



Dean Swann CIHT FIHE



## Land at Culham No1 Site, Culham

Drainage: Proof of Evidence

PINS Reference: NATTRAN/SE/HAO/286 (DPI/U3100/23/12)

# Document Control Sheet

<b>Document Title</b>	Drainage: Proof of Evidence
<b>Document Ref</b>	10812 POE01 Rv0
<b>Project Name</b>	Land at Culham No1 Site, Culham
<b>Client</b>	CEG
<b>In relation to</b>	PINS reference: NATTRAN/SE/HAO/286 (DPI/U3100/23/12) The CPO and Side Roads Order were both made by Oxfordshire County Council on 21 December 2022.
<b>Dated</b>	January 2024

## Contents

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1	Organisation and Proof of Evidence Author.....	3
2	Introduction.....	4
3	Local Planning Policy Compliance.....	6
4	Site Drainage and Site Topography .....	8
5	Sustainable Drainage Systems.....	11
6	Overall Conclusion.....	13
7	References.....	14

## Appendices

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- Appendix A – OCC Cop Plan (GH-132861001-LOLP-LEDA-1 revision P02.2)
- Appendix B – Existing Levels Plan (10812-EW-01 A)
- Appendix C – High level Cut and Fill (10812-EW-05 A)
- Appendix D - Flood Risk Assessment and Drainage Strategy (10812-DR-01 C)
- Appendix E – Constraints and Opportunities Plan (10812-SK-02 A)

# 1 Organisation and Proof of Evidence Author

## Brookbanks

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- 1.1** I work for Brookbanks. Brookbanks is a leading development consultancy in the planning promotion of residential and commercial led projects. Across the UK, we are currently providing advice to land promoters and developers on many strategic residential and commercial development sites ranging from 100 – 5,500 residential dwellings and / or in excess of 100 ha of business and commercial property.
- 1.2** Now with 26 years of operation, the company specialises in the pre and post planning delivery of major development initiatives and is currently working on some of the largest projects being executed across the UK. Our team has significant and probably unparalleled experience in successfully providing multi-disciplinary services to deliver strategic land through the planning process and into production.

## Dean Swann

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- 1.3** I am a HND qualified Civil Engineer and act as the Technical Director for Brookbanks. I am a lead in the Highways and Environmental Services provided by Brookbanks and in particular oversee the Hydrology Team including flood risk and drainage services. I am the witness for Flood Risk and Surface Urban Drainage Systems infrastructure.
- 1.4** I have 38 years experience in engineering consultancy and have specialised in the delivery of strategic development planning applications. I have also acted as expert witness on numerous occasions.
- 1.5** I through Brookbanks, have been involved in the site known as Culham No1. Site since 2015, providing drainage, Utilities, ground conditions, noise, air and general engineering advice to support the emerging proposals.

## Statement of Truth

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- 1.6** My evidence, set out herein, is true and has been prepared and is given in accordance with the guidance of my professional training and I confirm that the opinions expressed are my true and professional opinions.

## 2 Introduction

- 2.1** This Proof of Evidence (POE) supports the original Objection to CPO as submitted on behalf of CEG on the 23<sup>rd</sup> March 2023. It also supports the subsequent Statement of Case (SOC<sup>1</sup>) as submitted on behalf of CEG on the 14<sup>th</sup> December 2023). Finally it responds to the undated Oxfordshire County Council joint Statement of Case (JSOC<sup>2</sup>) as led by Oxfordshire County Council relating to CPOs and accompanying Side Roads Order for:

“The Oxfordshire County Council (Didcot Garden Town Highways Infrastructure – A4130 Improvement (Milton to Collett Roundabout), A4197 Didcot to Culham Link Road, and A415 Clifton Hampden Bypass) Compulsory Purchase Order 2022”

Finally, reference is made to the subsequent CEG objection<sup>3</sup> following the Statement of Cases as referred to above.

- 2.2** The CPO parcels in question and detail within this POE are 16/6a, 16/6g, 16/6j and 16/6z as detailed on Oxfordshire County Council drawing GH-132861001-LOLP-LEDA-1 revision P02.2, in Appendix A. It is understood that the County Council proposes to acquire such areas for the provision of works compounds during the construction stage of the wide road scheme as stated in JSOC<sup>4</sup>.
- 2.3** The comments within this POE relate specifically to section 4 and paragraph 4.5 of the above SOC and work completed by me on behalf of Brookbanks in the preparation of supporting an imminent Outline Planning Permission for the development of land known as Culham No 1 and for the purposes of this evidence is the “Site” as shown within the redline on the plan in Appendix B. It should also be understood that the Site is allocated in the District Council’s Local Plan and that the improvements by Oxfordshire Council as referred to in paragraph 2.1 of this POE, that the development of the Site supports the delivery of those improvements. Further details of the allocation are referenced in Carter Jonas Proof of Evidence dated January 2024, in particular section 3 paragraphs 3.1 through 3.4 .
- 2.4** The imminent planning application will seek outline permission for the following development:

“Outline planning application (with all matters reserved) for the following:

- Up to 115,000sq.m of employment floorspace [Use Class B2, B8 and E(g)];
- Up to 2,500sq.m of hotel floorspace (equating to approximately 100 hotel bedrooms) [Use Class C1];
- Up to 600sq.m of retail floorspace [Use Class E(a) and (b)];
- Up to 500sq.m of health club / gym floorspace [Use Class E(d)];
- Up to 500sq.m of creche / children’s nursery floorspace [Use Class E(f)]; and
- Up to 800sq.m of restaurant / public house floorspace [Sui Generis].”

**2.5** I have set out this Proof in the following order to demonstrate in a robust and comprehensive manner the conditions that have driven the drainage proposals envisaged by the forthcoming planning application for development of the Site, and that as a consequence, how the drainage proposals and wider infrastructure works would be unduly affected if the land is subject to compulsory acquisition and or the use as working space / works compounds etc. This POE follows the following structure:

- 3) *Discussion on local planning policy requirements and compliance affected by the CPO land*
- 4) *Discussion on the existing drainage and topography, of which the CPO land forms Part*
- 5) *Sustainable Drainage Design and advice/guidance followed*
- 6) *Conclusion*

## 3 Local Planning Policy Compliance

- 3.1** I am able to demonstrate that the drainage proposals are in full compliance with the development plan and adopted local planning policies.
- 3.2** South Oxfordshire District Council adopted its 2035 Local Plan in 2020. The following policies from the Local Plan relate directly to the Site and flood risk and drainage and again reference is made to Carter Jonas Proof of Evidence of January 2024 section 3, paragraphs 3.1 to 3.4.
- 3.3** Policy STRAT9: Land Adjacent to Culham Science Centre Site Area directly relates to the Site but does not have any specific flood risk or drainage policy. However for planning and development generally Policy EP4:Flood Risk would generally apply;

### ***Policy EP4: Flood Risk***

1. *The risk and impact of flooding will be minimised through:
 
  - i) *directing new development to areas with the lowest probability of flooding;*
  - ii) *ensuring that all new development addresses the effective management of all sources of flood risk;*
  - iii) *ensuring that development does not increase the risk of flooding elsewhere; and*
  - iv) *ensuring wider environmental benefits of development in relation to flood risk.**
2. *The suitability of development proposed in Flood Zones will be strictly assessed using the ‘Sequential Test’ and where necessary the ‘Exceptions Test’. A sequential approach should be used at site level.*
3. *A site-specific Flood Risk Assessment (FRA) should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1 a FRA should accompany all proposals involving:
 
  - *sites of 1 hectare or more;*
  - *land which has been identified by the Environment Agency as having critical drainage problems;*
  - *land identified in the Strategic Flood Risk Assessment as being at increased flood risk in future; or*
  - *land that may be subject to other sources of flooding, where development would introduce a more vulnerable use.**
4. ***All development proposals must be assessed against the current South Oxfordshire Strategic Flood Risk Assessment or any updates and the Oxfordshire Local Flood Risk Management Strategy to address locally significant flooding. Appropriate mitigation and management measures must be implemented and maintained.***
5. ***All development will be required to provide a Drainage Strategy. Development will be expected to incorporate Sustainable Drainage Systems and ensure that run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Development should strive to reduce run-off rates for existing developed sites.***
6. ***Sustainable Drainage Systems should seek to enhance water quality and biodiversity in line with the Water Framework Directive***

- 3.4** Particular attention is drawn to points 4, 5 and 6 of the policy, in terms of drainage development of the Site. These approaches are not conducive to a piece meal approach to its development in terms of drainage or the infrastructure provided. Drainage needs to be considered holistically for the Site. From day one of the drainage design process, a complete system to outfall needs to be envisaged for the Site in line with intended phasing and therefore delivery.
- 3.5** The Lead Local Flood Authority (LLFA) and the Drainage Officer for the Vale of the White Horse District Council have attended meetings discussing the overall development of the Site and its wider environs. Specific reference is made to comments received in those discussions from the LLFA who have said on several occasions, paraphrased “that the design of the development should be led by the needs of the drainage and not the other way around”.

## 4 Site Drainage and Site Topography

**4.1** I am able to demonstrate that the Site drainage regime and the existing topography demonstrate that the proposed drainage scheme follows existing drainage routes and is a rational and compliant design within the existing Site constraints detailed below.

### Existing Site Drainage Regime

**4.2** Within the Site there is an existing watercourse that flows from west of the railway line, crosses the south west corner of the Site diagonally and then is culverted under the A415. There is a second watercourse that crosses the east of the Site, the majority of which is believed to be culverted. This particularly culverted water course is believed to partially run under the land proposed to be acquired by Oxfordshire County Council through the CPO.

**4.3** The two watercourse are then understood to join underground, before flowing under the A415. These onsite watercourses belong to an unnamed tributary of the River Thames which flows approximately 1.2km south of the proposed development Site.

**4.4** The proposed development area in the Site is classed as a brownfield site as the Site is currently occupied with existing warehouses. Given its age there are no formal sustainable urban drainage system in place. It is assumed that surface water from the 7.5ha of existing development flows overland and into gullies and a traditional piped system, that eventually discharge unrestricted into either of the two identified watercourses.

**4.5** The exiting features identified above are illustrated on **Figure 5-3** below:

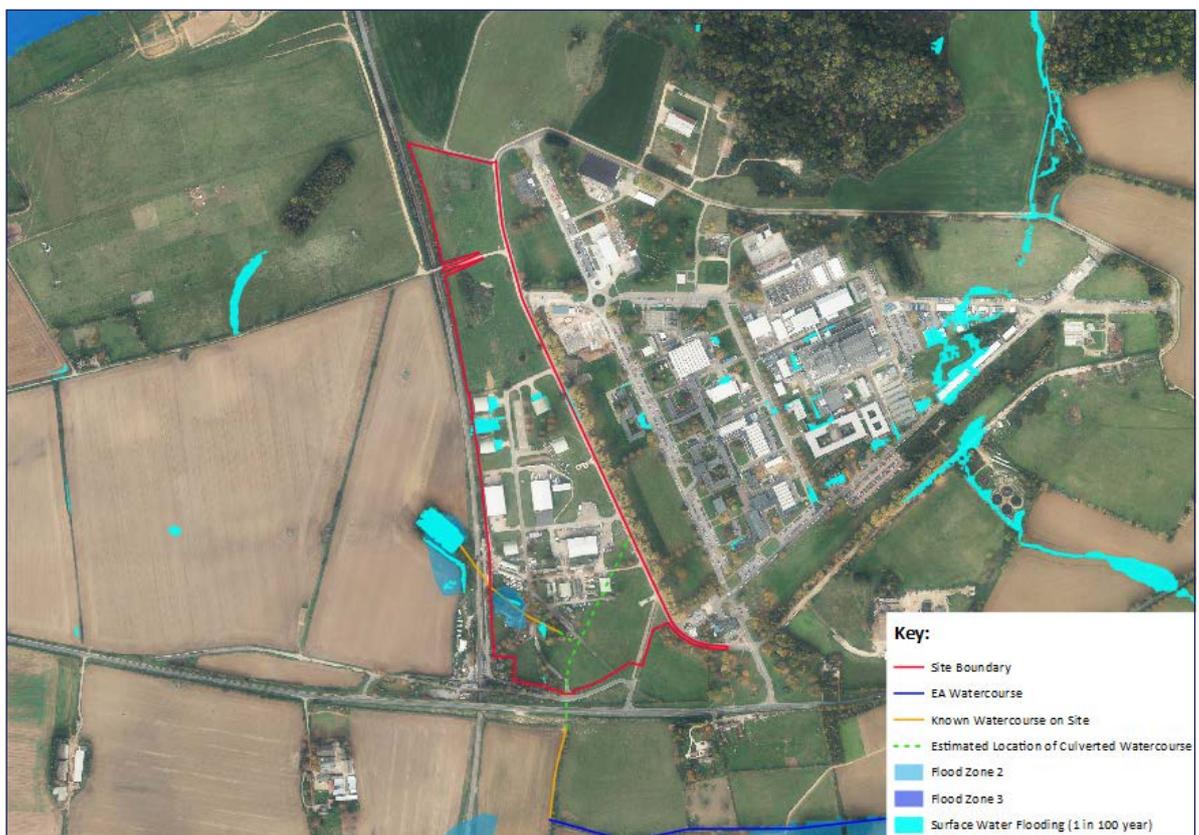


Figure 4-1: Existing Site Conditions

## Existing Topography

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Complete site within proposed Redline

- 4.6** As part of a former airfield, the existing Site gradients are relatively shallow, generally falling from north to south. From a Topographic Survey, produced by MK Surveys in July 2016, it's been established that the majority of the Site lies between 57.0m and 59.0m AOD. In the southern third of the Site, the ground falls to the west, reaching its lowest level of circa 52.0m AOD where the existing water courses are present as discussed above. The ground then rises again to meet the A415 Abingdon Road. An indication of existing levels is given in Appendix B.
- 4.7** On site there are many existing buildings, of general industrial usage. The total area of these buildings is circa 16,200m<sup>2</sup>. There are also numerous other roads, parking areas, and service yards which are identified on the survey, with an area of 20,675m<sup>2</sup>. There is a main road running from south to north through the Site, and three other minor roads, also serving the Site.
- 4.8** The Site currently has several areas and plateaus which are thought to be historic piece meal and discrete constructions including the historic Airfield use. There is no evidence of an holistic approach taken to design and drainage.

CPO land for Site compound

- 4.9** Plots 16/6a, 16/6g, 16/6j and 16/6z consist of grassed areas in the south, eastern and central areas of the proposed red line as referred to in paragraph 2.3 of this POE. It slopes down from the south eastern corner of the aforementioned plots to its Northern corner. Levels range from 58.0m AOD to 55.5m. There are also two manholes located within the plots which are thought to lay along the route of the water main that crosses the site in this location. This is taken from utility records received for the Site. Service enquiry findings are contained on drawing 10812-CP-001 in Appendix E.

## Conclusion on Existing Conditions

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- 4.10** The low point of the Site is in the south west corner following the watercourse through the site. The Site falls from north to south, however gradients are shallow and has several unconnected plateaus due to historic development. Site gradients also vary locally with steps and embankments at various plateau points.
- 4.11** The existing drainage regime is not holistic or sustainable, which would be a requirement for any sensibly planned redevelopment of the Site. In addition plot footprints will change across the Site with larger buildings and denser development with associated hard and soft landscaping and parking for any new proposal. This higher density is clearly visible on the Drainage Proposals as shown in Appendix D of this POE when compared to the aerial image in Figure 4-1. The lowest point is in the south of the Site and this would not be altered through the new proposed development and any new layout, as this is the natural outfall to the two water courses that drain the Site.
- 4.12** The two watercourse are believed to join underground within the CPO land before flowing under the A415. These onsite watercourses belong to an unnamed tributary of the River Thames which flows approximately 1.2km south of the proposed development Site.

#### Earthworks for Proposed development

- 4.13** A preliminary assessment of potential proposed levels and finished floor levels has been carried out based on the building footprints from concept layouts. This layout is considered to be commensurate with other employment developments of similar size and nature, and is therefore held to be appropriate to inform the extent of earthworks likely required.
- 4.14** The Site requires considerable rationalisation with areas of cut and fill across the Site. This is to deliver development plateaus for the new, more dense layout and for the Site to be interconnected from both an infrastructure and drainage perspective.
- 4.15** When considering areas for cut and fill, the final levels are considered along with the suitability of the material. This is especially true from areas of cut which for site balancing would be have that cut material considered for fill elsewhere. To that end, the CPO plots affected are relatively free of development presently and has from mapping, not been developed in the past. From trial holes on the site for infiltration testing, the materials in the CPO plots affected are fairly uniform and not thought to be contaminated or made ground. They are therefore highly suitable at present for areas of cut to then become fill elsewhere on the site. Finally, lowering the CPO plots affected, either as a whole or in part would be beneficial to the drainage strategy which looks to deliver a north to south conveyance and management to an outfall in to the existing water courses on Site. These are located immediately to the west of the CPO plots affected.
- 4.16** An initial high level cut and fill assessment is shown in Appendix C. The blue areas on that plan show substantial cut within the CPO plots affected. The material won from this area would be used to fill other areas on the plan to the north and east as discussed above.

## 5 Sustainable Drainage Systems

- 5.1 I am able to demonstrate that the drainage proposals envisaged by the imminent planning application are in general compliance with the Sustainable Drainage System requirements for new development. This is as detailed in the Oxfordshire County Council guidance document “Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire” V1.2 and the Oxfordshire County Council online Flood Toolkit located here:

*Surface Water Drainage - Oxfordshire Flood Toolkit.*

### **The Outline Sustainable Drainage Strategy includes:**

- 5.3 in accordance with the Oxfordshire County Council Guidance Document as above in paragraph 4.4 of that document it states “Developers should consider opportunities for rainwater harvesting and recycling in these water-stressed areas, and infiltration wherever possible to maximise groundwater recharge.” Therefore as a first step, Infiltration testing was completed by a competent geotechnical investigation firm, Geo Environmental Group or GEG through works on site carried out in April 2015. Through that engagement testing was carried out across the Site which tests both the geology along with drainage rates back into the local strata. Of the latter, they found that infiltration rates across the Site would not be a viable option as a method of discharge for surface water and therefore a scheme that discharged surface water to the local existing water courses would be next most viable solution.
- 5.4 Surface water is therefore expected to be discharged into the existing watercourses in the south of the proposed development.
- 5.5 A conceptual drainage and treatment train for the surface water on the proposed development looks to use various methods of storage and treatment. These are considered at this stage to be a mix of porous paving, rills and swales, both through a central corridor of the development, which is a predominantly landscaped area and elsewhere, serving bespoke infrastructure such as roads and carparks.
- 5.6 The drainage will be conveyed in a southerly direction towards the existing water courses for storage on site before being discharged.
- 5.7 The requirement to control water to greenfield run off rates for and up to the 1:100yr storm event including climate change, with the increase in density of development, requires some larger retention structures within the proposed development. These structures are in the form of basins in the southern section of the proposed development and include a basin within the CPO plots affected. These basins and the larger conveyance structures, are shown in Appendix D on an illustrative drainage strategy design 10812-DR-01 Rev C.
- 5.8 Basins have been designed away from built development and close to the existing water course, where possible. Should the basins therefore overflow in extreme events or due to blockages, surface water shall flow downhill and directly into the watercourse. The exceedance routes will not pass through built development areas.
- 5.9 A combination of swales and detention basins have been used within this proposed development in order to provide natural, on surface conveyance and storage of surface water. By allowing surface water to flow through the swales and other structures before entering the basins, we are providing additional stages of treatment before discharge, especially when comparing that to what happens today. This aligns with the Oxfordshire County Council Guidance Document as referred to above.

## Summary Surface Water Drainage Strategy

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- 5.10** In accordance with The SuDS Manual C753 and national government guidance the SuDS across the proposed development have been designed in order to store storm water for the 1 in 100 year + 40% climate change storm event.
- 5.11** Surface water that is stored within the basins has been designed to discharge at QBAR (in accordance with the SuDS Manual and national and local government guidance) into the existing unnamed watercourses that flow in the south opposite the CPO land.
- 5.12** By discharging to a QBAR rate, the onsite basins are providing a betterment to the existing uncontrolled runoff rates from the Site as it is today. This therefore, reduces the rate storm water enters the watercourses and reduces the risk of flooding both on the proposed development and further downstream.
- 5.13** The size of the development and the increased density of built development on Site will necessitate a mixed SuDS system to accommodate the sheer volume of water created by controlling runoff from the site as described in 5.13 above. A mixture of swales, basins and permeable areas will be required to achieve an appropriate and approved design. While design measures are interchangeable, it is understood that given site constraints and development density as described above, basins will be at the core of the main storage for the site.
- 5.14** The basins have been located in what will be the lowest lying areas within the proposed development following the extensive plateau works, in order for surface water to drain naturally via gravity. The larger final detention basins in the CPO plots affected have been placed adjacent to the water course, but outside of the identified Flood zone 2 by the Environment Agency. This placement strategy ensures that all SuDS connect into the existing features at convenient locations, but remain out of flood susceptible zones.
- 5.15** The Site currently does not have a system in place that improves the quality of surface water before discharging into the watercourse. The use of SuDS across the proposed development will provide at least 2-3 stages of treatment to surface water before it is discharged into the local water courses.

## 6 Overall Conclusion

- 6.1** The above sections demonstrate how drainage on the scheme has to be considered as a whole from initial concept to first submission for planning and beyond.
- 6.2** For this proposed development, the CPO plots affected and detailed in paragraph 2.2 lie adjacent to the discharge point to the existing water courses. It also forms a crucial area of material for the cut and fill requirements of the proposed development when balancing materials and rationalising plateaus for future construction and therefore the creation of a basin in the CPO plots affected.
- 6.3** As is usual for developments of this nature, regardless of where development may start, strategic earthworks and drainage infrastructure are constructed in the first phases of work. Once complete then secondary infrastructure such as services roads and then the main buildings are programmed and can be delivered.
- 6.4** If the CPO plots affected are to be returned at some unspecified date, it will still be necessary to construct temporary drainage measures along with unnecessary borrow pits in land that would have otherwise had been developed for employment use in the early stages of development. This will be required so that drainage is always available and that an earthwork balance can be achieved while the CPO plots affected are vested in the County Council. Once the land is returned then further works will need to be undertaken to establish development and drainage in this area akin to the original masterplan. This effectively is either abortive works and or alteration and double handing of materials which, not only have a and increased cost and viability implication for the Site, but also has safety implications due to the abortive and unnecessary works required to develop the site in two stages.
- 6.5** If the CPO plots affected are not returned and remains within the highway then the development area would be reduced from that seen today, with an unnecessary unused swathe of open land between the development and highway.
- 6.6** To lose control of over 1ha of land from the proposed development and have that land placed in effective limbo with no defined timescale for its return and without discussion with CEG or the landowners before the CPO stage, is not conducive to effective infrastructure planning and more importantly compliant drainage design. The County Council have also not demonstrated why it is necessary for the works compound to be sited in the currently proposed location. Indeed CEG have with both Brookbanks and other members of the development team, identified alternative area within the proposed development that could accommodate works compound areas which do not require holistic consideration for either infrastructure or drainage. In addition these areas that lie within land under the same ownership as the land proposed to be taken via CPO for compound purposes, and that both promoter and landowner have expressed a readiness to work with OCC and appointed contractors to essentially 'swap' these areas. This point is also made in the Carter Jonas Proof of Evidence January 2024, paragraphs 5.17 to 5.20.

## 7 References

<sup>1</sup> SOC CEG Statement of Case, PINS reference M.3

<sup>2</sup> JSOC County Council Statement of Case, PINS reference M.10

<sup>3</sup> CEG Objection J.22

<sup>4</sup> JSOC, paragraph 16.102 of the Council's Statement of Case Core Document M.10



## | Appendix A –OCC COP Plan



**KEY:**

	Red Line Boundary
	Land to be Acquired Permanently
	Land to be Acquired Temporarily
	Rights to be Acquired Permanently



Plot Number	Landowner	Land Take Requirement	Plot Area (SQM)
16/6a	LEDA Properties Limited	Land to be Acquired Temporarily	9788
16/6aa	LEDA Properties Limited	Land to be Acquired Temporarily	344
16/6b	LEDA Properties Limited	Land to be Acquired Temporarily	2757
16/6bb	LEDA Properties Limited	Land to be Acquired Temporarily	91
16/6c	LEDA Properties Limited	Land to be Acquired Temporarily	329
16/6cc	LEDA Properties Limited	Land to be Acquired Temporarily	243
16/6d	LEDA Properties Limited	Land to be Acquired Permanently	346
16/6e	LEDA Properties Limited	Land to be Acquired Permanently	3157
16/6f	LEDA Properties Limited	Land to be Acquired Permanently	45
16/6g	LEDA Properties Limited	Land to be Acquired Temporarily	78
16/6h	LEDA Properties Limited	Land to be Acquired Permanently	761
16/6i	LEDA Properties Limited	Land to be Acquired Permanently	1540
16/6j	LEDA Properties Limited	Land to be Acquired Temporarily	1603
16/6k	LEDA Properties Limited	Land to be Acquired Permanently	88
16/6l	LEDA Properties Limited	Land to be Acquired Permanently	14
16/6m	LEDA Properties Limited	Land to be Acquired Permanently	249
16/6n	LEDA Properties Limited	Land to be Acquired Permanently	61
16/6o	LEDA Properties Limited	Land to be Acquired Temporarily	688
16/6p	LEDA Properties Limited	Land to be Acquired Permanently	15
16/6q	LEDA Properties Limited	Land to be Acquired Permanently	221
16/6r	LEDA Properties Limited	Land to be Acquired Temporarily	1631
16/6s	LEDA Properties Limited	Land to be Acquired Temporarily	380
16/6t	LEDA Properties Limited	Land to be Acquired Permanently	338
16/6u	LEDA Properties Limited	Land to be Acquired Permanently	481
16/6v	LEDA Properties Limited	Land to be Acquired Permanently	717
16/6w	LEDA Properties Limited	Land to be Acquired Permanently	11
16/6x	LEDA Properties Limited	Land to be Acquired Permanently	200
16/6y	LEDA Properties Limited	Land to be Acquired Permanently	504
16/6z	LEDA Properties Limited	Land to be Acquired Permanently	228
16/6aa	LEDA Properties Limited	Land to be Acquired Temporarily	1334
16/6ab	LEDA Properties Limited	Land to be Acquired Temporarily	137
16/6ac	LEDA Properties Limited	Land to be Acquired Temporarily	1274
16/6ad	LEDA Properties Limited	Land to be Acquired Permanently	45
16/6ae	LEDA Properties Limited	Land to be Acquired Temporarily	32051
16/6af	LEDA Properties Limited	Land to be Acquired Permanently	365
16/6ag	LEDA Properties Limited	Land to be Acquired Permanently	3517
16/6ah	LEDA Properties Limited	Land to be Acquired Permanently	135
16/6ai	LEDA Properties Limited	Land to be Acquired Permanently	3096
16/6aj	LEDA Properties Limited	Land to be Acquired Permanently	356
16/6ak	LEDA Properties Limited	Land to be Acquired Permanently	105
16/6al	LEDA Properties Limited	Land to be Acquired Permanently	3227
16/6am	LEDA Properties Limited	Land to be Acquired Permanently	486
16/6an	LEDA Properties Limited	Land to be Acquired Permanently	1067
16/6ao	LEDA Properties Limited	Land to be Acquired Permanently	336
16/6ap	LEDA Properties Limited	Land to be Acquired Permanently	1376
16/6aq	LEDA Properties Limited	Land to be Acquired Temporarily	25
16/6ar	LEDA Properties Limited	Land to be Acquired Temporarily	24
16/6as	LEDA Properties Limited	Land to be Acquired Temporarily	47

PO1	First Issue	21/1/2022	AH	JD	SR
Rev	Description	Date	By	Check	Approved

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THE OXFORDSHIRE COUNTY COUNCIL  
 (DIDCOT GARDEN TOWN HIGHWAYS  
 INFRASTRUCTURE – A4130  
 IMPROVEMENT (MILTON GATE TO  
 COLLETT ROUNDABOUT), 4197 DIDCOT  
 TO CULHAM LINK ROAD, AND A415  
 CLIFTON HAMPDEN BYPASS)  
 COMPULSORY PURCHASE ORDER 2022

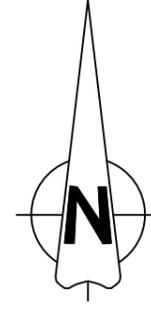
LAND OWNER LAND PLAN -  
 LEDA PROPERTIES LIMITED  
 SHEET 1 OF 2

Drawn	Checked	Approved	Date
AH	**	**	11/07/23

GH Project Number	Scale at A3
132861.001	1:1,250
Drawing Number	Revision
GH-132861001-LOLP-LEDA-1	P02.2

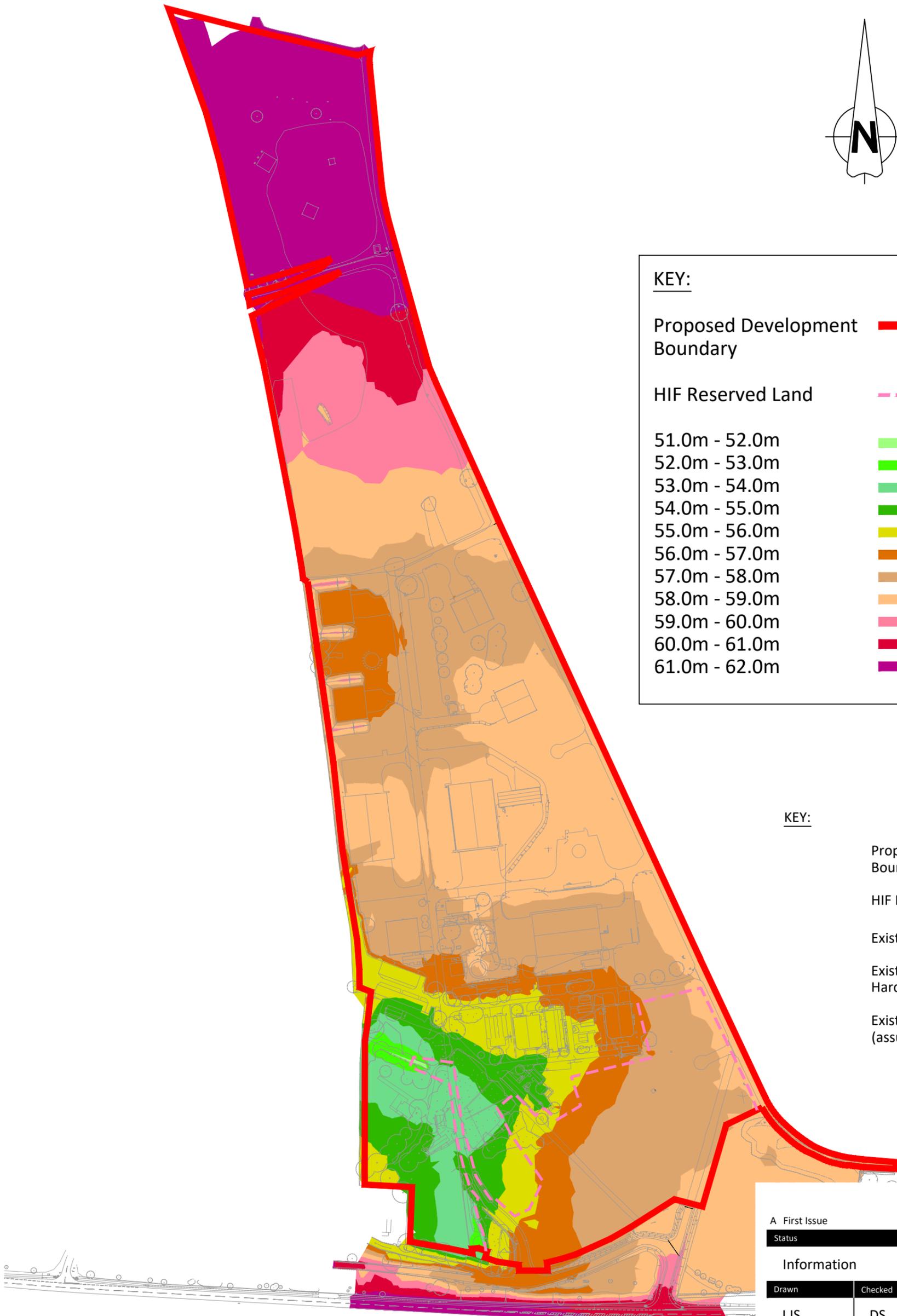


## | Appendix B – Existing Levels Plan



**KEY:**

Proposed Development Boundary	
HIF Reserved Land	
51.0m - 52.0m	
52.0m - 53.0m	
53.0m - 54.0m	
54.0m - 55.0m	
55.0m - 56.0m	
56.0m - 57.0m	
57.0m - 58.0m	
58.0m - 59.0m	
59.0m - 60.0m	
60.0m - 61.0m	
61.0m - 62.0m	



**KEY:**

	Proposed Development Boundary
	HIF Reserved Land
	Existing Buildings
	Existing Concrete Hardstanding Areas
	Existing Tarmac Roads (assumed concrete below)

A First Issue		LJS DS DS 30.11.21
Status	Status Date	
Information	Nov 2021	
Drawn	Checked	Date
LJS	DS	30.11.2021
Scale	Number	Rev
N.T.S	10812-EW-01	A



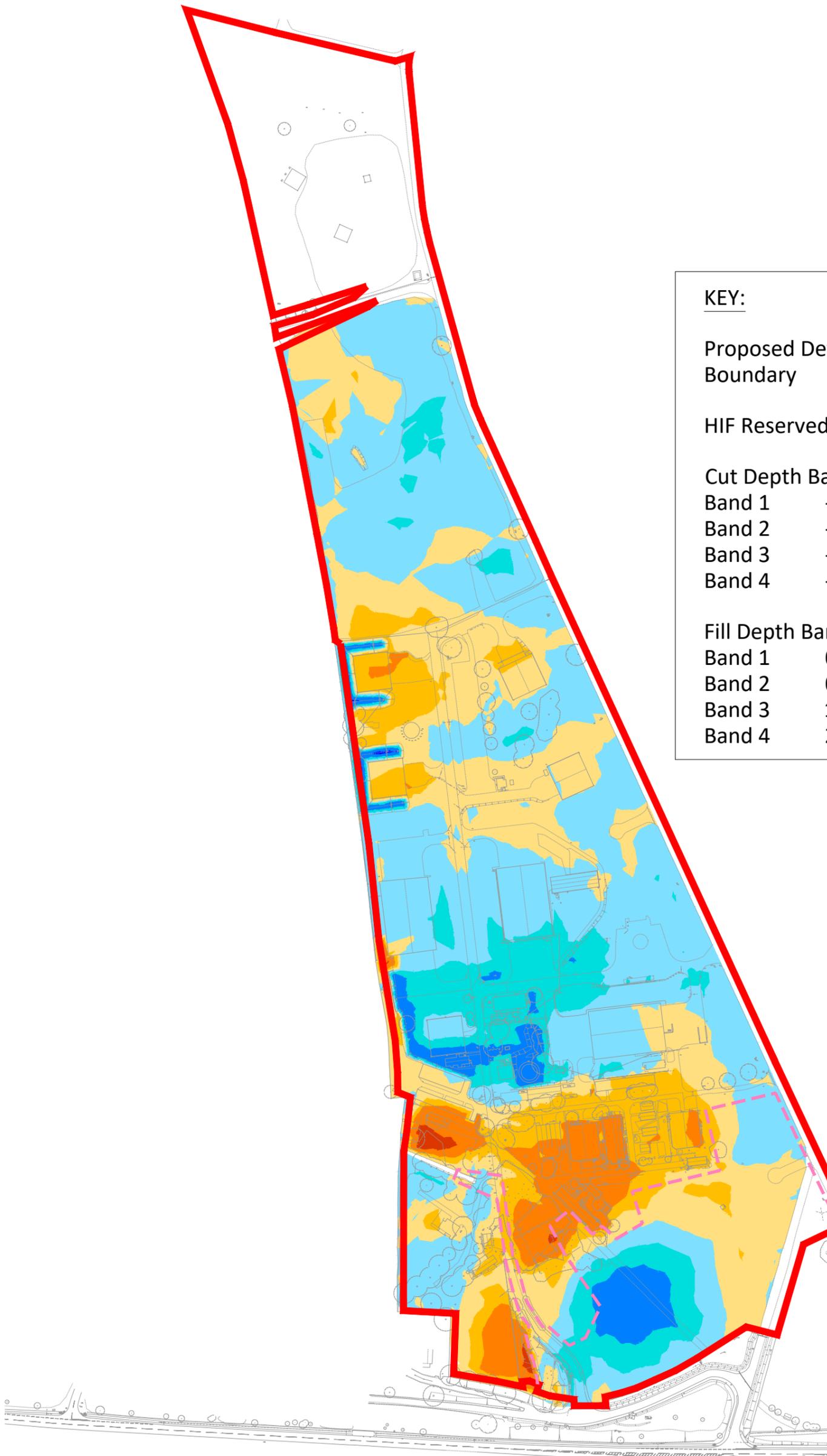
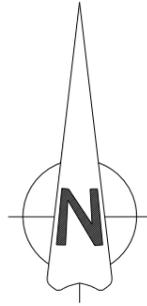
Culham No. 1 Site

Existing Land Form & Levels



6150 Knights Court, Solihull Parkway, Birmingham, B37 7WY  
 T +44 (0)203 958 5400 E mail@brookbanks.com  
 W brookbanks.com

## Appendix C – High Level Cut and Fill Exercise



**KEY:**

Proposed Development Boundary	
HIF Reserved Land	
<b>Cut Depth Bands</b>	
Band 1	-0.0m to -0.5m
Band 2	-0.5m to -1.0m
Band 3	-1.0m to -2.0m
Band 4	-2.0m to -3.0m
<b>Fill Depth Bands</b>	
Band 1	0.0m to 0.5m
Band 2	0.5m to 1.0m
Band 3	1.0m to 2.0m
Band 4	2.0m to 3.0m

B Removal of Proposed Masterplan KM DS DS 16.01.24  
 A First Issue LJS DS DS 06.12.21

Status	Status Date	
<b>Information</b>		
JAN 2024		
Drawn	Checked	Date
LJS	DS	06.12.2021
Scale	Number	Rev
N.T.S.	10812-EW-05	B

Culham No. 1 Site

Proposed Cut & Fill



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# Appendix D – Flood Risk Assessment and Drainage Strategy (10812-DR-01 C)



**NOTES:**

1. Do not scale from this drawing.
2. All dimensions are in metres unless otherwise stated.
3. Brookbanks Consulting Ltd has prepared this drawing for the sole use of the client. The drawing may not be relied upon by any other party without the express agreement of the client and Brookbanks Consulting Ltd. Where any data supplied by the client or from other sources has been used, it has been assumed that the information is correct. No responsibility can be accepted by Brookbanks Consulting Ltd for inaccuracies in the data supplied by any other party. The drawing has been produced based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.
4. No part of this drawing may be copied or duplicated without the express permission of Brookbanks Consulting Ltd.

**KEY:**

- Site Boundary
- Illustrative SuDS Location (storage for 11ha)
- Illustrative Permeable Paving in ground level car parking areas (storage for 1ha)
- Illustrative Conveyance Swale
- Surface Water Flow Direction
- Existing Watercourse
- Estimated Location of Culverted Watercourse
- HIF Reserved Land
- Foul Connection

**Development Catchment A**  
 Total Developed Area (ha): 3.50  
 Total Hard Area (ha): 3.50  
 Approx. Run-off Rate (l/s): 16.79

**Porous Car Parking v4**  
 Total Developed Area (ha): 0.25  
 Design Discharge Rate (l/s): 0.39  
 Total Storage Volume (m<sup>3</sup>): 214  
 Total Storage Area (m<sup>2</sup>): 3,000

Potential storage areas in tree pits and rainwater harvesting systems

**Development Catchment D**  
 Total Developed Area (ha): 1.00  
 Total Hard Area (ha): 1.00  
 Approx. Run-off Rate (l/s): 1.50

**Development Catchment B**  
 Total Developed Area (ha): 3.50  
 Total Hard Area (ha): 3.50  
 Approx. Run-off Rate (l/s): 7.20

**Basin A**  
 Total Developed Area (ha): 3.50  
 Design Discharge Rate (l/s): 5.26  
 Total Storage Volume (m<sup>3</sup>): 3,452  
 Total Basin Area (m<sup>2</sup>): 3,511

**Development Catchment C**  
 Total Developed Area (ha): 5.00  
 Total Hard Area (ha): 5.00  
 Approx. Run-off Rate (l/s): 23.99

**Basin B**  
 Total Developed Area (ha): 1.50  
 Design Discharge Rate (l/s): 2.26  
 Total Storage Volume (m<sup>3</sup>): 1,479  
 Total Basin Area (m<sup>2</sup>): 1,629

**Basin C**  
 Total Developed Area (ha): 5.00  
 Design Discharge Rate (l/s): 7.52  
 Total Storage Volume (m<sup>3</sup>): 4,959  
 Total Basin Area (m<sup>2</sup>): 4,974

C	SuDS Basin Option	KM	DS	DS	02.09.22
B	Underground Storage	KM	DS	DS	14.02.21
A	Second Issue	KM	DS	DS	24.11.21
-	First Issue	KM	DS	DS	30.11.21



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CEG

Culham No.1 Site  
 Oxfordshire

**Illustrative Surface Water  
 Drainage Strategy**

Status		Status Date
Draft		SEP 2022
Drawn	Checked	Date
KM	DS	24.11.21
Scale	Number	Rev
1:2000	10812-DR-01	C

UNTIL TECHNICAL APPROVAL HAS BEEN OBTAINED FROM THE RELEVANT LOCAL AUTHORITIES, IT SHOULD BE UNDERSTOOD THAT ALL DRAWINGS ARE ISSUED AS PRELIMINARY AND NOT FOR CONSTRUCTION. SHOULD THE CONTRACTOR COMMENCE SITE WORK PRIOR TO APPROVAL BEING GIVEN, IT IS ENTIRELY AT HIS OWN RISK.

## Appendix E – Constraints plan (10812-CP-001)

**Construction Design and Management (CDM)**

**Key Residual Risks**

Contractors entering the site should gain permission from the relevant land owners and/or principle contractor working on site at the time of entry. Contractors shall be responsible for carrying out their own risk assessments and for liaising with the relevant services companies and authorities. Listed below are Site Specific key risks associated with the project.

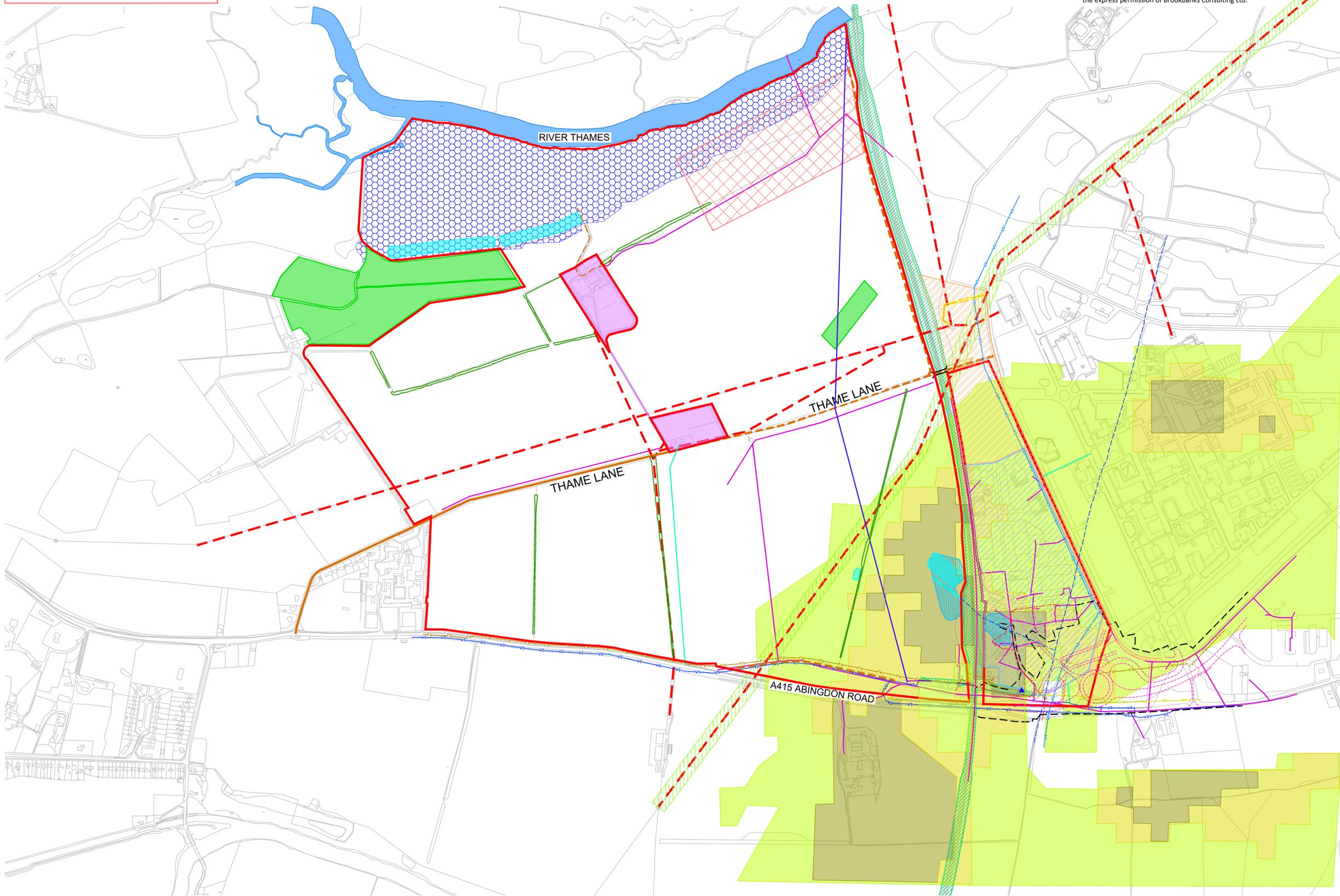
- 1) Overhead and underground services
- 2) Street Lighting Cables
- 3) Working adjacent to water courses and flood plain
- 4) Soft ground conditions
- 5) Working adjacent to live highways and railway line
- 6) Unchartered services
- 7) Existing buildings with potential asbestos hazards

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**KEY:**

- Allocation Boundary
- Existing OH HV Power Line
- Existing UG LV Cable
- 6m Wide Electricity Easement
- 40m Wide Electricity Easement
- Existing Pond
- Network Rail Land/Railway Line
- River Thames
- Existing Woodland
- Existing Road - Thame Lane Tarmac
- Unmade Road/Track
- Existing Bridge over Railway line (Listed)
- Existing Farm Land (Warren Farm) and Existing Housing to remain
- Culham Park Motocross Track to be demolished
- High risk of flooding
- Historic Flooding
- High Risk Groundwater Flooding
- Medium Risk Groundwater Flooding
- Low Risk Groundwater Flooding
- Existing Foul Sewer
- Existing Rising Main
- Existing Trunk Main (16")
- Existing Water Distribution Main
- Existing Private Water Main
- Pumping Station
- BT Cable
- Virgin Media
- Vodafone
- Existing Hedgerow
- Clifton Hampden Bypass Site Boundary/Extent of Works
- Clifton Hampden Bypass Proposed Road & Path Outline
- Possible Route of Partial Culverted Watercourse
- LEDA PROPERTIES LIMITED, under CEG Control - ON196259
- LEDA PROPERTIES LIMITED, under CEG Control - ON208645



First Issue CDW DS DS 17.01.2022

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**ceg**  
 Culham Innovation Park  
 Oxford

**Constraints Plan**

Status	Status Date
Draft	AUG 2021
Drawn	Checked
CDW	DS
Scale	Number
1:5000	10812-CP-001
	Rev
	-

0 100 200 300 400 500  
 METRES

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