catchments

3.4.3.1 FEH data shows the Site to be situated within the catchment area for the Kingsbridge Brook. Various tributary drainage features convey water from the area to the south and north of the Site, flowing eastwards, to link into the main watercourse on the northeastern flank of Stage 2 (NGR SP 48100 11040 – ***figure 5***).

3.4.3.2 The catchment area for the Kingsbridge Brook extends to cover an area of some 18km^2 to the north and west of Site and links into the main River Thames via the Wolvercote Mill Stream, some 1.7km downstream of the Site (***figure 5***).

3.4.4 Surface Watercourses

3.4.4.1 The principal watercourse with regard to the drainage systems in proximity to the Site is the Kingsbridge Brook. This receives drainage from both within the Site and the flood plain to the south of the A40. Drainage from these areas is focussed to a main tributary that passes between the water management area and restored Stage 2 lakes area (***figure 5***). This then links into the Kingsbridge Brook at the eastern boundary of the Site.

3.4.4.2 Incident rainfall falling in proximity to the plant area will feed towards the south, being collected in drainage around the "Long Ponds" and subsequently connecting into the aforementioned local drainage network.

3.4.5 Surface Waterbodies

3.4.5.1 The presence and nature of surface waterbodies located within a 500m radius of the Plant Area are highlighted on ***figure 5***.

3.4.5.2 A total of nine waterfeatures are recorded on OS mapping data within the survey radius. The majority are located within the Site boundary and related to the former extraction operations undertaken at the Site (restored areas to open water and former silt processing areas).

3.4.5.3 The two ponds located along the southern flank of the Plant Area (referred to as the 'Long Ponds') are natural features excavated into the sand and gravel aquifer. The water levels within the ponds are expected to be maintained by a combination of groundwater and runoff input from the adjacent lands. Water accumulating within the ponds flows via a buried pipe into the wider drainage system to the east.

3.4.5.4 A single pond is identified outside the Site falling within the search radius. This is an isolated feature located some 350m to the northeast of the Plant Area (north of the adjacent railway). This is situated on the featheredge of the sand and gravel deposit as shown by BGS mapping data and to the east of an area of former infill.

3.4.5.5 Based on the local topography, anticipated extent/thickness of the sand and gravel deposit, the presence of the railway/associated foundations and drainage that separates the two areas, the pond is not expected to be hydraulically linked to the Plant Area.

3.4.6 Flooding

3.4.6.1 Data has been obtained from the EA to determine the elevation and extent of areas vulnerable to surface flooding (Flood Product 4 – ***appendix 4***). A reproduction of the local EA fluvial flood mapping data is provided at ***figure 6***. Areas are highlighted with an Annual Exceedance Probability of 1% (Return Period of 1:100-years : Flood Risk Zone [FRZ] 3) and AEP 0.1% (Return Period of 1:1,000-years [FRZ 2]).

3.4.6.2 The flood mapping data shows the Plant Area to be primarily located within Flood Zone 1 (low risk of flooding), with a small area of the southeastern section falling in the FRZ2 and minor area of FRZ3.

3.4.6.3 The flood modelling data used for preparation of the flood plain maps shows the predicted 1% AEP flood level data (plus 70% allowance for climate change) as some

59.79maOD in the aforementioned area to the southeast of the Site. Similarly, the 0.1% AEP data predicts a level of some 59.71maOD for the same area.

3.4.6.4 Examination of the EA pluvial flood risk mapping data indicates the extant Site to be at low risk of surface flooding from rainfall.

3.5 Hydrogeological Setting

3.5.1 Background

3.5.1.1 Information concerning the Hydrogeology of the Study Area has been obtained from:

- Review of published geological and hydrogeological data.
- Review of hydrogeological study reports prepared in support of planning applications for quarrying and water dependant sites in the area
- Groundwater and surface water level measurements made within monitoring points located within the Site and surrounding area, undertaken by both the applicant and the EA.
- Fieldwork investigations and pump testing/dewatering operations undertaken in the vicinity of the Site;
- Experience and assessment of similar hydrogeological terrains elsewhere within the UK.

3.5.2 Aquifer Classification

3.5.2.1 The superficial sand and gravel deposits (underlying and encompassing the Plant Area) are designated by the EA as a 'Secondary A Aquifer' (formerly referred to as 'minor aquifers'). These are defined as permeable layers capable of supporting local abstraction and in some cases providing a component of baseflow to local watercourses.

3.5.2.2 The underlying solid strata of the Oxford Clay is regarded as non-aquifer ("unproductive strata" under the EA classification scheme), possessing low permeability and negligible potential for water supply or river base flow.

3.5.3 Groundwater Flow Mechanism

3.5.3.1 The near surface superficial deposits principally comprise sands and gravels overlain by alluvium. Groundwater movement through the deposit occurs within the interconnected system of pore-spaces as intergranular groundwater flow (which can be approximated mathematically using the idealised model as described by Darcy[4]).

3.5.3.2 The rate of transfer for groundwater through the superficial aquifer will depend on the gradient on the watertable, the cross sectional area (taking into account backfilled areas) and the hydraulic conductivity of the deposit.

3.5.3.3 In areas where the sand and gravel is overlain by alluvium (generally clayey/silt composition), it is likely that a degree of isolation will be recorded between the

4 "Les Fontaines Publiques de la Ville de Dijon" (The Public Fountains of the City of Dijon), Darcy, H.,1856, Dalmont, Paris

immediate surface and underlying groundwater system, reducing the free percolation of rainfall to groundwater.

3.5.3.4 The foregoing is balanced by the established network of relatively deep drainage channels installed in the locality, which will cut through the alluvium cover, allowing transfer to/from the surface water and groundwater systems.

3.5.3.5 The unproductive strata of the Oxford Clay will not support groundwater flow, but will act as an impermeable aquiclude (some 10m thickness) to vertical groundwater movement to other underlying aquifer units in the locality

3.5.4 Aquifer Boundaries

Aquifer local boundaries

3.5.4.1 The lateral boundaries of the sand and gravel aquifer to the north and south of the Site are determined by the limit of distribution, defined as where the sand and gravel deposits pinch out against the underlying Oxford Clay outcrop area, or have been excavated as part of historic development in the locality. At the closest approach, this is expected to occur immediately adjacent to the northern boundary of the Site (defined by the route of the railway and area of infilling to the north) and some 750m to the south of the southern Site boundary (limit of deposition).

3.5.4.2 The lateral boundaries to the west and east are effectively unlimited at the scale of interest for assessment, extending alongside the principal watercourses passing through the area.

Aquifer Internal Boundaries

3.5.4.3 Lateral internal boundaries for the local aquifer to the west, east and south are defined by areas of previous mineral working, restored as either infilled areas, lined openwaterbodies or silt processing areas.

3.5.4.4 The sand and gravel aquifer of the Site and surrounding area directly overlies Oxford Clay, which forms the lower boundary of the superficial aquifer.

3.5.5 Aquifer Recharge

3.5.5.1 The sand and gravel deposit encompassing the Site comprises an unconfined aquifer fed primarily from incident rainfall (autogenic recharge).

3.5.5.2 Indicative values for long-term average effective rainfall available for recharge to the local aquifer system (that part of rainfall remaining after accounting for reductions attributable to evaporation, evapotranspiration and soil moisture deficit) has been estimated at some 132 millimetres per annum (mm/a; ***table 6***) for agricultural areas and 6.8mm/a for open water areas.

3.5.5.3 Examination of the local topography indicates that recharge to the aquifer within the Plant Area, from runoff falling on areas of adjacent Oxford Clay outcrop (allogenic recharge), is unlikely to provide a significant contribution to the local aquifer resource.

3.5.6 Groundwater Occurrence and Levels

The Collected Data

3.5.6.1 Information regarding groundwater levels within the sand and gravel aquifer encompassing the Site have been taken from:

- Groundwater level data for piezometers installed within the sand and gravel aquifer encompassing the Site.
- Elevation data for local surface water features.

3.5.6.2 A large network of piezometers are currently installed and monitored in the vicinity of the Site. All piezometer locations have been accurately surveyed to facilitate reduction of collected groundwater data to Ordnance Datum. The locations for the installed monitoring points are shown on ***figure 7***.

3.5.6.3 The earliest monitoring has been undertaken at the Site since 1980. During the period to present day, the monitoring scheme has been expanded, with the collected data being used to provide a mechanism for assessment of any unacceptable drawdown effects in the locality, relating to the ongoing dewatering operation within the wider Site.

Groundwater Head Distribution

3.5.6.4 A representative contour plot depicting the head distribution within the sand and gravel aquifer for the locality, has been prepared using the aforementioned monitoring data (***figure 7*** – data recorded in May 19).

3.5.6.5 The interpolated plot indicates a general easterly direction of groundwater flow for the majority of the Site, in accordance with the general drainage pattern for the locality and movement of water through the restored system of lakes to the south of the Plant Area.

3.5.6.6 For the area to the south of the Site, the groundwater elevation data also indicates the potential for movement from the main River Thames, beneath the floodplain (and associated protected site), into the drainage channel located to the east of the Stage 2 Lake (tributary to the Kingsbridge Brook).

3.6 Water Resources Setting

3.6.1 Background

3.6.1.1 Information concerning the presence of abstraction in the vicinity of the Plant Area has been obtained from:

- EA radial search of abstraction licence database (2km from the site boundary).
- Radial search of the Private Water Supply database held by Cherwell District Council.

3.6.2 Water Abstractions

Licenced Abstractions

3.6.2.1 Information concerning licensed groundwater abstractions for the locality has been obtained from the EA licence database. Details of licensed abstractions within the survey area (extending 2km from the Plant Area boundary) are shown at ***table 5***.

Table 5 Licensed Abstractions				
Map Code	Licence Number	Licence Holder	Source	Purpose
AB1	28/39/16/0078	Thames Water Utilities Limited	River Thames (non tidal)	Water supply

3.6.2.2 One abstraction is identified in the locality. This relates to a licence held by Thames Water Utilities Limited (TWUL) for abstraction from the River Thames.

De-regulated Abstractions

3.6.2.3 Data has been obtained from Cherwell District Council (CDC), summarising deregulated abstractions located within the survey area (extending 2km from the Site boundary). The council has confirmed there are no Private Water Supplies registered within the survey radius.

3.6.3 Source Protection Zones

3.6.3.1 The Site is not located with any EA defined source protection zones.

4 PROPOSED ALTERATION TO THE RESTORATION SCHEME

4.1 The Approved Restoration

4.1.1 The currently approved restoration for the Plant Area is for creation of an open waterbody for fishing. A drawing depicting the approved restoration is provided at *W92m133* (see figures section).

4.1.2 In accordance with the other restored open waterbodies at the site, the Plant Area lake would comprise a lined feature excavated to below extant groundwater levels and as such the lake level would be maintained by a combination of runoff from immediately surrounding ground and (to a lesser extent) groundwater.

4.2 The Proposed Restoration

4.2.1 The proposed amended restoration is for the Plant Area to be returned to primarily a grassland area, with perimeter tree and shrub planting, and areas of openwater in the southeastern section of the site (*drawing C4/HAN/05/4*).

4.2.2 The restoration landform will comprise a generally sloping landform to the south, at levels comparable to pre-worked elevations.

4.2.3 The landform will be created through placement of classified inert material and capped with indigenous retained soils.

4.2.4 Runoff from within the restored site will be directed to the series of ponds located in the southeastern section of the Plant Area. These will be constructed to remain in continuity with the aquifer to the south and hence any water accumulation will be allowed to dissipate back to the extant aquifer in the immediate locality.

4.2.5 Water levels within the restored ponds is expected to reside at some 58.5maOD. This will leave a freeboard of some 1.5m to provide attenuation and temporary storage of water for periods of increased runoff. This is discussed in greater detail at ***section 5.4.2***.

5 IMPACT ASSESSMENT & MITIGATION MEASURES

5.1 Background

5.1.1 Assessment has facilitated the conceptualisation of the local groundwater and surface water regimes operating within and around the Site.

5.1.2 This understanding has enabled assessment of the potential impacts on the water environment that may be posed by the proposed amendment to the restoration scheme. The identified potential impacts are summarised and discussed below.

5.2 Generic Potential Impacts

5.2.1 Direct Impacts

5.2.1.1 The proposed altered restoration has the potential to result in direct impact upon the water environment in the following ways:

- Potential for impact upon groundwater levels, flows and quality;
- Potential for impact upon surface water levels, flows and quality;
- Potential for the exacerbation of extant flood risk.

5.2.2 Indirect Impacts

5.2.2.1 The direct impacts outlined above may lead, in-turn, to indirect impacts upon:

- Potential for indirect derogation of surface water flow rates and / or waterbodies;
- Potential for indirect impact upon the volume of groundwater and / or surface water available to existing abstractions;
- Potential impact upon floral and / or faunal habitats as a result of flow derogation within surface watercourses / wetland areas.

5.3 Preliminary Risk Screening

5.3.1 A preliminary screening of the potential impacts that the proposed amended restoration may have upon the water environment has been undertaken to identify where such impacts are potentially significant.

5.3.2 Where potential for impact is identified, further assessment has been undertaken at ***section 5.4***, with mitigation measures / planning controls being formulated as required (summarised at ***section 5.5***).

5.3.3 The results of preliminary risk screening are presented at ***table 6*** below.

Table 6 Preliminary Risk Screening					
Activity	Impact Class	Potential Primary Impact	Notes	Potential Secondary Impacts	Requirement for Further Assessment
Alteration of restoration scheme from a lined open waterbody to incorporate additional infilling to facilitate dry land recovery.	Groundwater levels and flows	Placement of inert material - reduction in permeability within superficial aquifer and associated alteration in groundwater movement.	The approved restoration for the Plant Area was to a clay-lined lake. Extant groundwater movement through the Plant Area is expected to be minimal, due to the presence of existing infilled areas both up and down hydraulic gradient and the site location on the edge of the sand and gravel deposit. As the approved lake was proposed to be clay lined, the proposed infilling (with potentially lower permeability material) within the main section of the site, would not be expected to result in any significant alteration in groundwater movement, in comparison to the currently approved scheme.	None	Yes. Due to the relative proximity of protected ecological sites.
	Surface water levels and flows	Reduction in permeability within superficial aquifer and associated alteration in transfer from groundwater to surface water environments. Potential for more rapid runoff from lower permeability infill areas.	As the approved lake restoration was to a clay lined lake, the proposed infilling with potentially lower permeability material within the central section would not be expected to result in any significant alteration in transfer of groundwater to surface water, in comparison to the currently approved scheme. The site design includes a series of ponds to enable collection and controlled management of runoff within the restoration landform.	None	Yes. Due to the relative proximity of protected ecological sites.
	Groundwater quality	Alteration in extant water quality through placement of inert material	Proposal is for the creation of a landform using classified inert material. In this regard, it is assumed any imported material will be subject to quality checks to ensure compliance with waste acceptance controls. The Plant Area is not particularly sensitive in this regard, being surrounded by areas of former infill and lined waterbodies, with expected minimal movement of groundwater. The foregoing notwithstanding, the importation activity will require application for an Environmental Permit, which will need to demonstrate inclusion of appropriate controls (following a risk based assessment) to ensure no unacceptable risk to the local water environment.	None – Following restoration, groundwater movement through the area encompassing the Plant Area will be low and the site has been shown to be isolated from other water dependant sites and/or users, by areas of former infill and/or lined open waterbodies.	None at this stage. An application for an Environmental Permit will be required, which will include assessment to specify the levels of control required for importation of inert material.
	Surface water quality	Alteration in extant water quality through placement of inert material	As above	None – Following restoration, groundwater movement through the Plant Area will be low, with the majority of surface water movement through the wider site continuing to pass through the series of lakes to the south, and to onward drainage to the east (away from the nearest protected site (Yarnton and Pixey Mead SSSI).	As above

5.4 Further Assessment of Potential Impacts

5.4.1 Groundwater Levels and Flows

Background

5.4.1.1 The proposed alteration to the approved restoration scheme for the Plant Area as described herein, is considered to have the potential to impact upon groundwater levels and flows in the following way:

- Placement of inert restoration material – reduction in extant superficial aquifer permeability and associated alteration in groundwater movement.

Placement of inert infill material

5.4.1.2 The extraction of the sand and gravel and replacement with inert infill material, has the potential to alter the permeability of the local subsurface and the related movement of groundwater through the restored area.

5.4.1.3 The nature of inert infill material proposed to facilitate the restoration of the Plant Area would typically possess a hydraulic conductivity of at least three orders of magnitude lower than the sand and gravel that has been extracted.

5.4.1.4 The significantly lower hydraulic conductivity of the infill materials gives the potential for retardation of groundwater flow upon the upstream (western) boundary of the Plant Area.

5.4.1.5 This potential impact is balanced by a number of factors: i. The historic placement of infill material to the west and east of the Plant Area, ii. Lining works undertaken around the restored lake to the south, iii. The lining works that would have been included for the approved restoration landform *and* iv. The location of the Plant Area close to the edge of the sand and gravel deposit.

5.4.1.6 Each of the foregoing factors will serve to minimise the movement of groundwater through the Plant Area under the approved restoration scheme. In this regard, the placement of infill material within the Plant Area will have negligible effect on groundwater levels and movement in comparison to the approved restoration.

Potential for Associated Secondary Impacts

5.4.1.7 The alteration of the approved restoration for the Plant Area from a lined openwaterbody to an area of primarily agricultural grassland, through placement of infill material, is not expected to result in any significant variation in groundwater levels outside the Site boundary. In this regard, the proposed alteration has no potential to result in secondary impacts on local groundwater dependant sites (such as Pixey and Yarnton Meads SSSI) and/or groundwater users.

Requirement for Mitigation / Planning Controls

5.4.1.8 In view of the above, planning controls or further mitigation measures are considered unnecessary with regard to the potential for post-restoration impact upon extant groundwater levels/movement.

5.4.2 Surface Water Levels and Flows

Background

5.4.2.1 The Proposed Development as described herein is considered to have the potential to impact upon surface water levels and flows in the following ways:

- Placement of inert restoration material – reduction in transfer from groundwater to surface water environment;
- Potential for more rapid transfer of runoff to surface water drainage network from lower permeability infill areas;

Alteration in Groundwater/Surface Water Transfer

5.4.2.2 Following extraction of the sand and gravel, the approved restoration for the Plant Area is to a lined lake. The amended restoration will include infilling across the majority of the Site, with retention of a series of ponds across the southeastern area. The ponds will be constructed to remain in continuity with the insitu sand and gravel along the southern flanks. Runoff from the restored landform will be directed to these features for subsequent dissipation to groundwater.

5.4.2.3 In this regard, the transfer of rainfall/surface water to groundwater for the restored Site will not be significantly altered from the currently approved scheme.

Management of Rainfall Runoff

5.4.2.4 In order to ensure the proposed altered restoration scheme will not result in any increase in the rate of transfer of water offsite, a series of drainage controls have been included to provide attenuation for rainfall runoff across the restored Plant Area.

5.4.2.5 Within the restored landform the attenuation storage will be provided within the series of ponds located along the southeastern boundary. The required volume for storage within the ponds has been calculated using the methodology detailed in: “Rainfall Runoff Management for Developments”, October 2013, joint DEFRA / EA Flood and Coastal Erosion Risk Management R&D Programme, Report SC030219. The methodology has been drawn together within the "UK Sustainable Drainage Tools website[5] ". Full details of the calculations are provided at ***appendix 3***.

5.4.2.6 The calculated required volume to meet the 1 in 100 year return period event (plus 40% allowance for climate change – in accordance with current design guidance) equates to some 7,335m^3. This compares with the circa 10,300m^3 provided within the proposed pond areas, above the maximum expected natural pond level (some 58.5maOD).

5.4.2.7 Based on the foregoing it is clear that sufficient attenuation storage will be provided to balance the design storm event (plus allowance for climate change) and in this regard, the proposed development will provide an enhanced level of control beyond the recommended drainage requirements.

5 HR Wallingford UK SUDS website - Guidance and Tools: http://www.uksuds.com

Potential for Associated Secondary Impacts

5.4.2.8 The inclusion of the series of ponds and associated storage areas within the proposed amended restoration landform will provide sufficient storage for control of runoff in accordance with current guidance for drainage systems.

5.4.2.9 No significant variation in transfer of water from the restored Plant Area is therefore expected and as such, the proposed alteration is considered to have no potential to result in secondary impacts on the local surface water network, surface water users and/or dependant sites, such as Pixey and Yarnton Meads SSSI.

Requirement for Mitigation / Planning Controls

5.4.2.10 Based on the foregoing discussion, planning controls/further mitigation measures relating to the proposed restoration landform depicted at ***drawing C4/HAN/05/4*** are considered unnecessary with regard to the potential for post-restoration impact upon extant surface water levels/transfer.

5.4.3 Flood Risk

Background

5.4.3.1 The Plant Area is primarily located within the Environment Agency Flood Zone 1 (FRZ1 – low risk of flooding – AEP of less than 0.1%), with a small area of the southeastern section falling in the FRZ2 (AEP 0.1%) and minor area of FRZ3 (AEP 1%).

5.4.3.2 The flood modelling data used for preparation of the flood plain maps shows the predicted 1% AEP flood level data (plus 70% allowance for climate change) as some 59.79maOD in the aforementioned area to the southeast of the Site. Similarly, the 0.1% AEP data predicts a level of some 59.71maOD for the same area.

5.4.3.3 A level for level comparison of the storage offered by the current site (which has been used in the EA flood model) and the amended restoration landform, for flood levels up to and exceeding the maximum predicted flood elevation (in this case the 1% AEP plus 70% climate change allowance) are presented at ***table 7***.

Table 7 Comparison of flood storage capacity – current and restoration landforms

Flood elevation (maOD)	Current site storage – against which EA model is run (m3)	Amended restoration storage (m3)
59.50	50	4,908
59.60	170	5,425
59.70	415	5,944
59.80	809	6,496
59.90	1,347	7,080
60.00	2,010	7,700
60.10	2,856	8,369
60.20	3,993	9,094

5.4.3.4 The foregoing data indicate the Plant Area will provide an increase in storage capacity for all elevations shown, in comparison to the currently modelled scenario.

Requirement for Mitigation and / or Planning Controls

5.4.3.5 Based on the foregoing discussion and incorporation of pond areas within the restoration landform (***drawing C4/HAN/05/4***), planning controls/further mitigation

measures are considered unnecessary with regard to the potential for post-restoration impact upon extant flood risk in the locality.

5.5 Summary Impact & Mitigation Schedule

5.5.1 The measures and procedures incorporated into the design of the amended restoration specific to the minimisation of impact upon the water environment are summarised at *table 8*.

Table 8 Summary Schedule of Potential Impacts & Mitigation Measures			
Impact Class	Mitigation by Design	Mitigation by Procedure	Contingency Action
Surface Water Levels and Flows	Incorporation of the ponds and associated attenuation areas as depicted on drawing C4/HAN/05/04. These are to be constructed to remain in continuity with sand and gravel deposits to the south and will provide attenuation capacity for the control of runoff from the restoration landform.	During the period for establishment of the restoration landform (the aftercare period), routine maintenance should be undertaken to remove any silt accumulation within the attenuation ponds, to ensure continued provision of adequate attenuation volume.	None
Flood Risk	Incorporation of ponds and associated attenuation areas will provide an increase in flood storage capacity for the restoration landform in comparison to the prevailing situation. The direction of runoff to the attenuation ponds will provide adequate control for runoff water to prevent any increase in local flood risk.	As above	None

6 RESIDUAL IMPACTS

6.1 The results of the assessment presented herein indicates, with the inclusion of the mitigation measures detailed at ***table 8***, the proposed alteration to the approved restoration for the Plant Area, is not expected to have any significant hydrological impacts upon the wider water environment.

6.2 This notwithstanding, the alteration from primarily an openwater area, to a largely dry restoration will result in lower evaporative loss from the local aquifer and hence an improvement in terms of retention for local water resources.

6.3 With regard to flooding, flood risk to people and property can be managed, but can never be completely removed; a residual risk will remain after flood management or mitigation measures have been put in place. The controls described above relate to the design standard 1 in 100-year storm Return Period (including allowance for climate change) using current calculation methods. The calculated attenuation volumes could be exceeded under more extreme conditions, such as a storm event with a Return Period in excess of the design standard.

6.4 The foregoing notwithstanding, for rainfall exceeding the design event, the attenuation ponds will continue to offer temporary storage for runoff, until a level of water is attained above the surrounding ground level. On this basis, the landform will provide some 25% more storage than that required to balance the 1 in 100-year design storm plus allowance for climate change.

7 CONCLUSIONS

7.1 A study has been conducted to assess the potential for alteration to the approved restoration within the Plant Area at Cassington to result in impact on the extant water environment and in particular the Pixey and Yarnton Meads Site of Special Scientific Interest.

7.2 The amended restoration design includes specific measures to ensure the protection of the water environment and the results of assessment indicate there are no hydrologically based reasons why the amended design should not be permitted.

7.3 This conclusion assumes that any permission, if granted, should follow the landform design as depicted in restoration drawing *C4/HAN/05/4* and mitigation features highlighted at *table 8* of this report.

Paul Burfitt
Senior Hydrogeologist

BCL Consultant Hydrogeologists Limited
September 2019

HN/CASS/HA/001/19

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Cassington Quarry

Yarnton, Oxfordshire

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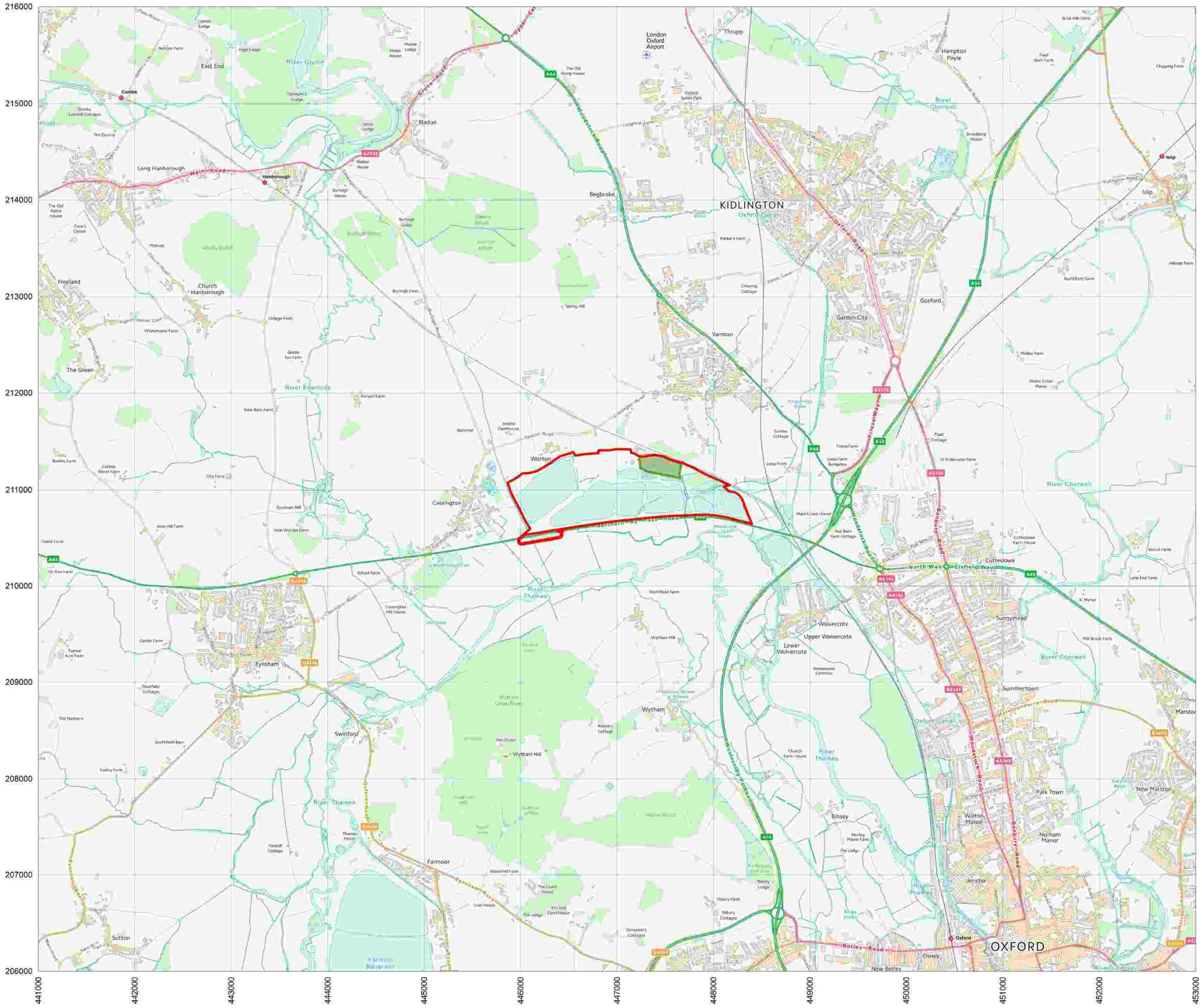
September 2019

Figures

BCL HYDRO
BCL Consultant Hydrogeologists Limited

Technology Centre, Wolverhampton Science Park, Glashier Drive, Wolverhampton
West Midlands, WV10 9RU. Tel: 01902 824111, Fax: 01902 824112
email: info@bclhydro.co.uk, web: http://www.bclhydro.co.uk
Registered Office: 33, Wolverhampton Road, Cannock, West Midlands, WV11 1AP
Registered in England & Wales. Company Registration Number: 4043373



Key

- Site Boundary
- Plant Area

Document ref. HN/CASS/HA/001/19

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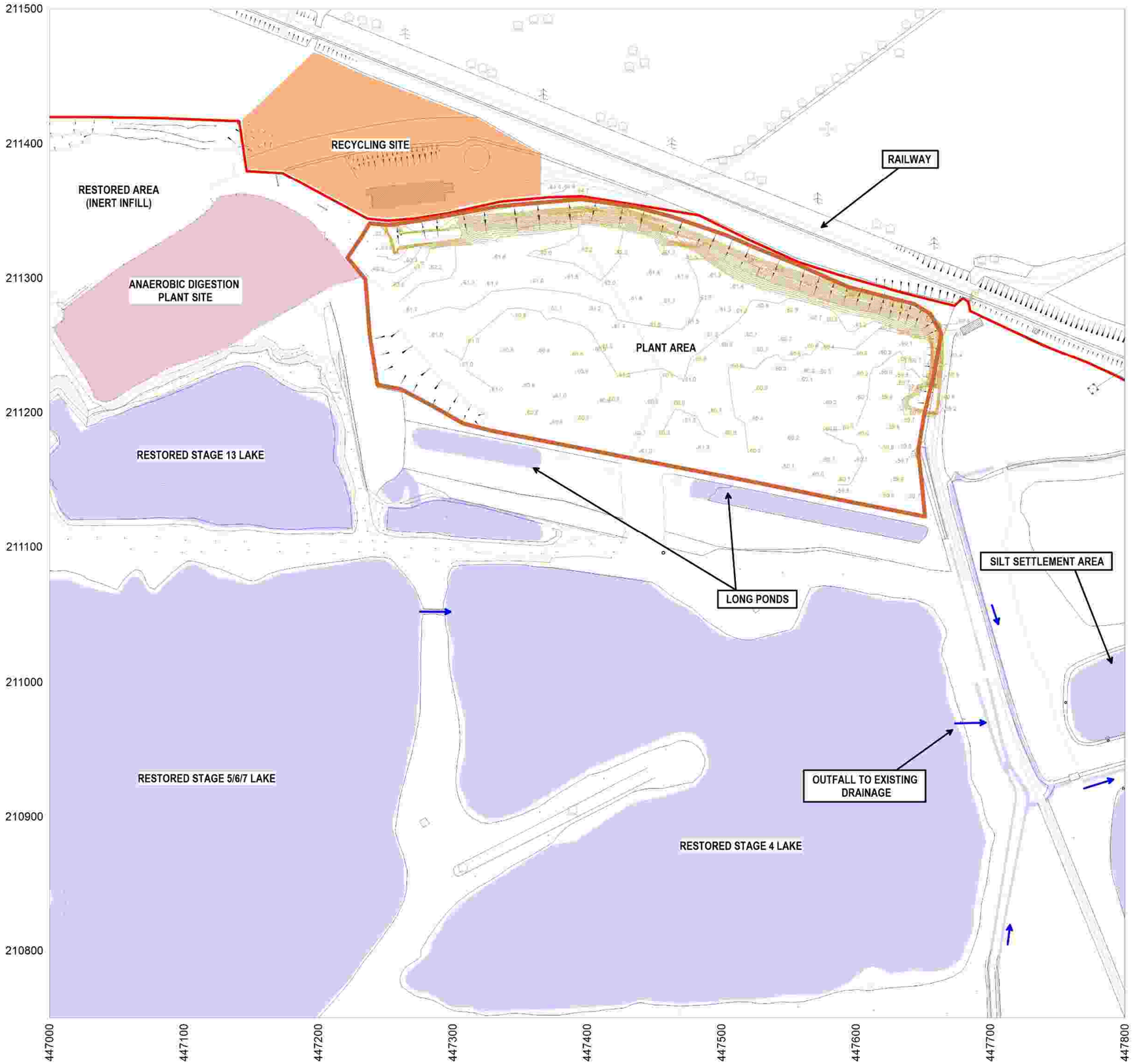
Figure 1: Site location plan

Drawn By: PB	Scale: 1:40,000
Date: Sep 19	Format: A3L



Key

- Site Boundary
- Plant Area

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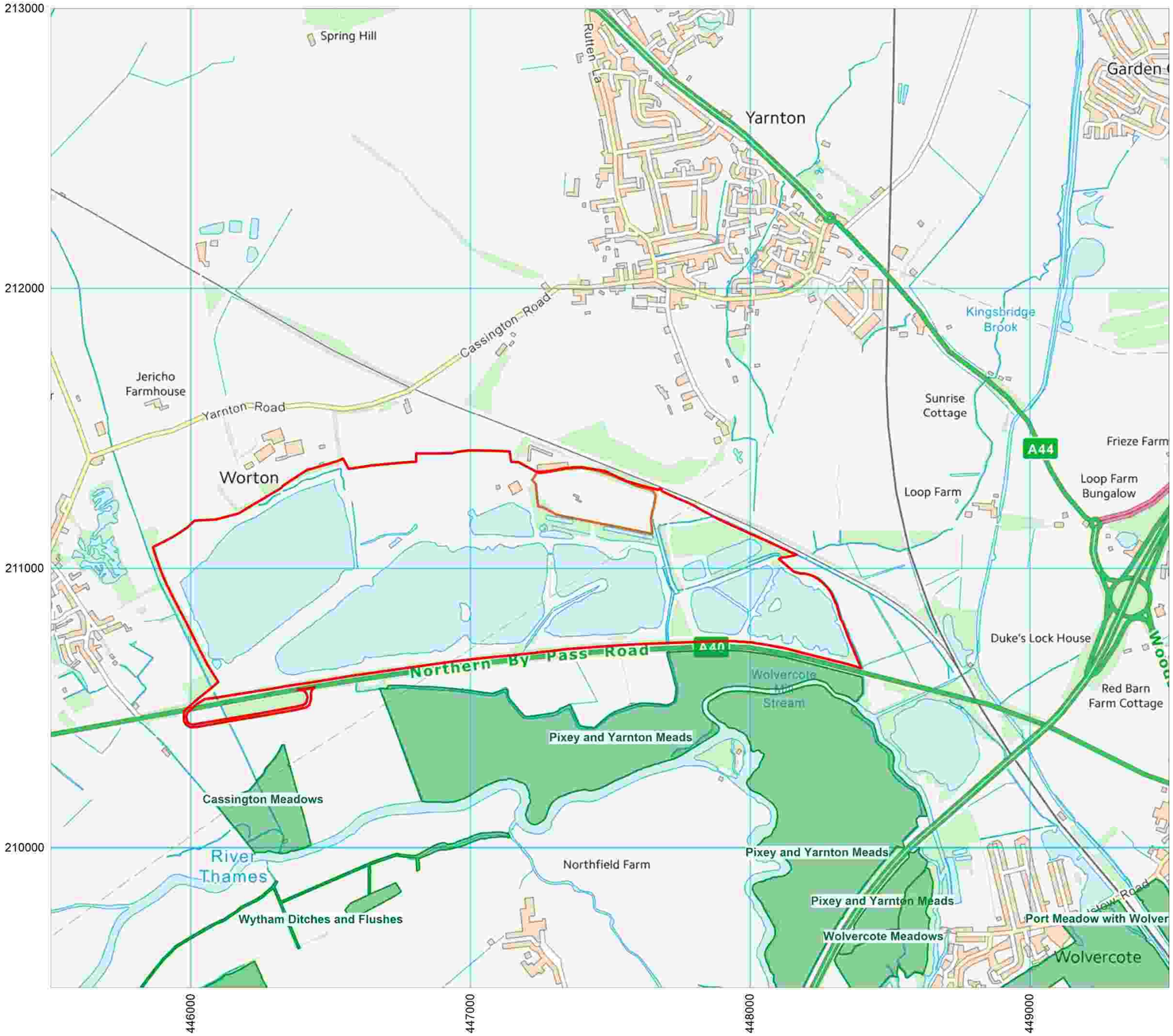
Figure 2: Site layout

Drawn By: PB	Scale: 1:3,000
Date: Sep 19	Format: A3L



Key

- Site Boundary
- Plant Area
- Protected site

Document ref. HN/CASS/HA/001/19

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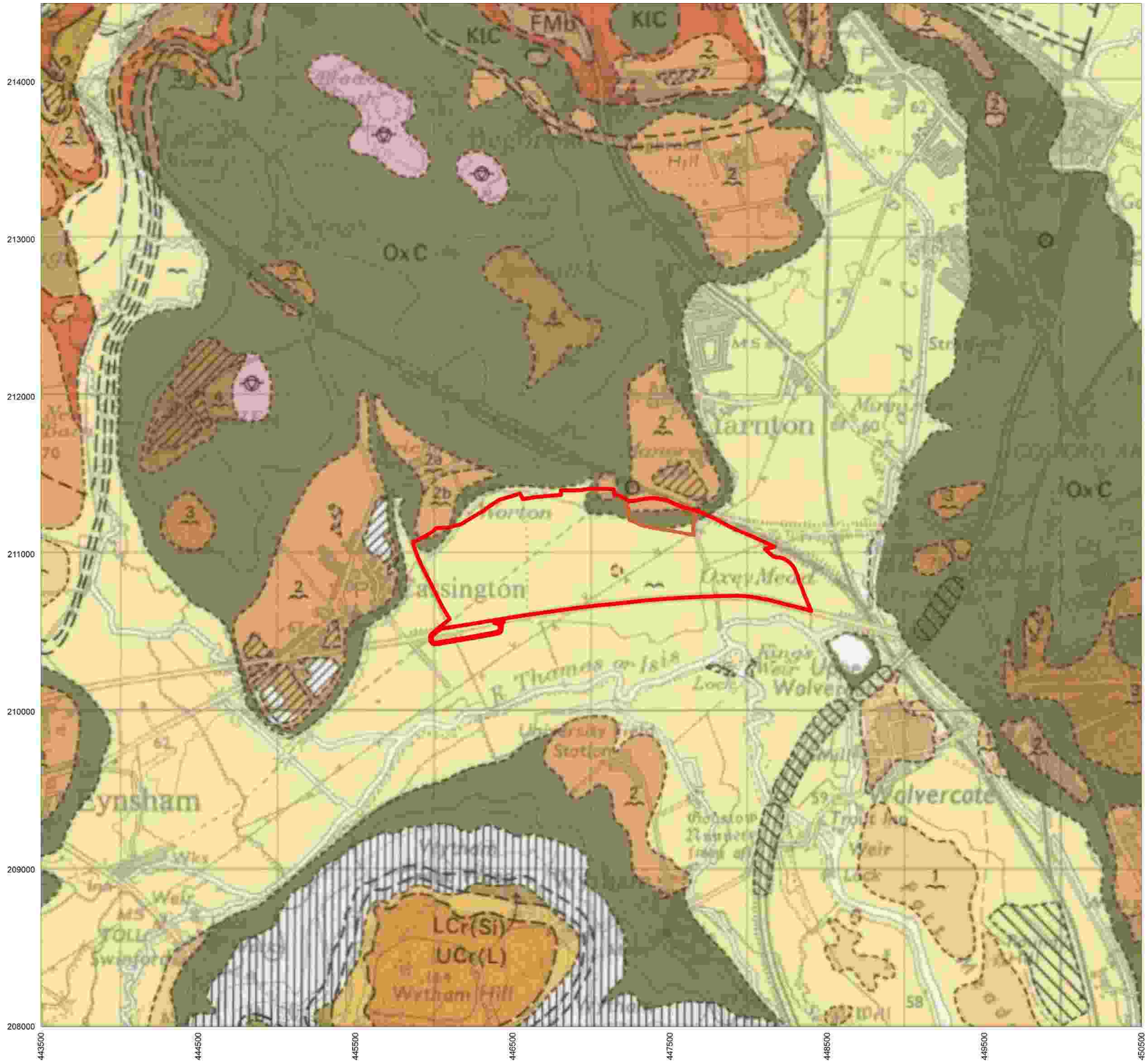
Figure 3: Protected sites of ecological importance

Drawn By: PB	Scale: 1:15,000
Date: Sep 19	Format: A3L

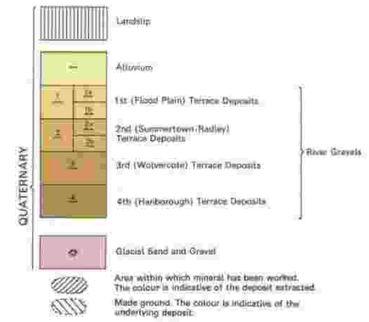


Key

Site Boundary

Plant Area

BGS Map 236 Witney drift symbols, colours and generalized vertical section



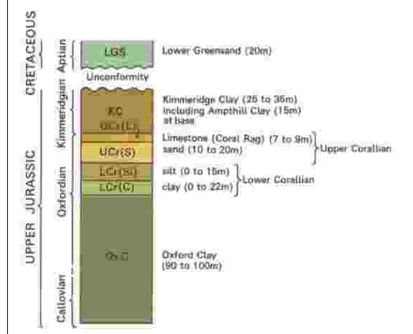


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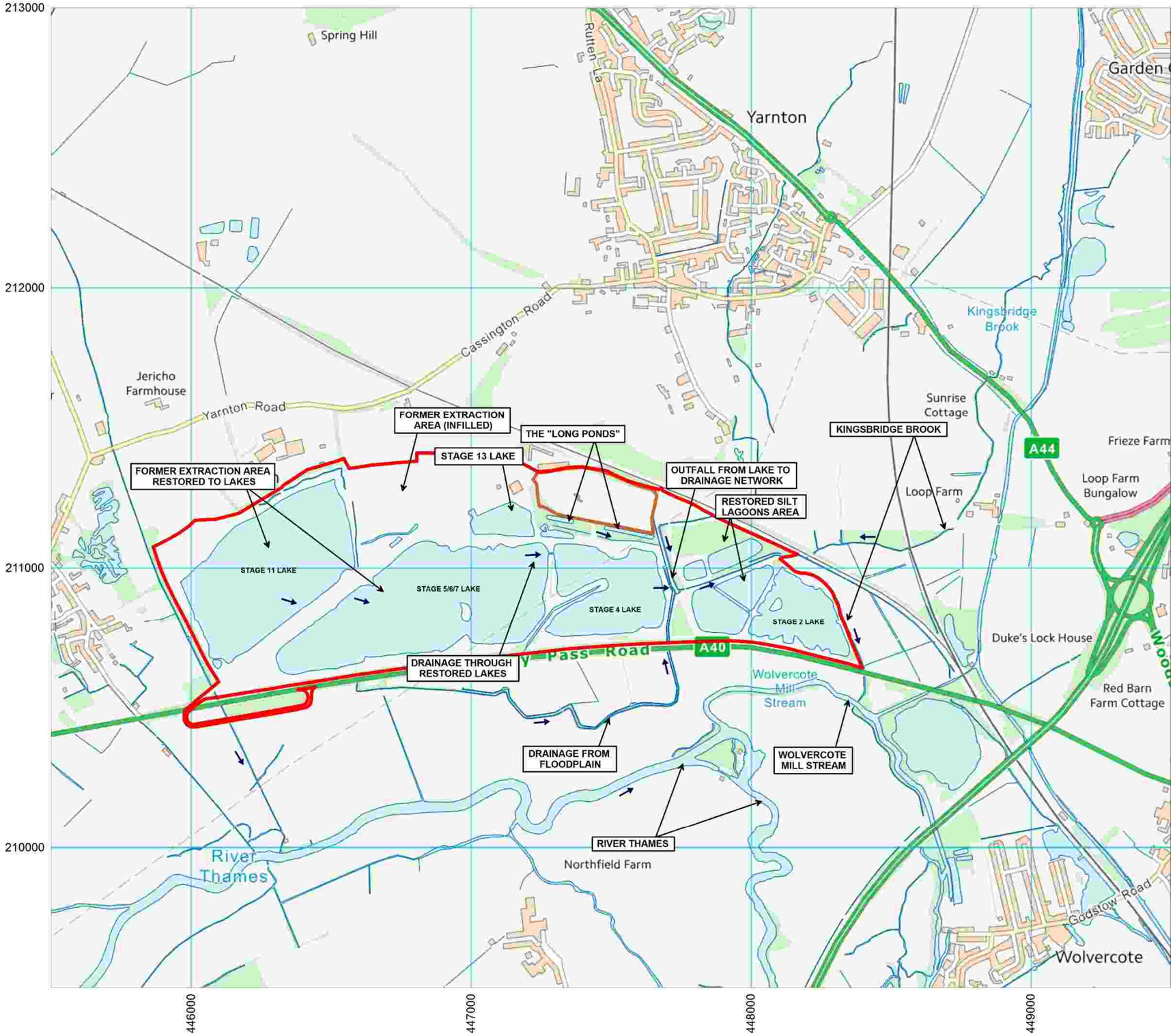
Figure 4: Regional geology (extract of map 236 Witney)

Drawn By: PB	Scale: 1:25,000
Date: Sep 19	Format: A3L



Key

- Site Boundary
- Plant Area
- Drainage direction

Document ref. HN/CASS/HA/001/19

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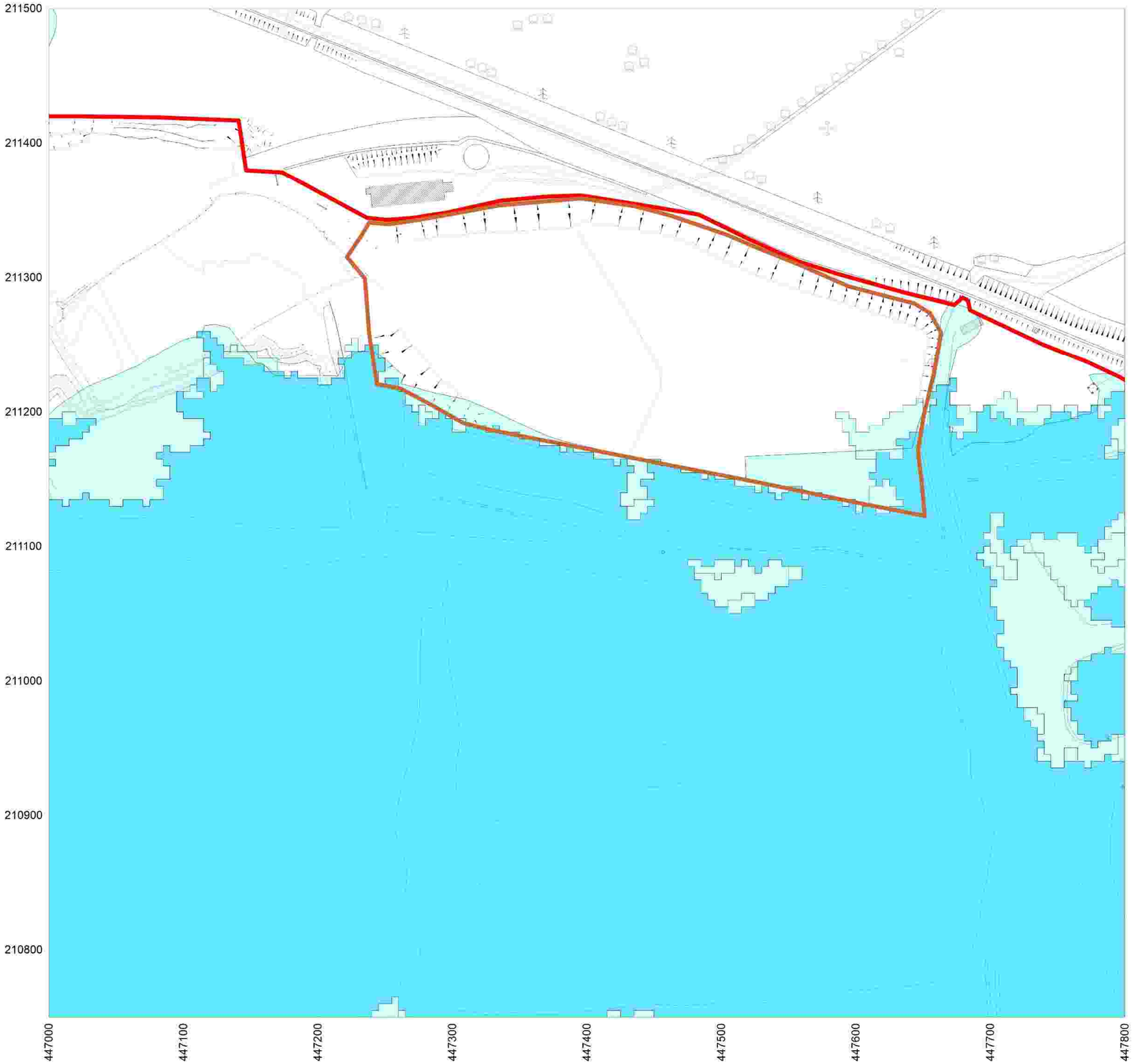
Figure 5: Local drainage and water features

Drawn By: PB	Scale: 1:15,000
Date: Sep 19	Format: A3L



Key

- Site Boundary
- Plant Area
- Flood Risk Zone 3 (FRZ3)
- Flood Risk Zone 2 (FRZ2)

Document ref. HN/CASS/HA/001/19

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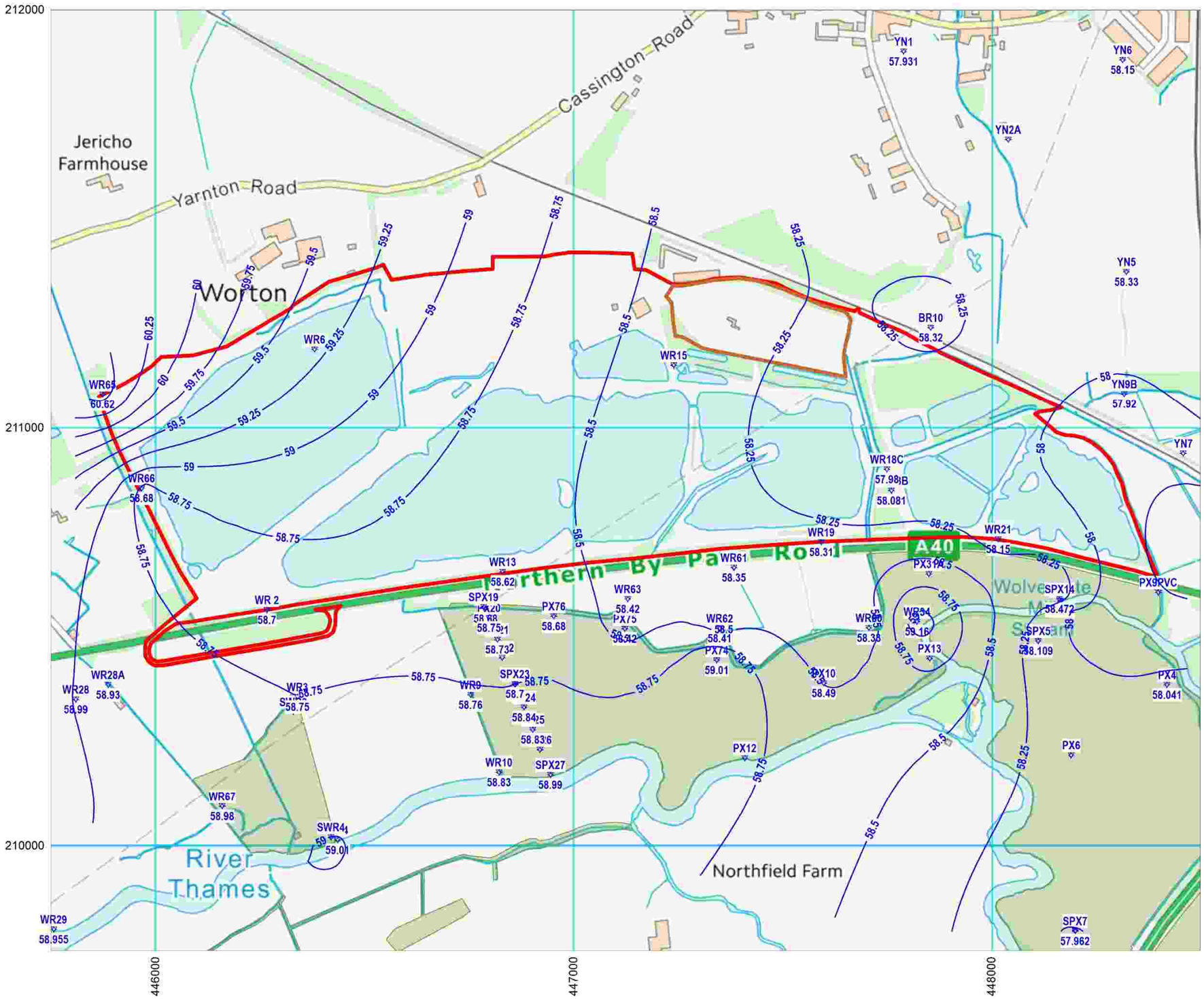
Figure 6: Flood Mapping data (extract of Environment Agency data - Sept 19)

Drawn By: PB	Scale: 1:3,000
Date: Sep 19	Format: A3L



Key

- Site Boundary
- Plant Area
- Protected Site
- Groundwater monitoring point and ID
- Groundwater contour (maOD)

Document ref. HN/CASS/HA/001/19

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Figure 7: Groundwater contour plot (Sand and gravel aquifer : May 19)

Drawn By: PB	Scale: 1:10,000
Date: Sep 19	Format: A3L

KEY:

- S73 planning boundary
- Land not in Hanson control
- Lake margin/amenity grassland
- Agricultural land
- Woodland/plantations/scrub
- Reed beds
- Shallow water margins
- Deeper water
- Restoration contours

ALL LEVELS IN METRES ABOVE ORDNANCE DATUM

Hanson HEIDELBERGCEMENT Group

Site: Cassington Quarry

Title: Composite Restoration Scheme

Scale	1:5000 @ A1	Date	Sept '11	Drawing No.
Drawn by	AC	Checked by	DMcD	W92m/133

Key:

- Cross Sections
- Fencing and Gates
- Proposed Restoration Contours
- ExistingConsent Area
- Existing Tree and Shrub Vegetation
- Areas to be Restored to Agricultural Grassland
- Existing Water Bodies
- Proposed New Pond Complex
- Proposed Tree and Shrub Planting
- Lake Shallows/ Reed Bed
- Areas to be Restored to Conservation Grassland

Anglo-Saxon Burial Ground

Path

Dismantled Railway

Drain

(DRY SILT

PIPE INVERTS 1–58.2 2–58.2 3–58.2

PIPE V 58.25

WL 58. (17/4/

BH

58.73

59.15

0 m 40 m 80 m 120 m 160 m 200 m

Scale Bar 1: 2000

rev:	date:	details:
C	04/06/19	(SD)Addition of Fence line and pond
B	22/05/19	(SD)Addition of Cross Sections
A	13/05/19	(SD)Addition of Proposed Trees

corylus Planning & Environmental Ltd.
The Old Dairy
Yanworth
Cheltenham
Gloucestershire
GL54 3LQ
tel: 01285 721072

client: Hanson

project: Cassington Quarry

title: Revised Restoration Scheme For Former Plant Site

scale:	date:	drawn by:	checked by:	size:
1:2000	13/05/19	SD	AW	A3

Project ref:	dwg no:	rev:
C4/HAN/05	C4/HAN/05/4	C

HN/CASS/HA/001/19

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Cassington Quarry

Yarnton, Oxfordshire

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Appendix 1 Guidance & Information Sources

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BCL Consultant Hydrogeologists Limited

Technology Centre, Wolverhampton Science Park, Glashier Drive, Wolverhampton
West Midlands, WV10 9RU. Tel: 01902 824111, Fax: 01902 824112
email: info@bclhydro.co.uk, web: http://www.bclhydro.co.uk
Registered Office: 33, Wolverhampton Road, Cannock, West Midlands, WV11 1AP
Registered in England & Wales. Company Registration Number: 4043373

Regulatory & Industry Standard Guidance & Methodologies & Literature References

i. “National Planning Policy Framework” (NPPF: Department for Communities and Local Government [DCLG], March 2012).
ii. “Planning Practice Guidance to the National Planning Policy Framework” (PPG_NPPF: DCLG, March 2014).
iii. “Hydrogeological Impact Appraisal for Dewatering Abstractions Environment Agency - Science Report (SC040020/SR1)”. Water Resource Consultants for the Environment Agency, April 2007.
iv. "Flood Risk and Coastal Change", Planning Practice Guidance (PPG), DCLG / Department for the Environment Food and Rural Affairs (DEFRA), 6th March 2014
v. “Flood Estimation Handbook CD-ROM, Version 3.0 (FEH CD-ROM No.3)”, Centre for Ecology and Hydrology (CEH; formerly the Institute of Hydrology), 2009 and successor web-service.
vi. “The Calculation of Actual Evaporation and Soil Moisture Deficit over Specified Catchment Areas”, Grindley J, November 1969, Hydrological Memorandum 38, Meteorological Office, Bracknell, UK.
vii. “Estimation of Open Water Evaporation, Guidance for Environment Agency Practitioners”, R&D Handbook W6-043/HB, Finch JW and Hall RL, October 2001;
viii. “Technical Management of Water in the Coal Mining Industry”, National Coal Board (NCB), 1982;
ix. "Techniques for the Interpretation of Landfill Monitoring Data” (Guidance Notes), EA Final technical report P1-471, 2002.
x. On-line Flood Mapping Service, Environment Agency, Sept 2019.
xi. "Groundwater Protection: Principles and Practice (GP3)" Version 1.1, EA, August 2013.
xii. “Some Physical Properties of Sand and Gravels”, Hazen A., 1893, Massachusetts State Board of Health, 24th Annual Report.
xiii. “Control of groundwater for temporary works”, Somerville, S.H. 1986, Construction Industry Research and Information Association (CIRIA) report no. 113.
xiv. "Groundwater Hydrology”, D K Todd, 1980

Published Data Sources

i. Ordnance Survey (OS): Topographic maps at scales of 1:50,000 and 1:25,000.
ii. OS open-source digital data (Meridian 2, Panorama & Terra50 data-sets).
iii. British Geological Survey (BGS): Published 1:50,000 scale solid and drift geological mapping, sheet-no’s. 236 (Witney).
iv. BGS Geoindex, well details and borehole logs, 2019.
v. Environment Agency (EA) , August 2019:
   - Source Protection Zone (SPZ) spatial mapping data;
   - Licensed abstractions;
   - Flooding spatial mapping data;
   - Local rainfall data, and;
   - Water Framework Directive Catchment Mapping, Cycle 2.
vi. Natural England (NE): Spatial mapping & citation information for Designated Sites of ecological interest (Sites of Special Scientific Interest [SSSI’s] & Special Areas of Conservancy [SAC’s]);
vii. Geoindex, well details and borehole logs and On-line Lexicon of Named Rock Units, BGS;

viii. Spatial mapping & citation information for Designated Sites of ecological interest (Sites of Special Scientific Interest [SSSI's] & Special Areas of Conservancy [SAC's]), Natural England (NE);

ix. "*The Physical Properties of Major Aquifers in England and Wales*", EA & BGS, Allen D.J, Brewerton L.J, Coleby L.M, Gibbs B.R, Lewis M.A, McDonald A.M, Wagstaff S.J, Williams A.T, 1997;

x. "*Climate & Drainage*", Technical Bulletin No. 34, Ministry of Agriculture Fisheries & Food (MAFF), September 1976.

Site Specific Data Sources

i. "*Worton Rectory Farm (Oxon). Feasibility study on the likely effects of proposed gravel scheme on Yarnton and Pixey Meads SSSI*", Institute of Hydrology for Hanson, July 1987.

ii. "*Cassington Quarry, Yarnton, Oxfordshire. Pump Test of Stage 4 Lake. Results of Testing: April 2019*", BCL Consultant Hydrogeologists Limited for Hanson, April 2019.

iii. Groundwater level data from Site piezometers, 1980 to 2017.

iv. Plant Area trial pit results – drawing W192m138, Hanson.

Hanson Aggregates Europe Limited

Cassington Quarry

Yarnton, Oxfordshire

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Appendix 2 BGS drill logs and Plant Area trial pits

BCL HYDRO
BCL Consultant Hydrogeologists Limited

Technology Centre, Wolverhampton Science Park, Glashier Drive, Wolverhampton
West Midlands, WV10 9RU. Tel: 01902 824111, Fax: 01902 824112
email: info@bclhydro.co.uk, web: http://www.bclhydro.co.uk
Registered Office: 33, Wolverhampton Road, Cannock, West Midlands, WV11 1AP
Registered in England & Wales. Company Registration Number: 4043373

BGS BOREHOLE RECORD SP49SE_121 (located to northwest of Plant Area)

SP49SE 121

Record of Borehole No. P3

Sheet 1 of 2

Location OXFORD A40

Client DEPARTMENT OF TRANSPORT
N : 211 190
E : 447 856

Type of boring LIGHT CABLE PERCUSSION (PILCON 150)

Job No. 11311028 Ground level 59.23m O.D. Diameter / 150mm to 19.40m Casing / 150mm to 6.10m

Daily Progress	Ground water levels	Depth of casing	Samples: Depth	No.	Type	Scale	Strata: Depth	Reduced level	Description of strata	Geology
11.7.86							0.30	58.93	TOPSOIL.	
			0.40	1	D		(0.45)			
			0.50 - 0.95	2	U(19)				Firm mottled brown, greys and reddy brown silty slightly sandy CLAY (CH) with some sub-rounded to sub-angular fine flint gravel.	ALLUVIUM
	1.55 ▼ (Seepage)		0.95 - 1.10	3	D		0.75	58.48		
							(0.65)		Stiff friable greyish brown very sandy silty CLAY with pockets of brown clayey sand.	
			1.40 - 1.85	4	D		1.40	57.83		
					C(53)		(0.60)			
			1.90	30	W		2.00	57.23	Very dense greyish brown very clayey silty fine to coarse SAND with a little rounded to sub-angular fine flint gravel.	
			2.50 - 2.95	5	B C(37)				Dense slightly sandy sub-angular to angular fine to medium with a little coarse flint GRAVEL.	FLOOD PLAIN GRAVEL
							(1.60)			
			3.40 - 3.85	6	B C(25)		3.60	55.63		
			4.10 - 4.55	8	U(58)				Stiff brown sandy silty CLAY with sub-rounded to sub-angular fine to coarse flint gravel and pockets of brown very clayey silty gravelly sand and soft claybound gravel.	
							(1.30)			
			4.55 - 4.70	9	D					
			4.95	10	D		4.90	54.33		
			5.00 - 5.45	11	U(51)		5.10	54.13	Firm horizontally thinly laminated dark olive grey mottled brown slightly calcareous silty CLAY with small pockets of brown medium to coarse sand.	WEATHERED OXFORD CLAY
			5.45 - 5.60	12	D					
		6.10	6.00	13	D		(2.40)		Stiff horizontally thinly laminated closely fissured slightly calcareous silty CLAY (CH) with traces of shell fragments.	
			6.50 - 6.95	14	U(31)					
			6.95 - 7.00	15	D					
			7.50	16	D		7.50	51.73	? ?	
			8.00 - 8.45	17	U(35)				Very stiff horizontally thinly laminated closely fissured dark olive grey occasionally slightly calcareous silty CLAY (CH) with traces of shell fragments (inc. Jurassic Worms and Ammonites)and traces of pyrites.	UNWEATHERED OXFORD CLAY
			8.45 - 8.50	18	D					
			9.00	19	D		(2.50)			
			9.50 - 9.95	20	U(43)					
			9.95 - 10.00	21	D		10.00	49.23	(BOREHOLE Continues...)	

Key

U.... undisturbed 102mm diameter sample
D.... disturbed jar sample
B.... disturbed bulk sample
W.... water sample
S( ). standard penetration test
C( ). cone penetration test
(33).. number of blows ('N' value)
▼.. groundwater encountered

Remarks

Water added from 1.55 to 3.60m to assist boring.
Piezometer installed at 10.00m in sand cell from 9.00 to 11.00m.
U4 No. 8 : 130mm Recovery.
U4 No. 11 : 360mm Recovery.
Remainder : full Recovery.

GROUND ENGINEERING

GE 3035

SP 41SE 121

Record of Borehole No. P3

Sheet 2 of 2

Location OXFORD A40

Client DEPARTMENT OF TRANSPORT
N : 211 190
E : 447 856

Type of boring LIGHT CABLE PERCUSSION (PILCON 150)

Job No. 11311028 Ground level 59.23m O.D. Diameter / 150mm to 19.40m Casing / 150mm to 6.10m

Daily Progress	Ground water levels	Depth of casing	Samples: Depth	No.	Type	Scale	Strata: Depth	Reduced level	Description of strata	Geology
									continued from sheet 1/2, i.e	
							10.00	49.23	Very stiff horizontally thinly laminated closely fissured dark olive grey occasionally slightly calcareous silty CLAY (CH) with traces of shell fragments, and traces of pyrites.	UNWEATHERED OXFORD CLAY
			10.50	22	D		(1.05)			
			11.00 - 11.10	N/R	U(100)					
			11.10 - 11.20	N/R	S(105)		11.05	48.18		
			11.00 - 11.40	23	B		(0.25)		Dark grey fine grained strong argillaceous LIMESTONE.	
			11.40 - 11.85	24	U(43)		11.30	47.93		
									Very stiff horizontally thinly laminated closely fissured dark olive grey silty CLAY (CH) with occasional shells and shell fragments (inc. Jurassic Worms and ammonites) along laminations.	
			11.85 - 11.90	25	D		(1.05)			
			12.00	26	D					
			12.30	N/R	S(50)*2					
			12.50		C(50)*2		12.35			
(12.70)	12.10	6.10					(0.45)		Dark grey fine grained strong argillaceous LIMESTONE	
12.7.86	11.90	6.10	12.35 - 12.70	27	B		12.80			
			12.90 - 13.35	28	U(58)				Stiff horizontally thinly laminated closely fissured olive grey silty CLAY (CH) with traces of shell fragments.	
			13.35 - 13.40	29	D					
(13.40)	DRY	6.10								
14.7.86	1.90	6.10								
			13.90	31	D		(2.45)			
			14.50 - 14.95	32	U (51)					
			14.95 - 15.00	33	D					
							15.25	43.98		
			15.50	34	D				Very stiff horizontally thinly laminated closely fissured dark olive grey very silty CLAY (CH) with layers and pockets of dark greyish grey clayey silty fine sand, and traces of shell fragments.	KELLAWAYS SAND / OXFORD CLAY TRANSITION
			16.00 - 16.45	35	U(56)					
			16.45 - 16.50	36	D		(2.25)			
			17.00	37	D					
			17.50 - 17.60	38	U(100)		17.50	41.73		
			17.60 - 17.65	39	D				Very dense occasionally very weakly cemented (calcareous) dark olive grey silty fine SAND.	KELLAWAYS SAND
			17.65	N/R	S(50)*4					
			17.65 - 18.30	40	D					
			18.10	N/R	U(100)					
			18.15 - 18.30	N/R	S(50)*5					
			18.50 - 18.95	41	D					
			18.50 - 19.10	42	S(94)		(1.70)			
			18.50 - 19.10	42	B					
			19.10 - 19.35	43	U(100)		19.20	40.03		
(19.40)	10.10	6.10	19.35 - 19.40	44	D		(0.20)		Very stiff horizontally thinly laminated closely fissured dark grey very silty CLAY (CH) with occasional light grey clayey fine sand pockets and partings, and occasional traces of shell fragments.	KELLAWAYS CLAY
			19.40 - 20.00	45	D		19.40	39.83		
					S(*)6				BOREHOLE COMPLETED AT 19.40m.	

Key

U.... undisturbed 102mm diameter sample
D.... disturbed jar sample
B.... disturbed bulk sample
W.... water sample
S( ). standard penetration test
C( ). cone penetration test
(33).. number of blows ('N' value)
▽.. groundwater encountered

Remarks

Chiselling through limestone from 11.05 to 11.30m and 12.35 to 12.80m.

*1 105 blows for 100mm in "seating"
*2 50 blows for 20 mm in "seating"
*3 50 blows for 30 mm in "seating"
*4 50 blows for 70 mm in "seating"
*5 50 blows for 12 mm .
*6 blows were 8,7-12,15,15,20,28,28. (15 for "seating").

U4 No. 35 : 330mm Recovery.
U4 No. 38 : 60mm Recovery.
U4 No. 43 : 200mm Recovery.
Remainder > 400mm Recovery.

GROUND ENGINEERING

GE 3035

C:\All Work\Geodrill\Hanson\1-Roger Griffiths Bit Plan\W92m138 (Plant Site Trial Pit Survey).dwg

Level Crossing

Anglian Water Authority

20m from Weighbridge

Resource Block B

Resource Block E

Resource Block E
= 59,880t saleable

Resource Block B
= 68,500t saleable

Inferred Edge of Previous Backfill Area

BH 59.33

BH 58.11 (17/4/01)

0815/01	1.8 / 0.4 / 0.3+	0815/09	0.6 / 3.44
0815/02	0.2 / 0.4 / 0.3+	0815/10A	1.0(c)
0815/03	1.2 / 0.2 / 0.3+	0815/10B	1.0(c)
0815/04	0.4 / 1.2 / 0.3+	0815/11	0.1 / 1.7 / 0.6 SIR / 1.2+
0815/05	0.2 / 1.4 / 0.3+	0815/12	0.3 / 0.9 / 0.3+
0815/06	0.2 / 1.6 / 0.3+	0815/13	1.7 / 2.0+
0815/07	0.4 / 1.2 / 0.3+	0815/14	1.5 / 0.3 / 0.3+
0815/08	0.45 / 1.25 / 0.3+	0815/15	0.3 / 3.5+
		0815/16	0.4 / 3.0 / 0.3+
		0815/17	0.2 / 0.4(c) / 2.5 / 0.3+

Legend

Made Ground / Backfill

In-Situ Sand & Gravel (c=cemented)

Basal Clay

1.8 / 0.4 / 0.3+

Productive Area

Barren Area
Likely Previous Backfill

Trial Pit Location
10th August 2015

0815/01

Hanson Building Products

Cassington Quarry

Plant Site Trial Pit Survey
August 2015

Scale	1:2,000 @ A3	Date	Oct '15
Drawn by	SOT	Checked by	RDG
Drawing No.	W92m/138		

Hanson Aggregates Europe Limited

Cassington Quarry

Yarnton, Oxfordshire

Section 73 Application - Revision to approved Restoration Scheme

Hydrological Assessment

Final Report
September 2019

Appendix 3 Rainfall data and SUDS calculations

BCL HYDRO
BCL Consultant Hydrogeologists Limited

Technology Centre, Wolverhampton Science Park, Glashier Drive, Wolverhampton
West Midlands, WV10 9RU. Tel: 01902 824111, Fax: 01902 824112
email: info@bclhydro.co.uk, web: http://www.bclhydro.co.uk
Registered Office: 33, Wolverhampton Road, Cannock, West Midlands, WV11 1AP
Registered in England & Wales. Company Registration Number: 4043373

EA Eynsham Raingauge (R37). NGR SP 44440 08670.

	Monthly total rainfall [mm]
1982	
Jul	8.25
Aug	0
Sep	0
Oct	91.75
Nov	83.25
Dec	71.75
1983	
Jan	51.25
Feb	18.75
Mar	40
Apr	91.5
May	98
Jun	8
Jul	26.75
Aug	16.75
Sep	53.5
Oct	52.25
Nov	3.25
Dec	0
1984	
Jan	69.5
Feb	0
Mar	38.25
Apr	0.5
May	58.75
Jun	15.75
Jul	0
Aug	0
Sep	71.5
Oct	50
Nov	123.75
Dec	0
1985	
Jan	49.5
Feb	38.25
Mar	52.5
Apr	33.25
May	87.5
Jun	130.75
Jul	56
Aug	42.25
Sep	14.5
Oct	45.25
Nov	38.4
Dec	0
1986	
Jan	46.4
Feb	0
Mar	61.6
Apr	73.6
May	47.8
Jun	31.8
Jul	49.6
Aug	0
Sep	27.4
Oct	77
Nov	75.6
Dec	0
1987	
Jan	7
Feb	36.2
Mar	57.2
Apr	62.2
May	54
Jun	101.2
Jul	38.8
Aug	29.2
Sep	27.2
Oct	122
Nov	62
Dec	20.8
1988	
Jan	114
Feb	37.2
Mar	65.6
Apr	0
May	56.6
Jun	79.8
Jul	78.6
Aug	50
Sep	44.8
Oct	42.4
Nov	35.4
Dec	16.2
1989	
Jan	32.2
Feb	65
Mar	46.6
Apr	54.2
May	12.8
Jun	64.6
Jul	40.4
Aug	10.2
Sep	0
Oct	72.4
Nov	35
Dec	177.6
1990	
Jan	74.4
Feb	87
Mar	14.8
Apr	24.4
May	11.4
Jun	62.6
Jul	20.2
Aug	9.4
Sep	11
Oct	61
Nov	27.1
Dec	47
1991	
Jan	69.2
Feb	20.2
Mar	59
Apr	69.6
May	8.4
Jun	102.2
Jul	115.6
Aug	7.4
Sep	76.2
Oct	31.4
Nov	63.2
Dec	17.2
1992	
Jan	39.8
Feb	21.2
Mar	41.8
Apr	55.8
May	84.8
Jun	48.2
Jul	75.6
Aug	123
Sep	110
Oct	84.2
Nov	114.6
Dec	38.8
1993	
Jan	73
Feb	5.2
Mar	30.6
Apr	80.4
May	59.4
Jun	41
Jul	58.4
Aug	28.6
Sep	98.2
Oct	81
Nov	45
Dec	100
1994	
Jan	81
Feb	55.4
Mar	40
Apr	42.4
May	76.8
Jun	14.4
Jul	24.6
Aug	51.8
Sep	56
Oct	47.8
Nov	52.6
Dec	71.6
1995	
Jan	105.8
Feb	57.8
Mar	47.2
Apr	20.6
May	47
Jun	5
Jul	19.4
Aug	5.6
Sep	90.8
Oct	36.4
Nov	85
Dec	94.8
1996	

Jan	30.2
Feb	56.6
Mar	30.2
Apr	51.4
May	35.2
Jun	14.2
Jul	30.6
Aug	34.8
Sep	27
Oct	38
Nov	74.6
Dec	20.6
1997	
Jan	7.6
Feb	67.2
Mar	8
Apr	16
May	81.4
Jun	76.8
Jul	23.8
Aug	119
Sep	19.2
Oct	54.4
Nov	96.2
Dec	51.4
1998	
Jan	57.8
Feb	10
Mar	61
Apr	104.2
May	19.8
Jun	64
Jul	22
Aug	31
Sep	0
Oct	0
Nov	0
Dec	0
1999	
Jan	0
Feb	0
Mar	0
Apr	0
May	0
Jun	0
Jul	0
Aug	30.2
Sep	83.6
Oct	64.6
Nov	35
Dec	89.2
2000	
Jan	19.6
Feb	73.4
Mar	12.2
Apr	148.6
May	81.4
Jun	29.8
Jul	24
Aug	63
Sep	86.4
Oct	111.6
Nov	94
Dec	113
2001	
Jan	55.2
Feb	74
Mar	70.2
Apr	73.8
May	34.6
Jun	21
Jul	54.4
Aug	99
Sep	34
Oct	94.6
Nov	41
Dec	21.4
2002	
Jan	56.8
Feb	70.8
Mar	30.4
Apr	39.4
May	64.4
Jun	38.8
Jul	85.8
Aug	46.6
Sep	21.2
Oct	122.8
Nov	117.2
Dec	91.4
2003	
Jan	69
Feb	12.8
Mar	27.4
Apr	40.4
May	54
Jun	49.2
Jul	52
Aug	8.4
Sep	16.6
Oct	26.2
Nov	76.8
Dec	67
2004	
Jan	57.8
Feb	25
Mar	37.6
Apr	61.6
May	32.8
Jun	21
Jul	42
Aug	121.8
Sep	28.8
Oct	112.2
Nov	31.2
Dec	36.4
2005	
Jan	18.4
Feb	15
Mar	45
Apr	47.2
May	36
Jun	56.2
Jul	41.8
Aug	31.4
Sep	30.4
Oct	37.6
Nov	30
Dec	38.2
2006	
Jan	10.4
Feb	19.6
Mar	62
Apr	27
May	72.6
Jun	6.8
Jul	79
Aug	62.2
Sep	91.2
Oct	82.6
Nov	10.6
Dec	61.2
2007	
Jan	72.2
Feb	70.4
Mar	44.6
Apr	2.4
May	126.8
Jun	79.6
Jul	125.6
Aug	39
Sep	13.6
Oct	76.4
Nov	54.8
Dec	61.6
2008	
Jan	83.8
Feb	17.4
Mar	73
Apr	44.8
May	98.4
Jun	56.6
Jul	0
Aug	39.6
Sep	46.2
Oct	33.8
Nov	76
Dec	41.8
2009	
Jan	0.6
Feb	0.6
Mar	16
Apr	35.4
May	46.6
Jun	62.4
Jul	79.8
Aug	38.6
Sep	8
Oct	43.8
Nov	99.6
Dec	69.2
2010	
Jan	56
Feb	56.6

Mar	45.4
Apr	18.8
May	30.6
Jun	36.2
Jul	12
Aug	111.6
Sep	40.8
Oct	35.2
Nov	16
Dec	0
2011	
Jan	0
Feb	0
Mar	0
Apr	0.2
May	43.6
Jun	33.8
Jul	30.2
Aug	72.6
Sep	26
Oct	26.8
Nov	25.2
Dec	68.6
2012	
Jan	33.2
Feb	21.6
Mar	20.8
Apr	123.6
May	31.6
Jun	131.8
Jul	76.2
Aug	65.8
Sep	56.6
Oct	87
Nov	94
Dec	98.6
2013	
Jan	58.6
Feb	47.4
Mar	65
Apr	22.6
May	56.2
Jun	7
Jul	31.6
Aug	20.2
Sep	40.8
Oct	83.8
Nov	48.8
Dec	88.6
2014	
Jan	118.4
Feb	52.2
Mar	32
Apr	1
May	67.2
Jun	39.4
Jul	54
Aug	91.8
Sep	3.4
Oct	65.4
Nov	85.4
Dec	41
2015	
Jan	55.8
Feb	43.4
Mar	27.6
Apr	19.2
May	52.2
Jun	30.4
Jul	55.4
Aug	56.8
Sep	33.2
Oct	52.8
Nov	66.8
Dec	61.2
2016	
Jan	83
Feb	45.8
Mar	70.6
Apr	45.4
May	66.4
Jun	77.4
Jul	6.8
Aug	32
Sep	39.8
Oct	17.4
Nov	78.2
Dec	26.6
2017	
Jan	62.4
Feb	27
Mar	19.6
Apr	5.8
May	61.6
Jun	35
Jul	42.8
Aug	64.6
Sep	70.2
Oct	13.4
Nov	48.8
Dec	78.4
2018	
Jan	55.2
Feb	19.4
Mar	86.4
Apr	50.4
May	87.2
Jun	0.8
Jul	12.2
Aug	32.6
Sep	22
Oct	42.2
Nov	48.4
Dec	58.4
2019	
Jan	18.8
Feb	35.4
Mar	29.4
Apr	22.4
May	8.6
Jun	4.4

HR Wallingford
Working with water

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	
Site name:	Cassington Quarry
Site location:	Plant Area

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the drainage scheme.

Site coordinates

Latitude:	51.79801° N
Longitude:	1.31376° W
Reference:	
Date:	2019-09-13 16:19

Methodology	IH124

Site characteristics

Total site area (ha)	6.9
Significant public open space (ha)	0
Area positively drained (ha)	6.9
Pervious area contribution (%)	30
Impermeable area (ha)	06.9
Percentage of drained area that is impermeable (%)	100
Impervious area drained via infiltration (ha)	0
Return period for infiltration system design (year)	10
Impervious area drained to rainwater harvesting systems (ha)	0
Return period for rainwater harvesting system design (year)	10
Compliance factor for rainwater harvesting system design (%)	66
Net site area for storage volume design (ha)	6.9
Net impermeable area for storage volume design (ha)	6.9

* Where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50 % of the 'area positively drained', the 'net site area' and the estimates of Qbar and other flow rates will have been reduced accordingly.

Design criteria

Volume control approach	Use long term storage

	Default	Edited
Climate change allowance factor	1.4	1.4
Urban creep allowance factor	1.1	1.1
Interception rainfall depth (mm)	5	5
Minimum flow rate (l/s)	5	5

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
Qbar total site area (l/s)	1.01	–
SOIL type	1	1
HOST class	N/A	N/A
SPR	0.1	0.1

Hydrology

	Default	Edited
SAAR (mm)	622	622
M5-60 Rainfall Depth (mm)	20	20
'r' Ratio M5-60/M5-2 day	0.4	0.4
Rainfall 100 yrs 6 hrs	63	
Rainfall 100 yrs 12 hrs	83.16	
FEH/FSR conversion factor	1.08	1.08
Hydrological region	6	
Growth curve factor: 1 year	0.85	0.85
Growth curve factor: 10 year	1.62	1.62
Growth curve factor: 30 year	2.3	2.3
Growth curve factor: 100 year	3.19	3.19

Site discharge rates

	Default	Edited
Qbar total site area (l/s)	1.01	1.01
Qbar net site area (l/s)	1.01	1.01
1 in 1 year (l/s)	13.8	13.8
1 in 30 years (l/s)	13.8	13.8
1 in 100 years (l/s)	13.8	13.8

Estimated storage volumes

	Default	Edited
Interception storage (m^3)	276	276
Attenuation storage (m^3)	7059	7059
Long term storage (m^3)	0	0
Treatment storage (m^3)	828	828
Total storage *(excluding treatment)* (m^3)	7335	7335

Hanson Aggregates Europe Limited

Cassington Quarry

Yarnton, Oxfordshire

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Hydrological Assessment

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Appendix 4 Environment Agency Flood Product 4 data

BCL HYDRO
BCL Consultant Hydrogeologists Limited

Technology Centre, Wolverhampton Science Park, Glashier Drive, Wolverhampton
West Midlands, WV10 9RU. Tel: 01902 824111, Fax: 01902 824112
email: info@bclhydro.co.uk, web: http://www.bclhydro.co.uk
Registered Office: 33, Wolverhampton Road, Cannock, West Midlands, WV11 1AP
Registered in England & Wales. Company Registration Number: 4043373

Product 4 (Detailed Flood Risk) for Cassington Quarry, Yarnton, Oxon
Our Ref: THM141387

Product 4 is designed for developers where Flood Risk Standing Advice FRA (Flood Risk Assessment) Guidance Note 3 Applies. This is:

i) "all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq metres; and all domestic extensions", and
ii) "all applications with a site area greater than 1 ha" in Flood Zone 2.

Product 4 includes the following information:

Ordnance Survey 1:25k colour raster base mapping;
Flood Zone 2 and Flood Zone 3;
Relevant model node locations and unique identifiers (for cross referencing to the water levels, depths and flows table);
Model extents showing *defended* scenarios;
FRA site boundary (where a suitable GIS layer is supplied);
Flood defence locations (where available/relevant) and unique identifiers; (supplied separately)
Flood Map areas benefiting from defences (where available/relevant);
Flood Map flood storage areas (where available/relevant);
Historic flood events outlines (where available/relevant, not the Historic Flood Map) and unique identifiers;
Statutory (Sealed) Main River (where available within map extents);

A table showing:

i) Model node X/Y coordinate locations, unique identifiers, and levels and flows for *defended* scenarios.
ii) Flood defence locations unique identifiers and attributes; (supplied seperately)
iii) Historic flood events outlines unique identifiers and attributes; and
iv) Local flood history data (where available/relevant).

Please note:

If you will be carrying out computer modelling as part of your Flood Risk Assessment, please request our guidance which sets out the requirements and best practice for computer river modelling.

This information is based on that currently available as of the date of this letter. You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

This information is provided subject to the enclosed notice which you should read.

This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at:

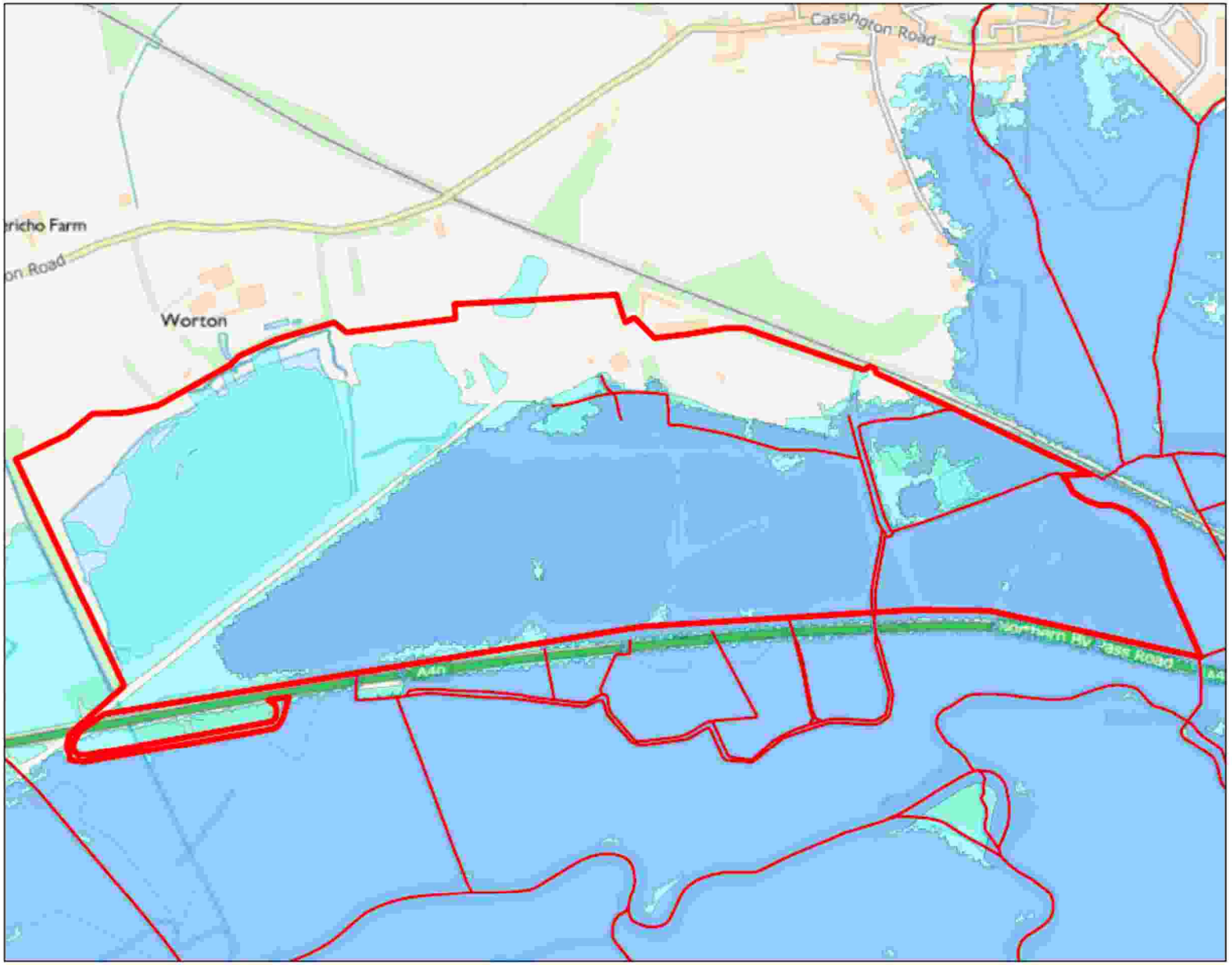
https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities

If you would like advice from us regarding your development proposals you can complete our pre application enquiry form which can be found at:

https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Red Kite House, Howbery Park, Wallingford, Oxon OX10 8BD
Customer services line: 08708 506 506
Email: WTenquiries@environment-agency.gov.uk

Flood Map for Planning centred on Cassington Quarry, Yarnton, Oxon
Created on 11/09/2019 REF:THM141387



Environment Agency

Kilometres

0 0.3 0.6

Legend

- Main River
- Flood defences
- Areas benefiting from flood defences
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)
- Flood Map - flood storage areas

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Defence information

THM141387

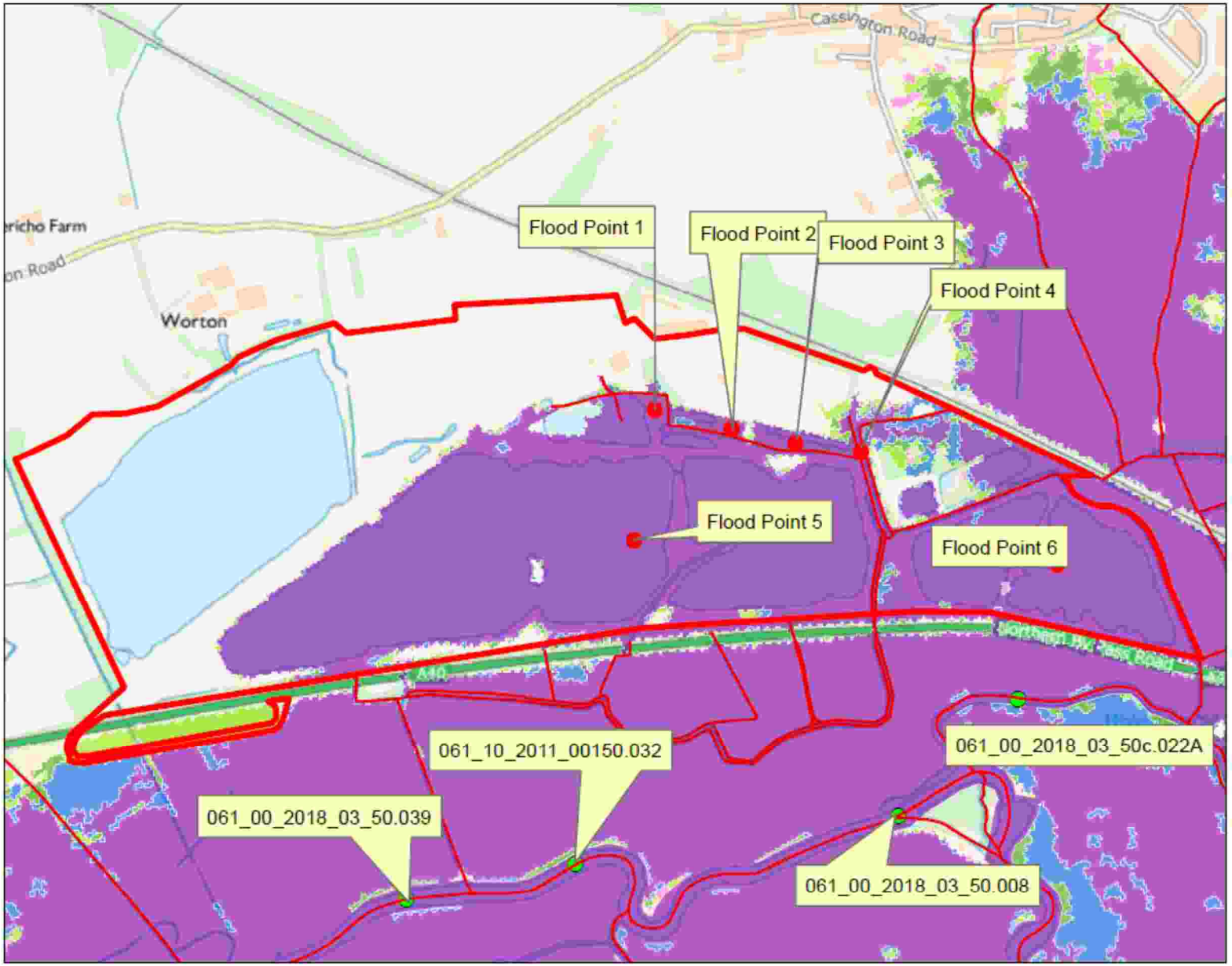
Defence Location:	No defences on Main River
Description:	This location is not currently protected by any formal defences and we do not currently have any flood alleviation works planned for the area. However we continue to maintain certain watercourses and the schedule of these can be found on our internet pages.

Model information

THM141387

Model:	Thames (Eynsham to Sandford) 2018
Description:	The information provided is from the Oxford Flood Alleviation Scheme mapping completed in March 2018. The project included updating the existing (2014) hydraulic model to support development of the outline FAS design. The study was carried out using 1D-2D modelling software (Flood modeller-Tuflow). Model design runs: 1 in 2/ 50% AEP; 1 in 5 / 20% AEP; 1 in 10/ 10% AEP; 1 in 20 / 5% AEP; 1 in 50/ 2% AEP; 1 in 75 / 1.3% AEP; 1 in 100 / 1% AEP, 1 in 100+25% / 1% + 25% AEP with climate change; 1 in 100+35% / 1% + 35% AEP with climate change; 1 in 100+70% / 1% + 70% AEP with climate change; 1 in 200/ 0.5% AEP and 1 in 1000 / 0.1% AEP. Mapped outputs: 1 in 2/ 50% AEP; 1 in 5 / 20% AEP; 1 in 10/ 10% AEP; 1 in 20 / 5% AEP; 1 in 50/ 2% AEP; 1 in 75 / 1.3% AEP; 1 in 100 / 1% AEP, 1 in 100+25% / 1% + 25% AEP with climate change; 1 in 100+35% / 1% + 35% AEP with climate change; 1 in 100+70% / 1% + 70% AEP with climate change; 1 in 200/ 0.5% AEP and 1 in 1000 / 0.1% AEP.

Detailed FRA Map centred on Cassington Quarry, Yarnton, Oxon
Created on 11/09/2019 REF:THM141387



Environment Agency

Kilometres

0 0.3 0.6

Legend

- Main River
- Model Nodes
- 20% AEP Flood Outline
- 5% AEP Flood Outline
- 1% AEP Flood Outline
- 1%+25% CC AEP Flood Outline
- 1%+35% CC AEP Flood Outline
- 1%+70% CC AEP Flood Outline
- 0.1% AEP Flood Outline

AEP = Annual Exceedance Probability
The probability of a flood of a particular magnitude, or greater, occuring in any given year

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Modelled floodplain flood levels

The modelled flood levels for the closest most appropriate model grid cells for your site are provided below:

				flood levels (mAOD)						
2D grid cell reference	Model	Easting	Northing	20% AEP	5% AEP	1% AEP	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
Flood Point 1	Thames (Eynsham to Sandford) 2018	447,232	211,182	59.49	59.55	59.61	59.67	59.70	59.79	59.71
Flood Point 2	Thames (Eynsham to Sandford) 2018	447,399	211,145	59.49	59.55	59.61	59.67	59.70	59.79	59.71
Flood Point 3	Thames (Eynsham to Sandford) 2018	447,538	211,112	No Data	59.55	59.61	59.67	59.70	59.79	59.71
Flood Point 4	Thames (Eynsham to Sandford) 2018	447,679	211,093	59.49	59.55	59.61	59.67	59.70	59.79	59.71
Flood Point 5	Thames (Eynsham to Sandford) 2018	447,192	210,909	59.49	59.55	59.61	59.67	59.70	59.79	59.71
Flood Point 6	Thames (Eynsham to Sandford) 2018	448,098	210,855	59.46	59.51	59.56	59.60	59.63	59.74	59.64

This flood model has represented the floodplain as a grid.
The flood water levels have been calculated for each grid cell.

Note:
Due to changes in guidance on the allowances for climate change, the 20% increase in river flows should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

For further advice on the new allowances please visit
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

APPENDIX 3

Cassington Quarry Waste Recovery Plan, Final, November 2020

Cassington Quarry

Environmental Permit Application

Waste Recovery Plan

November 2020

Prepared on behalf of Hanson Quarry Products Europe Limited

Quay West at MediaCityUK, Trafford Wharf Road, Trafford Park, Manchester M17 1HH
Tel: +44 161 874 8714
Email: andrew.bowker@wyg.com

Document control

Document:	Waste Recovery Plan
Project:	Cassington Quarry PA
Client:	Hanson Quarry Products Europe Limited
Job Number:	A116643
File Origin:	Z:\Projects\Hanson Quarry products (H01447)\A116643 (Cassington Quarry PA)\Reports\Finals

Revision:	FINAL	
Date:	November 2020	
Prepared by: Alice Shaw	Checked by: Andrew Bowker	Approved By: Andrew Bowker
Description of revision: Final to EA		

Contents

Drawings

C4/HAN/05/9 – S37 Application Plan (Revised Plant Site Restoration Scheme)

C4/HAN/05/4 – Revised Restoration Scheme for Former Plant Site

C4/HAN/-5/7 – Cross Sections

W92m/133 – Composite Restoration Plan

Appendices

Appendix A – Planning Permission Reference MW.0111/19

1.0 Introduction

1.1 Report Context

1.1.1 WYG has been commissioned to prepare and submit a Waste Recovery Plan (WRP) on behalf of Hanson Quarry Products Europe Limited (Hanson) for Cassington Quarry.

1.1.2 Planning permission reference MW.0111/19 was granted by Oxfordshire County Council (OCC) for the 'Continuation of the winning and working of sand and gravel with restoration using suitable imported materials to vary conditions 1 and 6 of planning permission 15/04415/CM to amend the approved restoration scheme for the plant site'. Hanson seeks to gain a bespoke waste recovery permit for the permanent deposit of inert waste to land at the plant site at Cassington Quarry to facilitate the restoration scheme outlined in the planning permission.

1.1.3 Hanson propose to import approximately 279,000 tonnes (or 155,000m^3) of inert waste for the revised restoration scheme for the plant site.

1.1.4 The Environment Agency Regulatory Guidance on Waste Recovery Plans and Permits, dated 18th October 2016, sets out the Environment Agency's (EA) approach to determining whether an activity involving the permanent deposit of waste on land is waste recovery or waste disposal. This document therefore constitutes a Waste Recovery Plan to satisfy the above.

2.0 Site Description

2.1 Site Setting

2.1.1 The application site comprises the plant area of Cassington Quarry and is approximately 7.12 hectares (ha) in size. The site is located approximately 1km south west of the village of Yarnton and 1.5km north east of the village of Cassington. The nearest town is Eynsham which is located approximately 4km south west of the site. The application site is centred at National Grid Reference (NGR) SP 47447 11253 and the site boundary is shown on Drawing Number C4/HAN/05/9.

2.1.2 The plant site is within a wider area of restored sand and gravel workings. The restoration comprises some arable restoration and water bodies, several of which are immediately south of the site. The proposed after use for the wider area comprises a combination of agriculture and recreational use.

2.1.3 The site is adjacent to three permitted facilities. Two of these facilities comprise waste operations which are operated by M & M Skip Hire Limited. One is a household, commercial and industrial waste transfer station (EPR/BP3097ET and EAWML 86122) and is located to the north of the site at NGR SP 47287 11380. The other waste facility involves the treatment of waste to produce soil, soil substitutes and aggregate in accordance with the standard rules set SR2010 No12 (EPR/FB3633AL and EAWML 103989). This facility is located approximately 120m north west from the site at NGR SP 47023 11359.

2.1.4 The third facility is a waste installation and is operated by Severn Trent Green Power (EPR/NP3134WU). The facility comprises an anaerobic digestion facility and is located to the east of the application site at NGR SP 46950 11320.

2.1.5 Access to the site is achieved via an unnamed access road which spurs off the eastbound A40 to the west of the site. This road serves the former quarry workings, application site, waste management site and AD plant before running back towards the A40 to join the westbound carriageway.

2.1.6 The nearest residential properties are approximately 350m to the north of the site at Mead Farm. The next closest is approximately 600m north to the edge of Yarnton.

2.2 Planning Permission

2.2.1 The current and implemented planning permission reference MW.0111/19 was submitted as a Section 73 application to allow for the continuation of the winning and working of sand and gravel with restoration using suitable imported materials to vary conditions 1 and 6 of planning permission 15/04415/CM to amend the approved restoration scheme for the plant site at Cassington Quarry. The planning permission corrects the erroneous previous conditions relating to the restoration of the site as Hanson are contractually bound to restore the site to its previous agricultural use and landform.

2.2.2 With reference to Drawing Number W92m/133, the original plan for the plant site was to create an open water body for fishing with some smaller areas of grassland. However, the proposed changes comprise most of the plant site to be restored to grassland in line with the contractual obligation to the landowner, with perimeter tree and shrub planting, and areas of open water in the south eastern section of the site (as shown on Drawing Number C4/HAN/05/4). Despite these changes, OCC have noted in their delegated report (Appendix B) that the revised scheme does not affect the restored areas that are adjacent to the site and the intended after use for the site as a whole.

2.2.3 This application was approved in April 2020 and a copy of the Decision Notice is provided as Appendix A.

2.3 Permitting Context

2.3.1 In order to facilitate the restoration of the plant site, as approved under planning permission MW.0111/19, and to ensure that the site is restored in accordance with the contractual obligation, Hanson seeks to put approximately 279,000 tonnes (or 155,000m^3) of inert waste to a beneficial use.

3.0 Proposed Development

3.1 Introduction

3.1.1 The proposed development comprises the importation of approximately 279,000 tonnes (or 155,000m^3) of inert material to infill the void created by the sand extraction in accordance with the implemented planning permission MW.0111/19. It seeks to utilise imported inert waste materials rather than using 'virgin' soils for the restoration. The proposed development would use the imported inert waste material to create grassland, with perimeter tree and shrub planting, and areas of open water in the south eastern section of the site (as shown on Drawing Number C4/HAN/05/4).

3.1.2 The open water complex in the south eastern part of the plant site would include lake shallows, reed beds and blocks of tree and shrub planting, creating a greater variance in increased habitats for local wildlife.

3.2 Material Requirements

Volumes

3.2.1 The restoration of the plant site at Cassington Quarry will require approximately 279,000 tonnes (or 155,000m^3) material to be brought to the site to shape the void created by the sand extraction.

3.3 Waste Types

3.3.1 Permitted wastes accepted at the site will be strictly inert as classified under the Landfill Directive (1999/31/EC) and Council Decision (2003/33/EC) of 19 December 2002 'establishing criteria and procedures for the acceptance of waste landfills'.

3.3.2 The proposed waste types would be required to meet the chemical and physical characteristics as stipulated within the Landfill Directive. As such, the only waste type proposed to be included within the recovery activity is as follows:

Table 1: Proposed Waste Types

EWC Code	Description	Restriction
01	**WASTE RESULTING FROM EXPLORATION, MINING, QUARRYING AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS**	
01 01	**Wastes from mineral excavation**	

01 01 02	Waste from non metalliferous excavation	Restricted to waste overburden and interburden only
01 04	**Wastes from physical and chemical processing of non-metafillerous minerals**	
01 04 08	Waste gravel and crushed rocks other than those mentioned in 04 04 06	
01 04 09	Waste sand and clay	
10	**WASTES FROM THERMAL PROCESSES**	
10 12	**Wastes from manufacture of ceramic goods, bricks, tiles and construction products**	
10 12 08	Waste ceramics, brick, tiles and construction products (after thermal processing)	
10 13	**Wastes from manufacture of cement, lime and plaster and articles and products made from them**	
10 13 14	Waste concrete	
17	**CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**	
17 01	**Concrete, bricks, tiles and ceramics**	
17 01 01	Concrete	Selected C&D waste only
17 01 02	Bricks	Selected C&D waste only
17 01 03	Tiles and ceramics	Selected C&D waste only
17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	Selected C&D waste only. Metal from reinforced concrete must have been removed.
17 05	**Soil (including excavated soil from contaminated sites), stones and dredging spoil**	
17 05 04	Soil and stones other than those mentioned in 17 05 03	Excluding topsoil, peat; excluding soil and stones from contaminated sites
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE**	
19 12	**Wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified**	
19 12 09	Minerals only	Wastes from the treatment of waste aggregates that are otherwise naturally occurring minerals. Does not include fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard.
19 12 12	Other wastes from mechanical treatment of wastes other than those mentioned in 19 12 12	Restricted to crushed bricks, tiles, concrete and ceramics only. Metal from reinforced concrete must be removed. Does not include fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard.

20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS**	
20 02	**Garden and park wastes (including cemetery waste)**	
20 02 02	Soil and stones	Only from garden and parks waste; excluding topsoil, peat.

3.3.3 This waste type is identified by the Environment Agency as suitable for use in the restoration of mineral workings and as general fill material (Environment Agency Guidance: Waste Recovery Plans and Permits: October 2016).

4.0 Justification for Waste Recovery

4.1 Introduction

4.1.1 The Environment Agency's Regulatory Guidance on Waste Recovery Plans and Permits (October 2016), sets out the Environment Agency's approach to determining whether an activity involving the permanent deposit of waste on land is waste recovery or waste disposal. The difference between waste disposal and waste recovery is summarised below:-

Waste Recovery

"Waste recovery is about using waste to replace other non-waste materials to achieve a beneficial outcome in an environmentally sound manner.

The clearest indicator of waste recovery is when it can be shown that the waste used is a suitable replacement of non-waste materials that would otherwise have to be used to achieve the end benefit."

4.1.2 It is clear from these statements that the purpose of the development is a key consideration in determining whether the operations constitute recovery or disposal. In particular, whether the scheme is driven by a need to achieve a beneficial purpose, in which the use of waste materials will assist, or whether it is intended as a means to dispose of waste, from which incidental benefits arise.

4.1.3 The purpose of the scheme for the restoration of Cassington Quarry is set out in the following section.

The Purpose of the Scheme

4.1.4 As previously mentioned, the scheme solely relates to the plant area of the wider Cassington Quarry site. The purpose of the scheme is to infill the void that will be created from sand extraction as approved under planning permission.

4.1.5 As mentioned in Section 2.2.6, the original plan for the plant site was to create an open water body for fishing with some smaller areas of grassland (as shown on Drawing Number W92m/133). However, Hanson are required to restore the site back to the original landform in order to meet the contractual obligations of the landowner. As such, most of the plant site will be restored to grassland, with perimeter tree and shrub planting, and areas of open water in the south eastern section of the site (as shown on Drawing Number C4/HAN/05/4). |These

scheme will facilitate a combination of agriculture and recreational use oif the site following completion of all .

4.2 The Recovery Test

4.2.1 In order to reach a formal determination as to whether the restoration of the site constitutes a recovery operation, the Environment Agency will apply the tests set out in the guidance which is based upon a legal test derived from the Waste Framework Directive and European case law, and are set out below:-

- Evidence to show that if you couldn't use waste you would do work to get the same outcome using non-waste;
- It is suitable for the intended purpose;
- Won't cause pollution;
- Purpose of the work;
- Quantity of Waste Used; and
- Meeting Quality Standards.

4.2.2 These questions are answered in the following sections to support the EA's consideration of this Waste Recovery Plan.

4.3 Evidence of substitution for non-waste materials

4.3.1 The Environment Agency's Waste Recovery Plans and Permit Guidance states that:-

"Your plan must show that if you couldn't use a waste material you would do work to get the same outcome using non-waste materials".

4.3.2 There are three main ways that applicants can demonstrate that a waste material will be substituting a non-waste material. These are as follows:-

- Financial gain by using non-waste materials;
- Funding to use non-waste; and
- Obligations to do work.

4.3.3 It is Hanson's intention to demonstrate, through this Waste Recovery Plan, that there is a legal obligation to restore the site. There is no further requirement within the aforementioned waste recovery guidance or case law that financial gain or funding to use non-waste must be satisfied

in the event that an obligation to undertake works is demonstrated.

4.3.4 In accordance with the Oxfordshire Minerals and Waste Local Plan (OMWLP), OCC aspire to maximise the diversion of waste to landfill by 2031 (Policy W2). In order to achieve this, Policy W6 notes that provision will be made for the permanent deposit to land or disposal to landfill of inert waste which cannot be recycled will be made at existing facilities. It also notes that priority will be given to the use of inert waste as infill material to achieve the satisfactory restoration and after use of active or unrestored quarries.

4.3.5 Cassington Quarry is listed in the OMWLP as an active quarry site and therefore the use of inert waste material to facilitate the restoration of the plant site accords with the above policies and therefore an example of sustainable waste management.

4.3.6 Policy M10 notes that mineral workings shall be restored to an after use that is appropriate to the location and delivers a net gain in biodiversity. As detailed in Section 2.1.2, the proposed after use for the wider quarry site comprises a combination of agricultural and recreational use. Despite the changes that have been made to the plant site, OCC have noted in their delegated report that the revised restoration scheme for the plant site will not affect areas within the wider quarry that have already been restored. OCC also note that the revised restoration scheme will not affect the after use of the wider quarry site and therefore is considered to accord with Policy M10 of the OMWLP.

4.3.1 As detailed above, planning permission MW.0111/19 was issued by OCC to allow the continuation of winning and working of sand and gravel as well as changes to the restoration scheme for the plant site. With reference to the Decision Notice (Appendix A), Condition 6 states the following:-

"The composite restoration scheme approved as a detail pursuant to condition 6 of permission 10/01929/CM and shown on Drawing W92m/133 as amended by Drawing C4/HAN/05/4 C and associated section drawing C4/HAN/05/7 A as relating to the plant site shall be implemented by 31st December 2022".

4.3.2 Planning conditions which require site restoration following extractive operations are attached to planning permissions when a mineral planning authority (MPA) considers that appropriate restoration of the site is a pre-requisite to the principle of mineral extraction being acceptable.

4.3.3 This planning permission represents a legal requirement to restore the site. As such, it is considered that the MPA would pursue enforcement action in the event of a breach of the planning condition in relation to the restoration of the site thereby demonstrating a legally

enforceable obligation.

4.3.4 In addition to the above, Hanson are contractually obliged to restore the site to it's former use as presented within the extract from the legal agreement between the site owner and the original leaseholder for the site. Restoration schemes which have previously been approved through the planning regime presented a lower profile than that which is currently approved and would not have met this contractual obligation. As such, the site owner would have continued to receive an annual rent until such time as the site is restored for agricultural use which was not previously approved through the original planning permission. As such, there is both a legislative and contractual obligation on the Operator to restore the site to original ground levels. A copy of the relevant extract of this legal agreement is provided as Appendix B.

4.4 Is the recovered waste material suitable for its intended use?

4.4.1 Many of the proposed waste types are physically similar to the likely primary aggregate non-waste materials to be used e.g. soils, sand, stone, gravel etc., and can be considered direct replacements. They are capable of being sufficiently compacted so that they can form a stable landform for the medium and long term and would undergo consolidation rapidly to reduce the risk of short term instability.

4.4.2 The proposed waste types are consistent with those which are considered acceptable for construction and reclamation activities within Standard Rules SR2015 No39: use of waste in a deposit for recovery operation.

4.4.3 It is considered that the proposed wastes are suitable for use in creating the enhanced landform and restoration.

4.5 Will the material cause pollution?

4.5.1 A Hydrogeological Risk Assessment (HRA) was undertaken in support of the planning application to assess the impact on the local water environment as well as the Pixey and Yarnton Meads Site of Special Scientific Interest (SSSI) which is located approximately 450m south of the plant site. It was noted in the HRA that the amended restoration design for the plant site includes specific measures to ensure the protection of the water environment and the results of assessment indicate there are no hydrologically based reasons why the amended design should not be permitted.

4.5.2 Strict waste acceptance, including careful screening of materials entering the site, would be

undertaken as detailed within the Environmental Permit application. These procedures would be employed on site to ensure that no prohibited materials, which are likely to cause a risk to the environment, would be accepted at Cassington Quarry.

4.5.3 It is considered that in following the strict criteria detailed above, the material is unlikely to cause pollution.

4.6 Purpose of the use

4.6.1 The purpose of the scheme is to restore the plant site at Cassington Quarry following mineral extraction as required under planning permission MW.0111/19 . The proposed development would use the imported inert waste material to create grassland, with perimeter tree and shrub planting, and areas of open water in the south eastern section of the site (as shown on Drawing Number C4/HAN/05/4).

4.7 Is the minimum amount of waste being used to achieve the intended benefit?

4.7.1 The use of inert waste material would allow the restoration of the site in accordance with planning and contractual obligations. The proposed development would require the importation of approximately 279,000 tonnes (or 155,000m^3) of inert waste to be utilised in the restoration scheme.

4.7.2 The proposed landform has been carefully designed to take into account the physical and technical requirements for the restoration (e.g. land stability, drainage, etc.) and also the inclusion of landscape features that would fit in with the surrounding landscape character and consideration of the previous landform prior to the extraction of sands and gravels.

4.7.3 A volume of approximately 279,000tonnes (or 155,000m^3)of imported material is required to achieve the profiles approved under the planning permission for the restoration scheme.

4.7.4 The site has previously had a lower restoration approved through the planning regime. However, the proposed restoration under previous planning permissions were not in line with the contractual obligations that the operator has to the landowner and as such the most recent planning permission sought to rectify this point. It is therefore considered that restoration back to original ground levels represents the minimum waste required to achieve the intended benefit of restoring the site.

4.8 Meeting quality standards

4.8.1 The restoration scheme has been carefully and professionally designed, taking into account physical constraints, such as land stability, land condition and drainage.

4.8.2 All works, including construction and landscaping, will be carried out in accordance with current industry best practices and the Environmental Permit. Efforts will be made to minimise disruption to local amenity and measures will be taken to cause as little nuisance as possible (e.g. dust emissions or noise) to local receptors.

4.8.3 In addition, the proposed restoration is to take place in a quarry site which is subject to controls under The Quarries Regulations 1999. Consequently, all restoration activities will be required to be undertaken in a manner that ensures long term stability.

5.0 Conclusion

5.0.1 In April 2020, planning permission reference MW.0111/19 was granted by Oxfordshire County Council (OCC) for the 'Continuation of the winning and working of sand and gravel with restoration using suitable imported materials to vary conditions 1 and 6 of planning permission 15/04415/CM to amend the approved restoration scheme for the plant site'. The amendments to the restoration scheme are a function of the contractual obligation which Hanson has to the land owner whereby, following mineral extraction, the site must be restored to original ground levels.

5.0.2 In order to facilitate the restoration of the plant site, Hanson are seeking to restore the plant site under the conditions of a bespoke waste recovery permit. This Waste Recovery Plan seeks to demonstrate that the approved restoration scheme should be considered a waste recovery activity.

5.0.3 This Waste Recovery Plan provides information relating to the benefits of the scheme and confirms that the minimum amount of waste is being used to confer these benefits. In addition, the information provided above shows clearly that the scheme meets the test as detailed within EA Waste Recovery Permit and Plans Guidance and that it should be considered as a recovery activity in line with EU Case Law.

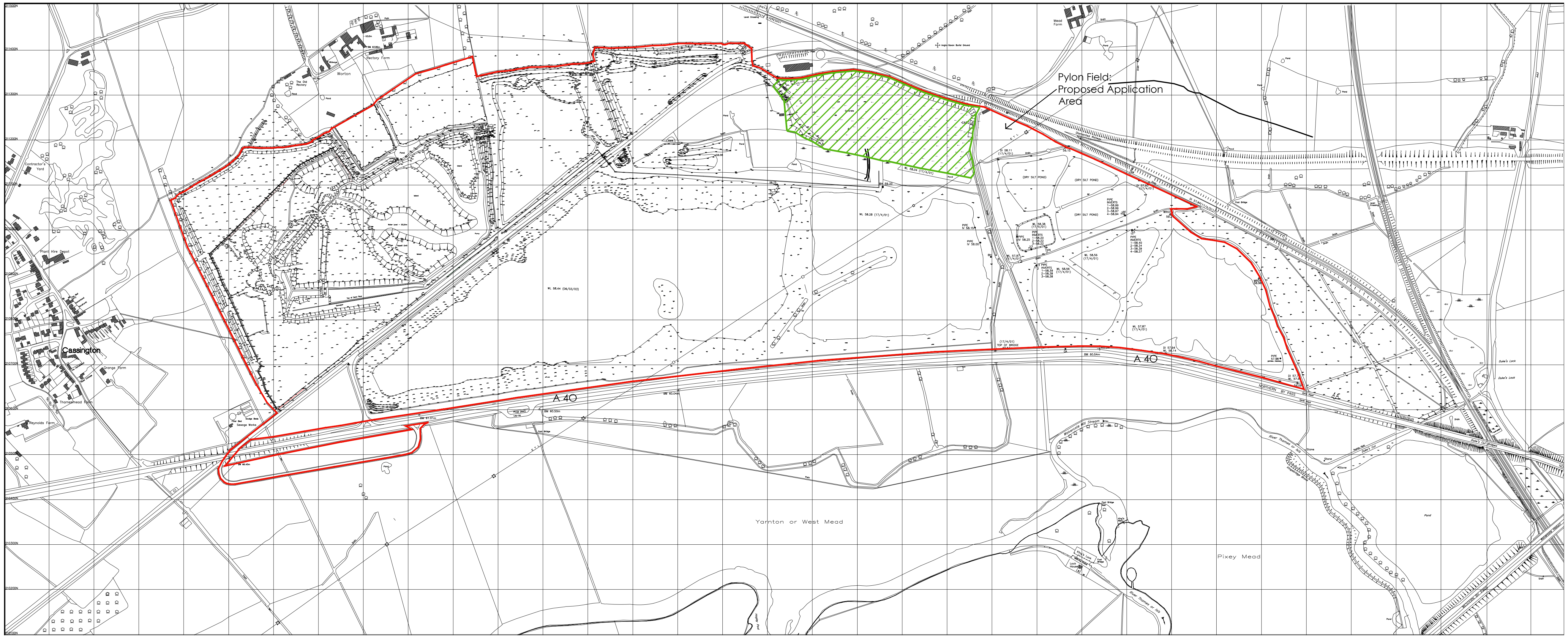
Drawings

C4/HAN/05/9 – S37 Application Plan (Revised Plant Site Restoration Scheme)

C4/HAN/05/4 – Revised Restoration Scheme for Former Plant Site

C4/HAN/-5/7 – Cross Sections

W92m/133 – Composite Restoration Plan



Key:

Existing Consent Area

Plant Site to be Restored

OXFORDSHIRE COUNTY COUNCIL

APPROVED

DATE: 15/04/2020
APPLICATION No: 19/02521/CM (MW.0111/19)

0 m | 200 m | 400 m | 600 m | 800 m | 1000 m

Scale Bar
1: 10000

rev: -	date: -	details: -

corylus
Planning & Environmental Ltd.

The Old Dairy
Yanworth
Cheltenham
Gloucestershire
GL54 3LQ

tel: 01285 721072

client:
Hanson

project:
Cassington Quarry

title:
S37 Application Plan (Revised Plant Site Restoration Scheme)

scale:	date:	drawn by :	checked by:	size:
1:10,000	30/09/19	SD	AW	A3

Project ref :	dwg no:	rev:
C4/HAN/05	C4/HAN/05/9	-

Key:

- Cross Sections
- Fencing and Gates
- Proposed Restoration Contours
- ExistingConsent Area
- Existing Tree and Shrub Vegetation
- Areas to be Restored to Agricultural Grassland
- Existing Water Bodies
- Proposed New Pond Complex
- Proposed Tree and Shrub Planting
- Lake Shallows/ Reed Bed
- Areas to be Restored to Conservation Grassland

Anglo-Saxon Burial Ground

OXFORDSHIRE COUNTY COUNCIL

APPROVED

DATE: 15/04/2020
APPLICATION No: 19/02521/CM (MW.0111/19)

Path

64.0 63.0 62.0 61.0 60.0 59.0 59.15 58.73

Dismantled

Drain

(DRY SILT

WL 58.
(17/4/

PIPE
INVERTS
1–58.2
2–58.2
3–58.2

PIPE
V 58.25

BH

0 m 40 m 80 m 120 m 160 m 200 m

Scale Bar
1: 2000

rev:	date:	details:
C	04/06/19	(SD)Addition of Fence line and pond
B	22/05/19	(SD)Addition of Cross Sections
A	13/05/19	(SD)Addition of Proposed Trees

corylus Planning & Environmental Ltd.
The Old Dairy
Yanworth
Cheltenham
Gloucestershire
GL54 3LQ
tel: 01285 721072

client: Hanson

project: Cassington Quarry

title: Revised Restoration Scheme For Former Plant Site

scale:	date:	drawn by :	checked by:	size:
1:2000	13/05/19	SD	AW	A3

Project ref :	dwg no:	rev:
C4/HAN/05	C4/HAN/05/4	C

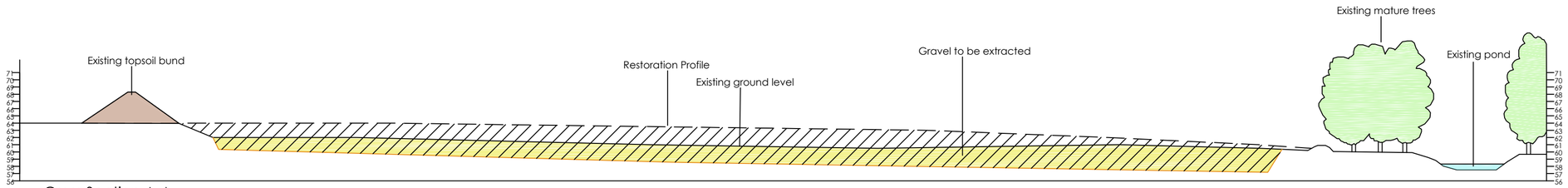
OXFORDSHIRE COUNTY COUNCIL

APPROVED

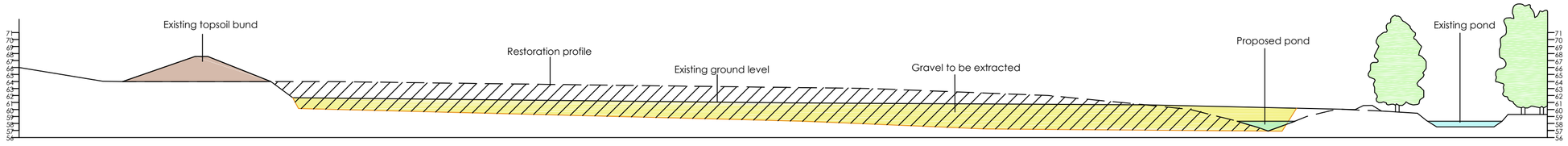
DATE: 15/04/2020
APPLICATION No: 19/02521/CM (MW.0111/19)

Key:

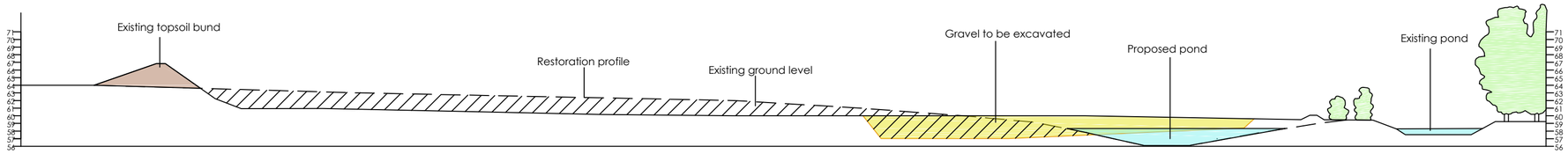
- Gravel To Be Extracted
- Proposed Backfill
- Water Bodies



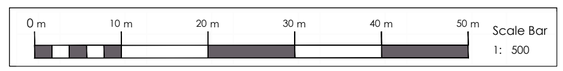
Cross Section A-A



Cross Section B-B



Cross Section C-C



rev:	date:	details:
A	23/09/19	SD - Water level adjustments

corylus Planning & Environmental Ltd.
The Old Dairy
Yanworth
Cheltenham
Gloucestershire
GL54 3LQ
tel: 01285 721072

client: Hanson

project: Cassington Quarry

title: Cross Sections A-A, B-B and C-C

scale:	date:	drawn by:	checked by:	size:
1:500	04/06/19	SD	AW	A2

Project ref.:	dwg no:	rev:
C4/HAN/05	C4/HAN/05/7	A

OXFORDSHIRE COUNTY COUNCIL

APPROVED

DATE: 15/04/2020
APPLICATION No: 19/02521/CM (MW.0111/19)

KEY:

- S73 planning boundary
- Land not in Hanson control
- Lake margin/amenity grassland
- Agricultural land
- Woodland/plantations/scrub
- Reed beds
- Shallow water margins
- Deeper water
- Restoration contours

ALL LEVELS IN METRES ABOVE ORDNANCE DATUM

Hanson HEIDELBERGCEMENT Group

Title:	Cassington Quarry
Title:	Composite Restoration Scheme
Scale: 1:5000 @ A1	Date: Sept '11
Drawn by: AC	Checked by: DMcD
Drawing No.:	W92m/133

Appendices

Appendix A – Planning Permission MW.0111/19

Application No: MW.0111/19 District Ref: 19/02521/CM

OXFORDSHIRE COUNTY COUNCIL

County Planning Authority

TOWN AND COUNTRY PLANNING ACT 1990
TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT PROCEDURE) (ENGLAND)
ORDER 2015

To: Hanson Quarry Products Europe Limited
Hanson House
14 Castle Hill
Maidenhead
Berkshire
SL6 4JJ

CONDITIONAL PLANNING PERMISSION

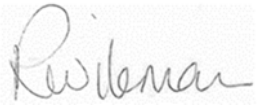
Section 73 application for the continuation of the winning and working of sand and gravel with restoration using suitable imported materials to vary conditions 1 and 6 of planning permission 15/04415/CM to amend the approved restoration scheme for the plant site at Cassington Quarry, Cassington Road, Yarnton, OX29 4EB

The OXFORDSHIRE COUNTY COUNCIL as County Planning Authority hereby GRANT PLANNING PERMISSION for this development SUBJECT TO the conditions set out in the attached Schedule 1.

The reasons for the imposition of the conditions are as set out in the attached Schedule 1.

The relevant Development Plan policies are set out in the attached Schedule 2.

Dated: 15/04/2020



on behalf Director for Planning & Place

YOUR ATTENTION IS DRAWN TO THE NOTES OVERLEAF

Notes

IMPORTANT

- This permission does not convey or imply any approval or consent which may be required under any enactment, byelaw, order or regulation other than section 57 of the Town and Country Planning Act 1990.

- Application for approval under the Building Regulations must be made to the Council for the district in which the land is situated.

Appeals to the Secretary of State

- If you are aggrieved by the decision of the County Planning Authority to refuse permission for the proposed development or to grant it subject to conditions, then you can appeal to the Secretary of State under section 78 of the Town and Country Planning Act 1990.
- If you want to appeal, then you must do so within six months of the date of this notice, however if an enforcement notice is served relating to the same or substantially the same land and development as in your application and if you want to appeal against the County Planning Authority's decision on your application then you must do so within: 28 days of the date of service of the enforcement notice, or within 6 months of the date of this notice, whichever period expires earlier using a form which you can get from the Secretary of State at Temple Quay House, 2 The Square, Temple Quay, Bristol BS1 6PN (Tel: 0303 444 5000) or online at https://www.gov.uk/planning-inspectorate
- The Secretary of State can allow a longer period for giving notice of an appeal, but he will not normally be prepared to use this power unless there are special circumstances which excuse the delay in giving notice of appeal.

- The Secretary of State need not consider an appeal if it seems to him that the local planning authority could not have granted planning permission for the proposed development or could not have granted it without the conditions they imposed, having regard to the statutory requirements, to the provisions of any development order and to any directions given under a development order.
- If you intend to submit an appeal that you would like examined by inquiry then you must notify the Local Planning Authority and Planning Inspectorate (inquiryappeals@planninginspectorate.gov.uk) at least 10 days before submitting the appeal. Further details are on GOV.UK.

Purchase Notices

- If either the County planning authority or the Secretary of State refuses permission to develop land or grants it subject to conditions, the owner may claim that he can neither put the land to a reasonably beneficial use in its existing state nor render the land capable of a reasonably beneficial use by the carrying out of any development which has been or would be permitted.

- In these circumstances, the owner may serve a purchase notice on the Council of the District in whose area the land is situated. This notice will require the Council to purchase his interest in the land in accordance with the provisions of Part VI of the Town and Country Planning Act 1990.

Schedule 1 - Conditions

1. The development shall be carried out solely in accordance with details submitted with the application unless modified by the conditions of this permission:

   - Application form dated 28/10/19
   - Covering Letter dated 28/10/19
   - Hydrological Assessment Final Report dated September 2019
   - Drawing W92m/130
   - Drawing W92m/127a
   - Drawing 001 – OX Proposed New sand and gravel processing plant
   - Drawing 011-OX Proposed weighbridge and accommodation
   - Drawing 6010/0/1 – Key plan (for junction)
   - Drawing 6010/0/2 – Plan and profiles for the proposed junction
   - Aftercare scheme dated 04/01/95
   - Aftercare scheme dated 21/02/95
   - Aftercare scheme dated 22/03/95
   - Aftercare scheme dated 12/04/95
   - Drawing W92a/10 – Revised advanced screening proposal
   - Drawing W92e/15a – Restoration of Working stages 1 – 4
   - Drawing W92e/16c – Operational plan
   - Drawing W92m/22a – New processing plant, location and details
   - Drawing 3 (ref CHS 458/83) – Working plan
   - Drawing W92m/25 – Restoration proposals
   - Drawing W92m/27a – As dug working arrangements
   - Drawing W92m/42 – Working arrangements stage 5 – 9 sailing lake
   - Drawing W92m/43 – Stages 10 – 12 working arrangements
   - Drawing W92m/44 – Stages 10 – 12 restoration concept (as modified on approval)
   - Drawing W92m/133 – Composite restoration scheme
   - Drawing C4/HAN/05/9 – S73 application revised plant site area affected
   - Drawing C4/HAN/05/8 – Proposed working scheme with original extraction limit
   - Drawing C4/HAN/05/4 C – Revised restoration scheme for former plant site
   - Drawing C4/HAN/05/7 A – Revised restoration scheme for former plant site Cross sections A-A, B-B and C-C
   - Cassington Quarry Stage 10 Five Year Aftercare Scheme dated 12/03/2012
   - Drawing W93/92c – Stage 13 revised restoration

   Reason: To ensure that the development is carried out as proposed (OMWCS policy C5).

2. No excavations shall be undertaken or continued after 31st December 2020.

Reason: To ensure satisfactory and timely restoration (OMWCS policy M10).

3. The weighbridge and office accommodation shown on drawing 011-OX, removal of all plant and machinery, and all restoration shall be carried out and completed not later than 31st December 2022.

   Reason: To ensure satisfactory and timely restoration in accordance with policy (OMWCS policy M10).

4. All excavation shall re-commence and continue as indicated on the plans accompanying this application and the plans approved under planning permission W2001/1729 and 02/0062/CM, in an orderly and progressive manner, and leaving no humps of unexcavated land.

   Reason: To ensure that the details of the development and restoratoin are satisfactory (OMWCS policy M10).

5. No working shall take place except in accordance with the approved scheme and plans of working, landscaping and restoration indicated in the particulars of the permission.

   Reason: To ensure that the details of the development and restoration are satisfactory (OMWCS policy M10).

6. The composite restoration scheme approved as a detail pursuant to condition 6 of permission 10/01929/CM and shown on Drawing W92m/133 as amended by Drawing C4/HAN/05/4 C and associated section drawing C4/HAN/05/7 A as relating to the plant site shall be implemented by 31st December 2022.

   Reason: To ensure that the details of the development and restoration are satisfactory (OMWCS policy M10).

7. Details of any mobile plant to be brought on site, and its location within the site shall be submitted to and approved in writing by the Mineral Planning Authority prior to being brought onto the site.

   Reason: To enable the Mineral Planning Authority to retain control over the working and the interests of amenity (OMWCS policy C5).

8. The excavated areas shall be sloped at an angle not steeper than 1 in 1 ½ and in such a manner as to provide adequate support for adjoining land, and to prevent undercutting and scour.

   Reason: To safeguard the stability of and give support to adjoining land and to protect bridleway 21 (OMWCS C5).

9. Except with the prior written consent of the Mineral Planning Authority, no excavations shall take place within:
   a. 8 metres of any watercourse;
   b. 6 metres of the entire length of the northern boundary of the land;
   c. 10 metres from the extremity (i.e. wing walls) of any railway bridge along the northern boundary of the land or the bridge which carries the A40 over the disused Witney Branch line;
   d. 10 metres of the boundary of any highway which contains or comprises a carriageway;
   e. 6 metres either side of bridleway 21

Reason: To safeguard the stability of and give support to adjoining land and to protect bridleway 21 (OMWCS C5).

10. (a) The margin of 8 metres between watercourses and the excavations required in accordance with condition 9(a) shall be preserved completely unobstructed and clear of any works, including drainage measured from the top of the nearest bank of the watercourse to the nearest edge of the workings.
(b) an access at least 4 metres wide shall be provided to the margin in 10(a) from the access road to the site.

Reason: To safeguard the watercourses in the vicinity of the site, to prevent pollution and to protect the flood plain (CLP policy ENV1).

11. Except with the prior written approval of the Mineral Planning Authority, no watercourses shall be incorporated in the excavations and no direct connection shall be made between any excavation and any watercourse.

Reason: To safeguard the watercourses in the vicinity of the site, to prevent pollution and to protect the flood plain (CLP policy ENV1).

12. All possible steps shall be taken to prevent any solid matter, sand or gravel, or excess amounts of suspended matter from passing into any watercourse from the excavation, conveyors, the washing process, or dewatering.

Reason: To safeguard the watercourses in the vicinity of the site, to prevent pollution and to protect the flood plain (CLP policy ENV1).

13. There shall be no discharge of polluted water, sand, gravel, solid matter, oil, grease, or any other offensive or injurious matter into any watercourse.

Reason: To safeguard the watercourses in the vicinity of the site, to prevent pollution and to protect the flood plain (CLP policy ENV1).

14. Oil storage tanks shall be sited on impervious bases surrounded by oil tight bund walls. The bunded areas shall be capable of containing 110% of the tank's volume and shall enclose all fill and draw pipes.

Reason: To safeguard the watercourses in the vicinity of the site, to prevent pollution and to protect the flood plain (CLP policy ENV1).

15. All stockpiles of overburden, topsoil and excavated materials in the flood plain shall be sited so as not to impede the flow of flood waters and retained for as short a period as possible.

Reason: To safeguard the watercourses in the vicinity of the site, to prevent pollution and to protect the flood plain (CLP policy ENV1).

16. No dewatering shall be undertaken while nearby watercourses are running bank full under flood conditions.

Reason: To safeguard the watercourses in the vicinity of the site, to prevent pollution and to protect the flood plain (CLP policy ENV1).

17. No operations permitted or required by this permission shall be carried out, lorries shall not enter or leave the site and plant shall not operate except between the following times:
a. 0700 hours to 1800 hours Mondays to Fridays;

b. 0700 hours to 1300 hours on Saturdays

Reason: To preserve the amenities of the locality (OMWCS policy C5).

18. No operations permitted or required by this permission shall be carried out, lorries shall not enter or leave the site and plant shall not operate on Sundays or Bank Holidays.

Reason: To preserve the amenities of the locality (OMWCS policy C5).

19. All plant and machinery used on the land and capable of being fitted with silencers shall be fitted to the satisfaction of the Minerals Planning Authority, and except in an emergency with the consent of the Mineral Planning Authority, pumping shall only be carried out by means of electric pumps or such alternatives the details of which shall first be submitted to and approved in writing by the Mineral Planning Authority.

Reason: To preserve the amenities of the locality (OMWCS policy C5).

20. Notwithstanding the provisions of the Town and Country planning (General Permitted Development) (England) Order 2015, as amended, no fixed buildings, plant or machinery or structure or erection in the nature of plant of machinery shall be erected, sited or placed on any of the land without the prior written consent of the Mineral Planning Authority.

Reason: To enable the Mineral Planning Authority to retain control over the development which, if not so controlled, could obtrude unnecessarily or unsatisfactorily upon the appearance of the site (OMWCS policy C5).

21. Except with the prior written consent of the Mineral Planning Authority, the total area of the site which for the purposes of mineral working is at any time stripped of topsoil and overburden, under excavation and excavated but which has not been restored in accordance with condition 6, excluding land in use for storage, silt beds, permanent processing plant or site roads shall not exceed 24 hectares.

Reason: To enable the Mineral Planning Authority to retain control over the development which, if not so controlled, could obtrude unnecessarily or unsatisfactorily upon the appearance of the site (OMWCS policy C5).

22. Any land not in use at any time for the siting of plant or machinery, or for the excavation of minerals shall be retained so far as is practicable in agricultural use.

Reason: To reduce the damage to agriculture during the workings (OMWCS policy C5).

23. Notwithstanding Condition 34, no imported waste materials shall be deposited on the land except inert materials in the area bounded in red on approved plan W92m/44 and in the area as hatched in green on drawing C4/HAN/05/9.

Reason: To safeguard the watercourses in the vicinity of the site, to prevent pollution and to protect the flood plain (CLP ENV1).

24. The existing hedges along the boundaries of the land shall be retained and properly maintained. Any plants which may die shall be replaced, and the replacements properly maintained. In particular the hedge along the boundary of the land adjacent to the A40 shall be allowed to grow, and shall not be cut back except with the prior written consent of the Mineral Planning Authority.

Reason: To preserve the amenities of the locality (OMWCS policy C5).

25. All trees on the land shall be preserved and properly maintained. In the event of any trees dying or being seriously damaged or destroyed, a new tree or equivalent number of trees, of a species first approved in writing by the Mineral Planning Authority shall be planted and properly maintained in positions first approved in writing by the Mineral Planning Authority.

Reason: To preserve the amenities of the locality (OMWCS policy C5).

26. Any fence or gate which is required by this permission to be retained or erected and which is destroyed or damaged during operations permitted or required by this permission shall be replaced or repaired.

Reason: To preserve the amenities of the locality (OMWCS policy C5).

27. All derelict material and all buildings, plant and machinery, and all structures erected or placed on the land in the course of the operations permitted by this permission, when no longer required for the purposes directly associated with the winning and working of the minerals, shall be removed and the land shall be restored in accordance with condition 6 of this permission.

Reason: To minimise the detriment and the duration of the detriment caused to the site by excavation of minerals thereon and by ancillary operations (OMWCS policy C5).

28. Written notice shall be given to the Mineral Planning Authority of the completion of the development hereby permitted.

Reason: To enable the Mineral Planning Authority to retain control over the development which, if not so controlled, could obtrude unnecessarily or unsatisfactorily upon the appearance of the site (OMWCS policy C5).

29. The junction between the internal haul route and A40 that has been constructed in accordance with the drawings numbered 6010/01 and 6010/02 dated April 1984 or such other scheme approved by the Mineral Planning Authority shall be kept pot hole and mud free whilst the development is in operation.

Reason: In the interests of highway safety (OMWCS C10).

30. Facilities shall be provided on footpaths and bridleways to allow lorries to cross without obstructing or causing damage to said footpaths and bridleways, and without causing damage to the users thereof.

Reason: To ensure the protection of footpaths and bridleways (OMWCS policy C11).

31. The old railway turntable between the disused Witney Branch railway line and the internal haul route shall be protected from the development hereby permitted.

Reason: To preserve the amenities of the locality (OMWCS policy C5).

32. The aftercare scheme approved on 10/05/95 shall be implemented.

Reason: To ensure that the details of the development and restoration are satisfactory (OMWCS M10).

33. The aftercare scheme approved as a details pursuant to condition 33 of permission 10/0129/CM on 12/03/2012 and set out in “Cassington Quarry Stage 10 – Five Year

Outline Aftercare Scheme" dated 12/03/2012 shall be implemented. That implementation shall be subject to any changes made as a result of any annual meeting, beginning when restoration of the whole area bounded in red on approved plan W92m/44 is complete, and shall take place for a period of 5 years.

Reason: To ensure that the restored site is properly husbanded (OMWCS M10).

34. No waste shall be imported on to the site.

Reason: To minimise the disturbance from the use hereby permitted (OMWCS C5).

35. The area bounded in red on the approved plan W92m/44 shall be restored to agriculture in accordance with that plan by 31st December 2022.

Reason: To ensure that the site is restored to a condition suitable for agricultural use (OMWCS policy M10).

36. The revised restoration and landscaping scheme approved as a detail pursuant to condition 38 of permission 10/0129/CM and shown on drawing W93m/92c shall be implemented by 31/12/2012.

Reason: To comply with Section 197 of the Town and Country Planning Act 1990 and to improve the appearance of the site in the interests of visual amenity (CLP policy ESD 13).

37. Heavy goods vehicles shall leave or enter the site only by approved accesses on the A40 marked by the letter x on approved plan W92m/44.

Reason: In the interests of highway safety and to safeguard the local environment from traffic noise (OMWCS policy C10 and CLP saved policy TR10).

38. No heavy goods vehicles shall enter the public highway unless the wheels and chassis have been sufficiently cleaned to prevent material being deposited on the highway.

Reason: In the interests of highway safety and to safeguard the local environment from traffic noise (OMWCS policy C10 and CLP saved policy TR10).

39. Haul roads shall be sprayed with water sufficiently to suppress dust.

Reason: To protect the amenities of the locality from the effects of dust (OMWCS policy C5).

40. No reversing bleepers or other means of audible warning of reversing vehicles shall be fixed to, or used on, any vehicle operating on the site, other than those which use white noise.

Reason: To protect the amenities of the locality from the effects of noise (OMWCS C5).

41. Any processing plant shall be removed from the site as soon as practicable following the cessation of extraction.

Reason: To remove the plant expeditiously from the landscape and allow for restoration within a reasonable timescale (OMWCS policy M10).

42. No works of site clearance or development shall be carried out other than in accordance with Section 4 of the Ecology Report (Applied Ecology Ltd, November 2015) including

checking for the presence of badger setts prior to soil bund removal and that any vegetation clearance would be completed outside of the main bird nesting season (therefore clearance only during September to February).

Reason: To ensure the protection of flora and fauna and to ensure that the development does not result in the loss of biodiversity (OMWCS C7 and NPPF paragraphs 170, 174 and 175).

43. No works of site clearance, demolition or development are to take place unless or until the results of a reptile survey have been submitted to the Mineral Planning Authority and approved in writing. If reptiles are found to be present, the report shall contain details on the mitigation strategy, receptor site and how this will be managed in the long-term for the benefit of reptiles. No works of translocation shall commence unless or until the translocation area has been inspected to the satisfaction of the Local Planning Authority as a suitable habitat for the reptiles to be translocated. No works shall take place other than in accordance with the approved document.

Reason: To ensure the protection of reptiles and to ensure that the development results in no net loss of biodiversity (OMWCS policy C7 and NPPF paragraphs 170, 174 and 175).

44. Prior to restoration being carried out, details of the proposed planting using native species and buffers to the re-sized water bodies shall be submitted to, and approved in writing by, the Mineral Planning Authority. This shall also include details of how the amended plant site restoration will be managed long term. This is to include any required remediation measures and the five year after care proposals for the revised area, in line with the existing restoration plans for the restored site as a whole.

Reason: To ensure that the restored site is properly husbanded (OMWCS M10).

Informative

In accordance with paragraph 38 of the NPPF Oxfordshire County Council takes a positive and creative approach and to this end seeks to work proactively with applicants to secure developments that will improve the economic, social and environmental conditions of the area. We seek to approve applications for sustainable development where possible.
We work with applicants in a positive and creative manner by;

- offering a pre-application advice service, and
- updating applicants and agents of any issues that may arise in the processing of their application and where possible suggesting solutions. For example, in this case questions were raised over the Hydrology Report provided by the applicant's consultant by the Environment Agency, which was resolved by further information requested by the Waste Planning Authority and provided by the applicant.

Schedule 2 - Relevant Development Plan Policies

- Oxfordshire Minerals & Waste Core Strategy (OMWCS)

M10	Restoration of mineral workings
W6	Landfill and other permanent deposit of waste to land
C1	Sustainable development
C2	Climate change
C3	Flooding
C4	Water Environment
C5	Local environment, amenity and economy
C7	Biodiversity and Geodiversity

C8 Landscape
C10 Transport
C11 Rights of Way
C12 Green Belt

• Oxfordshire Mineral and Waste Local Plan 1996 (OMWLP)
CY3 After uses of Cassington – Yarnton area
CY4 Promotion of pedestrian/ cycle routes

• Cherwell Local Plan (CLP1) 2031
Policy PSD 1 Presumption in favour of sustainable development
Policy ESD 6 Sustainable flood risk management
Policy ESD 8 Water resources
Policy ESD 9 Protection of the Oxford Meadows SAC
Policy ESD 10 Protection and enhancement of biodiversity and the natural environment
Policy ESD 13 Local landscape protection and enhancement
Policy ESD 14 Oxford Green Belt
Policy ESD 17 Green infrastructure

• Cherwell Local Plan 1996 (saved policies) (CLP)
C1 Protection of sites of nature conservation value
C2 Development affecting protected species
C7 Landscape conservation
TR7 Minor Roads
TR10 Heavy Good Vehicles
ENV1 Pollution control
ENV7 Development affecting water quality
ENV8 Flood Defence

Caulmert
engineering environmental planning

Registered Office: InTec, Parc Menai, Bangor, Gwynedd, LL57 4FG
Tel: 01248 672666
Fax: 01248 672601
Email: contact@caulmert.com
Web: www.caulmert.com