

Intended for
PropCo

Document type
Report

Date
March 2023

Proposals for discharge of Planning Conditions relating to Contamination and Ground Gases

Royal Elm Park

Planning Enactment Works



Royal Elm Park

Planning Enactment Works

Project name **Royal Elm Park Planning Enactment**
Project no. **1620013486**
Recipient **[Name]**
Document type **[Text]**
Version **02**
Date **2023/03/30 March 2023**
Prepared by **Matthew Pannett**
Checked by **Damian Friel**
Approved by **Damian Friel**
Description **Proposals for discharge of Planning Conditions relating to Contamination and Ground Gases**

Ramboll
Cornerblock
Two Cornwall Street
Birmingham
West Midlands B3 2DX

T +44 121 230 1650
<https://uk.ramboll.com>

Confidential

This report is produced by Ramboll at the request of the client for the purposes detailed herein. This report and accompanying documents are intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party and shall not be liable for any loss, damage or expense of whatsoever nature which is caused by their reliance on the information contained in this report.

Doc ID / Version 0.1

Ramboll UK Limited
Registered in England & Wales
Company No: 03659970
Registered office:
240 Blackfriars Road
London
SE1 8NW

Contents

1.	Introduction	2
1.1	Purpose of this Report	2
1.2	The proposed Royal Elm Park Development	2
1.3	Site Conditions Summary	2
1.4	The Planning Enactment Works	4
1.5	Relevant planning Conditions	4
2.	Condition 3	5
2.1	Proposed Discharge	5
2017 to 2021 Monitoring Results		6
Summary		6
3.	Condition 4	7
3.1	Proposed Discharge	7
4.	Condition 7	8
4.1	Proposed Discharge	9
4.1.1	Part (a)	9
4.1.2	Part (b)	9
4.1.3	Part (c)	9
5.	Condition 68	11
5.1	Proposed Discharge	11
6.	Condition 70	12
6.1	Proposed Discharge	12
7.	Condition 71	13
7.1	Proposed Discharge	13
8.	Condition 72	14
8.1	Proposed Discharge	14
9.	Condition 73	16
9.1	Proposed Discharge	16

Appendices

Appendix 1

Drawings for the proposed enactment works

Appendix 2

Arup Environmental Strategy Report

Appendix 3

Ramboll Report 'Summary of Groundwater and Ground Gas Results'

1. Introduction

1.1 Purpose of this Report

This report details proposals to discharge pre-commencement conditions in respect of groundwater and ground gases for the Royal Elm Park development. The proposals reflect the limited construction works proposed to enact the planning application.

1.2 The proposed Royal Elm Park Development

The proposed development will contain several new buildings containing residential, leisure and commercial spaces. A convention centre building housing conference facility, office space and an ice rink is interlinked with an hotel and serviced apartment block with associated leisure facilities and food outlets. A central public plaza separates this building from the rest of the development which consists of seven separate residential blocks and a multi storey car park. A landscaped public amenity space is provided between the residential blocks which doubles up as a surface water drainage feature to handle run off during flood events. The proposed buildings are typically six to nine storeys high of varying steel, concrete, and timber construction. Due to the ground conditions, they will be supported on piled foundations and will typically have suspended reinforced concrete slabs at their lowest level.

1.3 Site Conditions Summary

The site is occupied by an authorised landfill beneath the site. Reading Football Club hold a Waste Management Licence (WML)/ Environmental Permit for the site. The licence status is given as "Closure", which means the landfill no longer receives waste. The landfill was licenced to accept waste type A4, which includes household, commercial and industrial waste. The Environmental Permit is only for the surcharged waste (approximately 3 m deep) deposited in 1997 over the top of an existing historic land-raise site.

The geology below the land raise is as follows:

The superficial geology shown on the BGS map is:

- Made ground;
- Alluvium, described by the BGS as clay, sand and gravel. The alluvium is mapped within the eastern half of the Site;
- River Terrace Deposits 1 (RTD 1) are shown along the northwestern boundary of the Site. River Terrace Deposits 2 (RTD 2), are mapped across the remaining western section of the Site. The BGS describe the RTD as sand and gravel, with local lenses of silt, clay or peat. The bedrock geology is as follows:
- The BGS maps show that the Site is underlain by London Clay and the Lambeth Group.
- London Clay is mapped across the southern half of the Site and is described by the BGS as mainly comprising bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. It commonly contains thin courses of carbonate concretions ('cementstone nodules') and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the

Confidential

top of the formation. At the base, and at some other levels, thin beds of black rounded flint gravel occur in places. Glauconite is present in some of the sands and in some clay beds, and white mica occurs at some levels. The BGS map indicates that the London Clay is absent in the north of the Site although this is not supported by the borehole data (refer to section 5.2).

- The Lambeth Group is mapped across the northern half of the Site beneath the superficial geology and is described by the BGS5 as variable sequences mainly of clay, some silty or sandy, with some sands and gravels, minor limestones and lignites and occasional sandstone and conglomerate. The Lambeth Group underlies the London Clay within the southern part of the Site.
- The Upper Chalk is present at depth beneath the Lambeth Group and is described as white nodular and soft Chalk with flint seams.

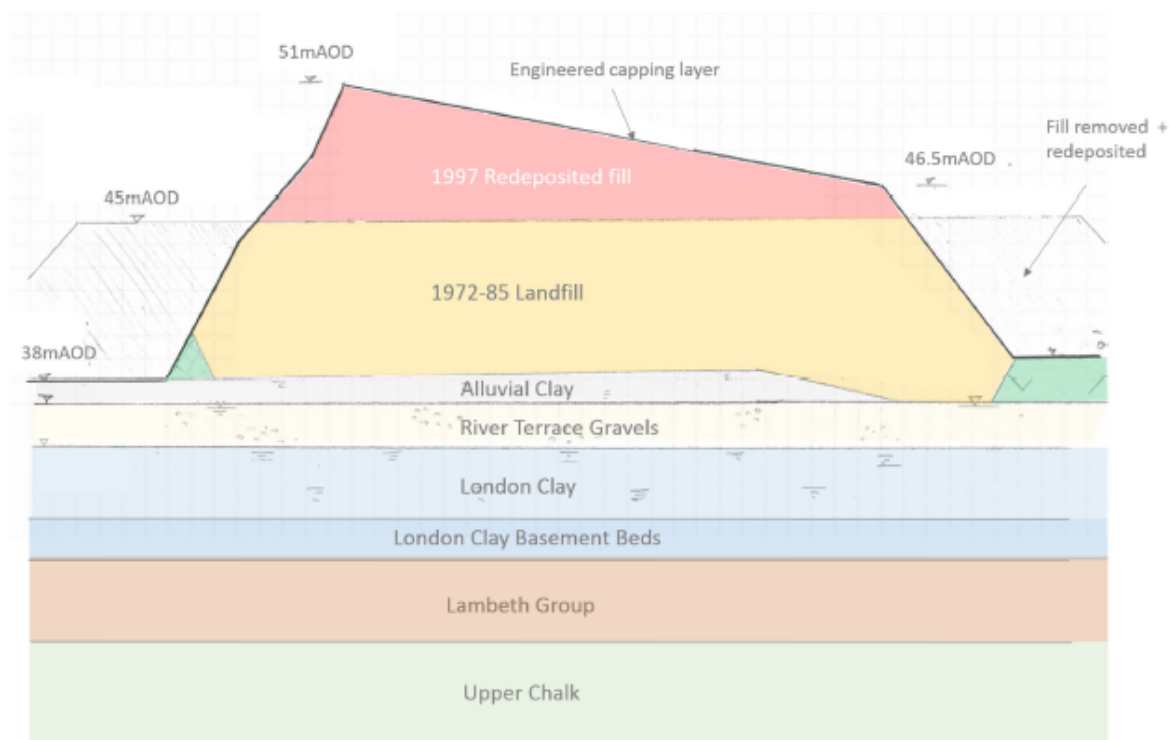


Figure 1: Summary of ground geology

A network of groundwater monitoring wells at the Site was installed at various stages, which are screened in the various landfill deposits and geological formations beneath the site. A simplified schematic cross section is presented below (taken directly from Arup¹) and summarises the relationships between these formations.

¹ Ove Arup & Partners Ltd., Proposed Redevelopment at Madejski Stadium, Environmental Strategy, on behalf of Reading Football Club, Ref. REP-240524-E002, 2 November 2017;

1.4 The Planning Enactment Works

The proposed enactment works consist of a single pile which is part of the foundations for the proposed multi-storey car park. Refer to Appendix 1 for drawings detailing to location and construction of the pile.

The works will briefly comprise:

1. Erection of fencing to provide security and limit safe access to the area of the works.
2. Provision of associated welfare facilities for the contractor.
3. Excavation to locate the geotextile membrane at the base of the capping layer. Local removal of the geotextile membrane to allow the CFA auger to operate without damage to the adjacent membrane.
4. Backfill of the excavation and placing of a suitable piling mat for support of the piling rig.
5. Assembly of the piling rig and construction of a single 600mm diameter CFA pile 3m into the Lambeth Group
6. Removal of the spoil arising from the pile construction to a licensed landfill site
7. Removal of the stone capping layer

1.5 Relevant planning Conditions

The planning conditions addressed by this report are 3, 4, 7, 68, 70, 71, 72 and 73.

2. Condition 3

Planning Condition 3 is as follows:

No development shall take place until an assessment of the nature and extent of **contamination (including ground gas)** has been submitted to and approved in writing by the Local Planning Authority. This assessment must be undertaken by a competent person, in accordance with relevant guidance and British Standards and shall assess any contamination on the site, whether or not it originates on the site. Moreover, it must include:

(i) a survey of the extent, scale and nature of contamination;

(ii) an assessment of the potential risks to:

- human health,
- property (existing or proposed) including buildings, crops, livestock, pets, woodland and service lines and pipes,
- adjoining land,
- surface waters,
- ecological systems,
- archaeological sites and ancient monuments.

2.1 Proposed Discharge

For a detailed risk assessment of the nature and extent of contamination including ground gas refer to the Arup report 'Environmental Strategy, Rev C, dated 7 December 2017' in appendix 1.

The Arup assessment is based on ground water and ground gas monitoring up to and including 2016. It identified the following contamination and gas risks:

Groundwater Contamination:

The dominant contaminants in the River Terrace Gravels and the Chalk were ammoniacal nitrates and Potassium, with some elevated levels, above UK DWS 2010 groundwater criteria, of Nickel, Manganese, Lead, Arsenic and Nitrate as NO₃ in the River Terrace Gravels. ²

Ground Gases:

The Arup Environmental Report, Appendix C note dated 17 February 2017, determined the characteristic gas situation (CS) to be predominantly CS4 with some results at CS5 and a design gas screening value (GSV) of 20L/hr.

Monitoring of ground water and ground gases is carried out on a continuous schedule by Reading Football Club as part of their obligations under their Environmental Permit (Permit number T/W/54/12/4/436) for top layer of waste material deposited during the original development of the site for Madejski Stadium. The groundwater, leachate and gas data have been regularly collected from the Site since July 1996 and were assessed in the Arup report up to 2016. Details of the ongoing monthly, quarterly, 6-monthly and annual groundwater and ground gases monitoring are scheduled in the Appendix B of the Arup Environmental report.

² Reference Arup Environmental Strategy, Rev C dated 7 December 2017.

2017 to 2021 Monitoring Results

Monitoring results from the permit monitoring from 2017 to 2021 have been collated and assessed against the level of contaminants against those on which the Environmental Strategy is based. Refer to Appendix 3 for the detailed assessment.

In accordance with the Environmental Strategy, Ammoniacal Nitrogen is the only contaminant of concern for which trigger levels are required to be determined in the River Terrace Gravels and the Chalk. The 2017 to 2021 monitoring identifies the following:

The monitoring results show that the level of groundwater contamination shows a clear seasonal variation in many wells, with a decrease in concentration during the spring and summer months. The concentrations also appear to have been relatively stable over the monitoring period.

Similarly, the monitoring results show that the ground gases to be consistent with the Arup assessment in 2017, namely predominantly CS4 with some results at CS5 and a design gas screening value (GSV) of 20L/hr.

Summary

Review of monitoring results from 2017 to 2021 show that the concentrations of key contaminants of Ammoniacal Nitrogen and Potassium, and ground gases methane and carbon dioxide, are consistent with those pre-2017. The risk assessment detailed in the Arup Environmental Strategy is still relevant and appropriate for discharge of the Planning Condition 3.

3. Condition 4

Planning Condition 4 is as follows:

No development shall take place until a detailed remediation scheme to bring the site to a condition suitable for the intended use by removing unacceptable risks to human health, buildings and other property and the natural and historical environment has been submitted to and approved in writing by the Local Planning Authority. The scheme must include all works to be undertaken, proposed remediation objectives and remediation criteria, an appraisal of remedial options, and proposal of the preferred option(s), and a timetable of works and site management procedures, in accordance with relevant guidance and British Standards. The Remediation Scheme will exclude consideration of contamination to and remediation of groundwaters (addressed within conditions 70-73 below). The scheme must ensure that the site will not qualify as contaminated land under Part 2A of the Environmental Protection Act 1990 in relation to the intended use of the land after remediation.

3.1 Proposed Discharge

The remediation proposals will follow those outlined in the Arup report '**Environmental Strategy, Rev C, dated 7 December 2017**'. The strategy includes the following:

- Foundations constructed using 600mm diameter CFA piles founded in the Lambeth Beds
- On-site control of overland water flow during construction to limit the potential for increased flow into the existing waste during construction.
- Sequential removal and replacement of the existing capping material and geotextile over the fill for construction of the foundations
- Designing all the permanent surfaces to be impervious so that storm water is captured and discharged to the public sewers off-site.
- Construction of robust ground floor constructions with several barriers to mitigate ingress of harmful gases from the landfill into occupied accommodation.

The enactment works are programmed for construction in July 2023 (subject to approval and procurement). The works are estimated to take less than 2 weeks from site set-up to completion. A further detailed programme of the works will be submitted to RBC once agreed with the successful contractor.

4. Condition 7

Planning Condition 7 is as follows:

- a) *Ground Gas*

Prior to implementation of the development a management plan shall be submitted to and approved in writing by the Local Planning Authority setting out the:

- Frequency and type of monitoring of ground gases to be undertaken to include on and off site gas migration;
- Frequency and method of reporting the results;
- What remedial actions will be taken in the event of results or readings showing a worsening of earlier readings.

The monitoring, reporting and consequent management of ground gas shall be undertaken in accordance with the approved plan, prior to, during and post construction and until the waste is unlikely to present a hazard to human health, i.e. when monitoring demonstrates that the site Characterisation CS2 has been reached (demonstrated by the results of a minimum of 24 datasets over two consecutive years at this level).

- b) *Gas Mitigation Measures*

Prior to construction a management plan shall be submitted to and approved in writing by the Local Planning Authority. This will set out the:

- Proposed gas mitigation measures for the buildings;
- Type and frequency of monitoring and recording of gas levels within buildings;
- Operations and maintenance procedures, including the method of reporting (including incidents), replacement of mitigation measures, detection systems and the corrective actions which would be implemented in the case of the failure of the identified mitigation measures.

The monitoring, reporting and management shall be undertaken in accordance with the approved plan.

Should detailed design of each phase of the development require changes to the approved management plan then an amended plan shall be submitted to and approved in writing by the Local Planning Authority, prior to the occupation of a phase.

- c) *Management Company*

(i) **Prior to construction** details of the company, including their level and type of experience, who will be employed to undertake the monitoring, reporting, management and maintenance requirements in accordance with the plan approved under 7a, shall be submitted to and approved in writing by the Local Planning Authority.

(ii) Prior to the occupation of the first phase, details of the site wide management company, including their level and type of experience, who will have overarching responsibility for the management of the site, including management of the company employed prior to construction as under 7c) (i) above, and who will undertake the ongoing monitoring, reporting, management and maintenance requirements in accordance with the plans approved under 7a and 7b above, shall be submitted to and approved in writing by the Local Planning Authority.

Any subsequent changes of the Management Company shall be submitted to and approved in writing by the Local Planning Authority, one month prior to the change

4.1 Proposed Discharge

4.1.1 Part (a)

The intent of condition 7 is to ensure construction of the proposed development follows the strategy described in the Arup Environmental Strategy which considers a major construction, i.e., the whole development or a major phase of it.

For the enactment works we propose the following management plan in respect of ground gases:

On and off-site ground gases will be monitored on a monthly basis in accordance with the Environmental Permit Monitoring scheduled in Appendix B of the Arup Environmental Strategy in Appendix 2. Particular attention will be made to boreholes R, S and T that are near to the proposed enactment works and historically have emitted high gas concentrations.

The results up to February 2023 will be collated and assessed using the empirical method set out in CIRIA C6653 and in BS8485:2015 and involves the assignment of a design gas screening value (GSV) using site gas monitoring measurements, from which the site's characteristic gas situation (CS) is determined. The results will be compared to those pre 2017 and if a worsening condition is found the conceptual site model (CSM) presented in Appendix C of the Arup Environmental Strategy will be updated.

4.1.2 Part (b)

The gas mitigation measures within the buildings are as proposed in the Arup Environmental Strategy report.

The type and frequency of monitoring and recording of gas levels within buildings will be designed as part of the future building designs and reflect the gas characterisation of the site from the ongoing gas monitoring that will continue as part of the Environmental Permit.

Similarly, the operations and maintenance procedures, including the method of reporting (including incidents), replacement of mitigation measures, detection systems and the corrective actions which would be implemented in the case of the failure of the identified mitigation measures will be determined as part of the future building designs and reflect the gas characterisation of the site from the ongoing gas monitoring that will continue as part of the Environmental Permit.

At each stage of the planned phased development of the site the management plan will be updated to reflect the latest gas monitoring results and shall be submitted to Reading Borough Council for approval.

4.1.3 Part (c)

Part C(i)

Ramboll will be acting on behalf of PropCo to design the piling works for the enactment as to see that the relevant measures required under the Environmental Strategy are complied with. This will include:

- The method of piling and associated earthworks
- Assessment of groundwater contamination and trigger levels via the regular monthly monitoring prior to the works
- Proposal of 'trigger' levels to RBC for review and agreement with the EA
- Review and assessment of subsequent groundwater monitoring results in comparison to the trigger levels.
- Operation of the cut-off well No. 4 (closest to the proposed enactment pile)

Monitoring of ground gases and groundwater will be carried out by Mils German on behalf of Reading Football Club.

Management of all construction access to and from the works will be carried out by Reading Football Club.

Part C(ii) is not applicable for the enactment works.

5. Condition 68

Planning Condition 68 is as follows:

No development of any phase or part of a phase shall take place until details of the proposed piling method for that phase that

a) should include dewatering groundwater from the landfill by use of a combination of newly installed leachate abstraction wells and the existing groundwater dewatering system;

b) should include submission of a landfill dewatering scheme and

should ensure that piling is to a maximum depth of 3m into the Lambeth Group thus avoiding the sandy lenses, has been submitted to and, approved in writing by the Local Planning Authority. The Piling (for each phase of the development) shall thereafter be undertaken in accordance with the approved details.

5.1 Proposed Discharge

For details of the proposed enactment works refer to Appendix 1.

Leachate from the abstraction wells nearest to the proposed pile will be drawn-down immediately prior to the proposed pile construction. Refer to Appendix for location of the proposed wells.

The perimeter cut-off wells (Line 4) will be brought into operation and offered to RBC/the EA for review immediately prior to the pile construction. For location of Line 4 refer to Appendix 1.

6. Condition 70

Planning Condition 70 is as follows:

No development of any phase or part of a phase shall take place until a monitoring plan to protect groundwater quality in the two aquifers below the site has been submitted to and approved in writing by the Local Planning Authority.

a) In order to protect the aquifers under this site, during all phases of the development, groundwater monitoring should be carried out as detailed below:-

(i) **Prior to Construction** - Carry-out 3 sets of groundwater monitoring of the River Terrace Gravels and plus 2 No. Chalk boreholes at monthly intervals, the last set being at least two months prior to any excavation.

(ii) **During Construction** - Carry out monthly groundwater monitoring of 4 River Terrace Gravels boreholes close to each phase of construction from the start of excavation and continue until the site surface is resealed by reinstatement of gas resistant membrane and capping layer and placement of the ground floor slab (defined as the end of the construction phase); plus 2 No. Chalk boreholes.

(iii) **Post construction** - Monthly monitoring from 4 River Terrace Gravel boreholes for 6 months (these 4 boreholes will change depending on the phasing of the development) and monthly monitoring from 2 No Chalk boreholes for a period of 12 months post completion of the ground slabs.

b) If results of monitoring of the site show a deterioration in groundwater quality above pre-agreed trigger levels (agreed with the Environment Agency) during construction (piling) or post construction (for each of the six phases of the development) this should then trigger the Action Plan in Table 7 - item 11.2.5 of the Environmental Strategy Revision C , dated 7th December 2017. In the event that a significant offsite pollution plume is identified, then hydraulic containment will be required for the impacted aquifer and the monitoring plan should be extended.

6.1 Proposed Discharge

Groundwater monitoring for the enactment works will be carried out as follows:

(i) **Prior to Construction** - Groundwater monitoring of the River Terrace Gravels plus 2 No. Chalk boreholes at monthly intervals up to February 2023 will be assessed and used for determining trigger levels in accordance with Condition 71.

(ii) **During Construction** - Due to the short duration of the enactment works no specific groundwater monitoring will be carried out during the enactment works other than the monthly monitoring as part of the Environmental Permit.

(iii) **Post construction** - Monthly monitoring will continue post construction works, including from 4 River Terrace Gravel boreholes most adjacent to the enactment pile for 6 months and monthly monitoring from 2 No Chalk boreholes for a period of 12 months post completion of the enactment works.

Results of the post-construction monitoring will be collated and compared to the pre-determined trigger levels and submitted to RBC for review.

7. Condition 71

Planning Condition 71 is as follows:

No development shall take place until details of proposed trigger values for groundwater monitoring within the underlying aquifers are submitted to and approved in writing by the Local Planning Authority.

Each groundwater monitoring well will require an individual trigger value for specific determinants to be agreed.

The methodology for calculating the trigger values is detailed in Appendix D of the Environmental Strategy, Revision C dated 7th December 2017. The time frame for submission of these proposed trigger values should be three months prior to commencement of construction.

7.1 Proposed Discharge

Groundwater monitoring results up to December 2021 have been collated and assessed, and trigger levels proposed for each well for specific contaminants. Refer to the Ramboll report 'Summary of Groundwater and Ground Gas Results' in Appendix 3.

Further monitoring results from between December 2021 and February 2023 will be collated and trigger levels determined and submitted to RBC for review prior to the enactment works commencing on site.

8. Condition 72

Planning Condition 72 is as follows:

No development shall take place until the Action Plan (item 11.2.5 of the Environmental Strategy Revision C, dated 7th December 2017) is submitted to and approved in writing by the Local Planning Authority that details the protocol to be used in the event of deterioration in the quality of the groundwater in the aquifers above trigger levels.
The Action Plan shall be implemented in accordance with the approved details.

8.1 Proposed Discharge

The works will be implemented in accordance with the construction strategy detailed in the Arup report 'Proposed Redevelopment at Madejski Stadium, Environmental Strategy, Rev C' dated 7 December 2017, a copy of which is in Appendix 2.

For the enactment works this will be as follows:

Pre-construction Monitoring

The groundwater extraction system (Figure 10.4 in Appendix A of the Arup Environmental Strategy) will be inspected and any necessary remedial works identified and proposals for these submitted to the EA. The dewatering system will be commissioned for Line 4 adjacent to the proposed pile construction.

For all subsequent phases, lines 2, 3 and 4 will be operated.

Results from the ongoing monthly Permit monitoring of groundwater, from 2017 to February 2023, will be collated and assessed and compared to the pre-planning monitoring. This will identify the general trend / characterisation of the groundwater contamination since planning was granted.

We will calculate trigger levels in accordance with Appendix D of the Arup Environmental Strategy. Trigger levels have already been assessed for the groundwater contamination results between December 2016 and December 2021. These are provided in section 5 of the report 'Summary of Groundwater Quality Results' in Appendix 3. These results will be further assessed using the latest (min two months) results for those most relevant boreholes into the Chalk and the RTG and submitted to RBC/EA for their review.

Construction Phase

The pile construction works, including set-up and dismantling is anticipated to take no longer than two weeks and the single pile construction will be completed within a single day. Should some leachate enter the underlying geology due to the piling it will take some time to be detected in the surrounding bore holes after the pile has been constructed. Therefore, no monitoring is proposed at the same time as the pile construction.

Post Construction

The Arup Strategy refers to post-construction monitoring *following completion of the ground floor slab*. Since the enactment works does not include construction of any ground floor slab this in theory would not apply. However, the intent of this requirement was to identify and understand if and to what extent the construction had on the quality of groundwater. In the interests of that intent, we would propose to collate and assess results from the ongoing permit monitoring, post the enactment works.

We will submit our assessment of the post-construction monitoring, compared to the pre-construction trigger levels and recommending the status (Red/Amber/Green) of the results in accordance with the action plan set out in section 11.2.5 of the Arup Strategy and the following table:

Status	Action
Green	None specifically but continue monitoring in accordance with 11.1 and EP
Amber: rising trends recorded over at least 3 consecutive monitoring events	Review construction processes on site & agree improvements where appropriate
Red: trigger values met/exceeded over at least 3 consecutive monitoring events	Turn on dewatering lines and the new extraction wells to the base of the waste local to each construction phase and in agreement with the EA. Temporarily increase monitoring frequencies to fortnightly and review results.

9. Condition 73

Planning Condition 73 is as follows:

Prior to development taking place the Environment Agency need to be satisfied that the groundwater dewatering system installed on this site is operational and fit for purpose. The Environment Agency will need to visually inspect the groundwater dewatering system for that Phase or part of Phase prior to any development taking place on this site. The onsite inspection of the groundwater dewatering system shall be approved in writing by the Local Planning Authority.

9.1 Proposed Discharge

The groundwater de-watering system consists of a series of vertical wells connected near the surface into four lines. These are shown on Arup drawing 'Wellpoint System Layout, Figure 4 dated 29/10/15' in Appendix 1.

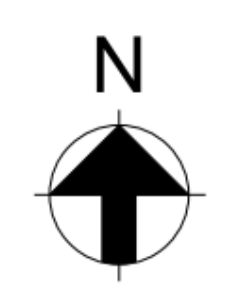
Line 4 is closest to the proposed pile location. Line 4 will be brought into operation and offered to the Reading Borough Council, and by extension to the Environment Agency, for inspection prior to the proposed pile construction in July 2023.

Appendix 1

Drawings for the proposed enactment works

Appendix 1

Drawings for the proposed enactment works

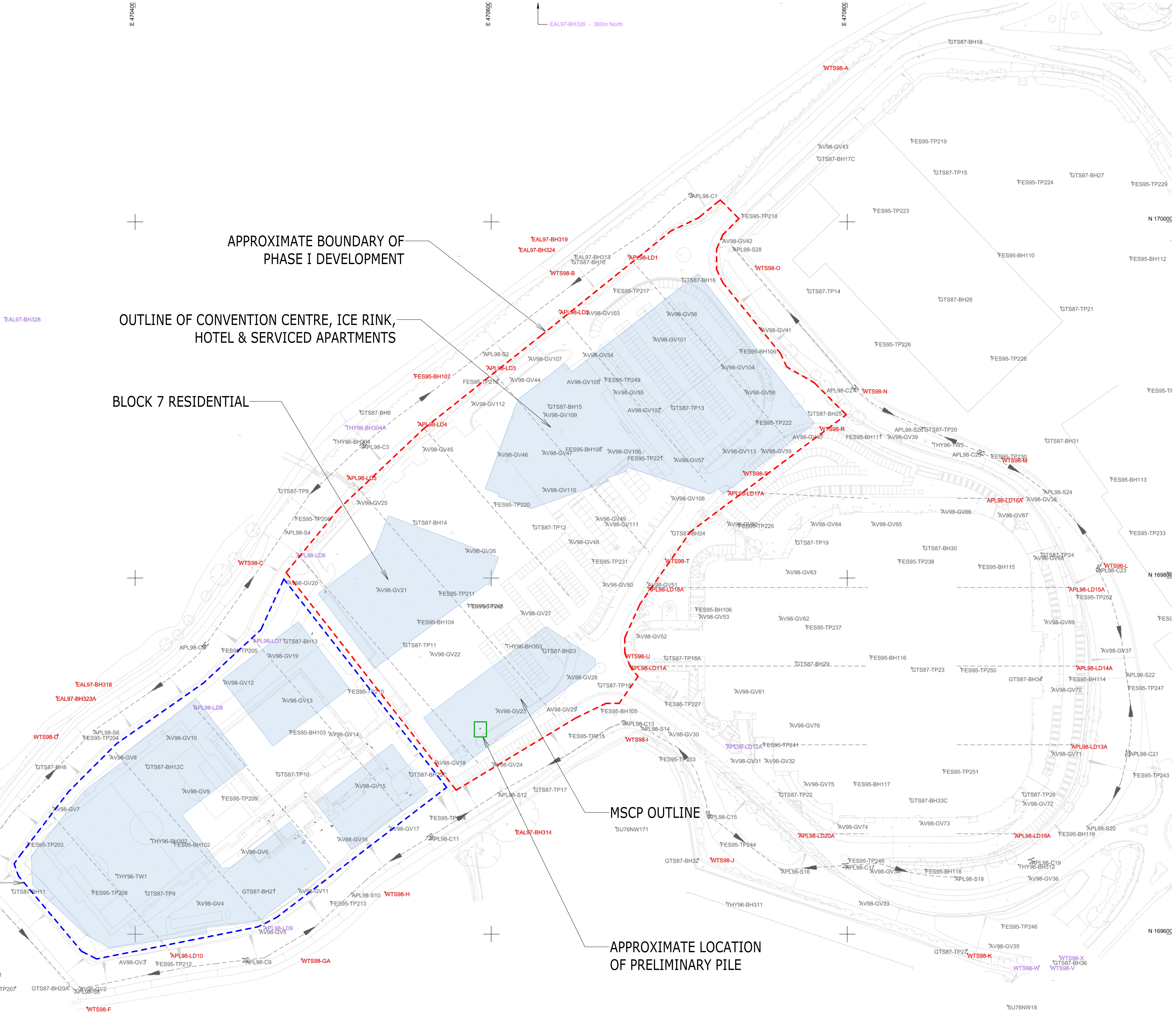


ACTIVE BOREHOLES IN 2017				
Name	X	Y	Elevation (mOD)	Status of Location
THY96-BH301	470437.54	169544.23	38.34	Lost
THY96-BH304A	470518.32	169885.50	39.08	Lost
EAL97-BH317	470861.88	169465.33	37.78	Lost
EAL97-BH320	470169.88	169459.33	38.37	Lost
EAL97-BH326	470627.88	170486.33	37.99	Lost
EAL97-BH327	470853.88	169458.33	37.60	Lost
EAL97-BH328	470326.88	169946.33	37.90	Lost
WTS98-E	470299.60	169635.00	39.16	Lost
WTS98-V	470914.12	169582.05	39.60	Lost
WTS98-W	470907.75	169582.05	0.00	Lost
WTS98-X	470919.26	169587.71	39.65	Lost
APL98-LD6	470490.70	169813.90	46.60	Lost
APL98-LD7	470466.20	169765.80	49.90	Lost
APL98-LD8	470433.00	169728.40	49.41	Lost
APL98-LD9	470472.40	169604.50	51.54	Lost
APL98-LD12A	470732.12	169706.39	0.00	Lost
FES95-BH107	470556.88	169914.33	39.00	Monitored
EAL97-BH314	470613.88	169658.33	38.64	Monitored
EAL97-BH315	470166.88	169455.33	38.45	Monitored
EAL97-BH318	470366.88	169741.33	38.43	Monitored
EAL97-BH319	470622.88	169991.33	38.76	Monitored
EAL97-BH321	470625.88	169488.33	37.97	Monitored
EAL97-BH323A	470355.88	169733.33	38.38	Monitored
EAL97-BH324	470615.88	169885.33	38.66	Monitored
EAL97-BH325	470161.88	169449.33	38.40	Monitored
WTS98-A	470786.90	170087.50	39.58	Monitored
WTS98-B	470633.40	169972.30	39.63	Monitored
WTS98-C	470458.20	169809.60	39.33	Monitored
WTS98-D	470356.60	169711.90	39.46	Monitored
WTS98-F	470373.10	169558.90	39.30	Monitored
WTS98-GA	470493.60	169596.10	39.22	Monitored
WTS98-H	470540.40	169623.80	39.21	Monitored
WTS98-I	470675.70	169710.40	39.56	Monitored
WTS98-J	470723.40	169642.60	38.94	Monitored
WTS98-K	470867.50	169589.00	38.85	Monitored
WTS98-L	470944.40	169808.00	39.80	Monitored
WTS98-M	470887.00	169867.20	39.49	Monitored
WTS98-N	470808.70	169905.90	39.69	Monitored
WTS98-O	470748.50	169975.20	39.67	Monitored
WTS98-Q	470298.70	169578.20	38.67	Monitored
WTS98-R	470784.72	169884.82	47.40	Monitored
WTS98-S	470741.82	169859.82	47.51	Monitored
WTS98-T	470697.92	169810.62	47.49	Monitored
WTS98-U	470675.42	169757.22	47.57	Monitored
APL98-LD1	470677.40	169981.10	44.31	Monitored
APL98-LD2	470636.60	169950.40	44.69	Monitored
APL98-LD3	470597.60	169919.00	44.07	Monitored
APL98-LD4	470559.00	169887.40	44.63	Monitored
APL98-LD5	470519.30	169857.30	44.84	Monitored
APL98-LD10	470420.10	169589.00	48.76	Monitored
APL98-LD11A	470678.26	169750.55	0.00	Monitored
APL98-LD13A	470925.98	169706.39	0.00	Monitored
APL98-LD14A	470928.87	169750.55	0.00	Monitored
APL98-LD15A	470924.54	169794.71	0.00	Monitored
APL98-LD16A	470898.49	169844.71	0.00	Monitored
APL98-LD17A	470733.13	169848.62	0.00	Monitored
APL98-LD18A	470688.09	169794.71	0.00	Monitored
APL98-LD19A	470894.10	169656.39	0.00	Monitored
APL98-LD20A	470772.75	169656.39	0.00	Monitored

N 170000

N 169800

N 169600



NOTES

- DO NOT SCALE FROM THIS DRAWING.
- ALL DIMENSIONS ARE IN MILLIMETRES U.N.O.
- ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.

P01	ISSUED TO SUPPORT PLANNING	XX/XX/2022	MR	DF
Rev	Description	Date	By	App

FOR INFORMATION

ROYAL ELM PARK
PHASE I PLANNING
ENACTMENT WORKS

RAMBOLL

tel 0121 230 1659 brimingham@ramboll.co.uk
www.ramboll.co.uk

SITE LOCATION PLAN

Project No:	Scale (if A3):	Date:	Drawn:
1620013486	NTS	MAY '22	MR
Drawing No:	Rev:		
13486-RAM-XX-XX-DR-S-00050	P01		

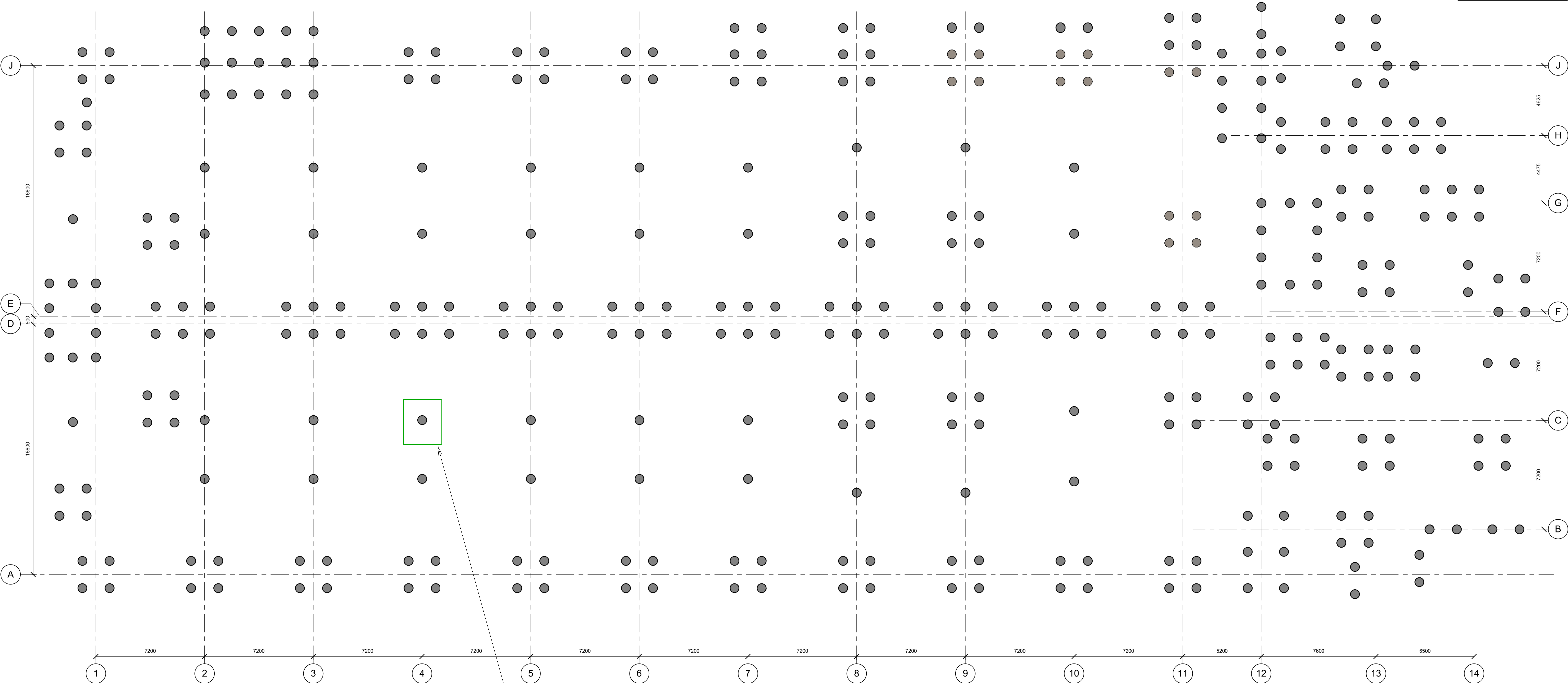
INFORMATION BASED ON ARUP DRAWING
"OVERLAY OF PROPOSED BUILDING
FOOTPRINTS ON EXISTING MONITORING
LOCATIONS - REV 01"

H & S Note

Existing landfill site with likely contamination.
Contractor must refer to CDM Risk Register
and results of Ground Investigation.

COPYRIGHT RAMBOLL UK LIMITED. ALL RIGHTS RESERVED. THIS DOCUMENT IS ISSUED FOR THE PARTY WHO COMMISSIONED IT AND FOR THE SPECIFIC PURPOSES CONNECTED WITH THE PROJECT ONLY. IT SHOULD NOT BE RELIED UPON BY ANY OTHER PARTY OR USED FOR ANY OTHER PURPOSE. RAMBOLL ACCEPTS NO RESPONSIBILITY OR LIABILITY WHICH MAY ARISE FROM RELIANCE OR USE OF THIS DOCUMENT OR THE DATA CONTAINED HEREIN BY ANY OTHER PARTY OR FOR ANY OTHER PURPOSE.

- NOTES
- DO NOT SCALE FROM THIS DRAWING.
 - ALL DIMENSIONS ARE IN MILLIMETRES U.N.O.
 - ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.



This drawing is Indicative only. Final Number of piles and layout TBC

This layout is based on 600mmØ CFA piles asumed SWL 1000kN, with a FOS of 3.0.

LOCATION OF PRELIMINARY PILE

INFORMATION BASED ON ARUP DRAWING
"MCP-ARP-ZZ-PL-DR-S-1000 - MCP PILE
LAYOUT GENERAL ARRANGEMENT - REV P1"

P01	ISSUED TO SUPPORT PLANNING	XX/XX/2022	MR	DF
Rev	Description	Date	By	App

FOR INFORMATION

ROYAL ELM PARK
PHASE I PLANNING
ENACTMENT WORKS



tel 0121 230 1650 birmingham@ramboll.co.uk
www.ramboll.co.uk

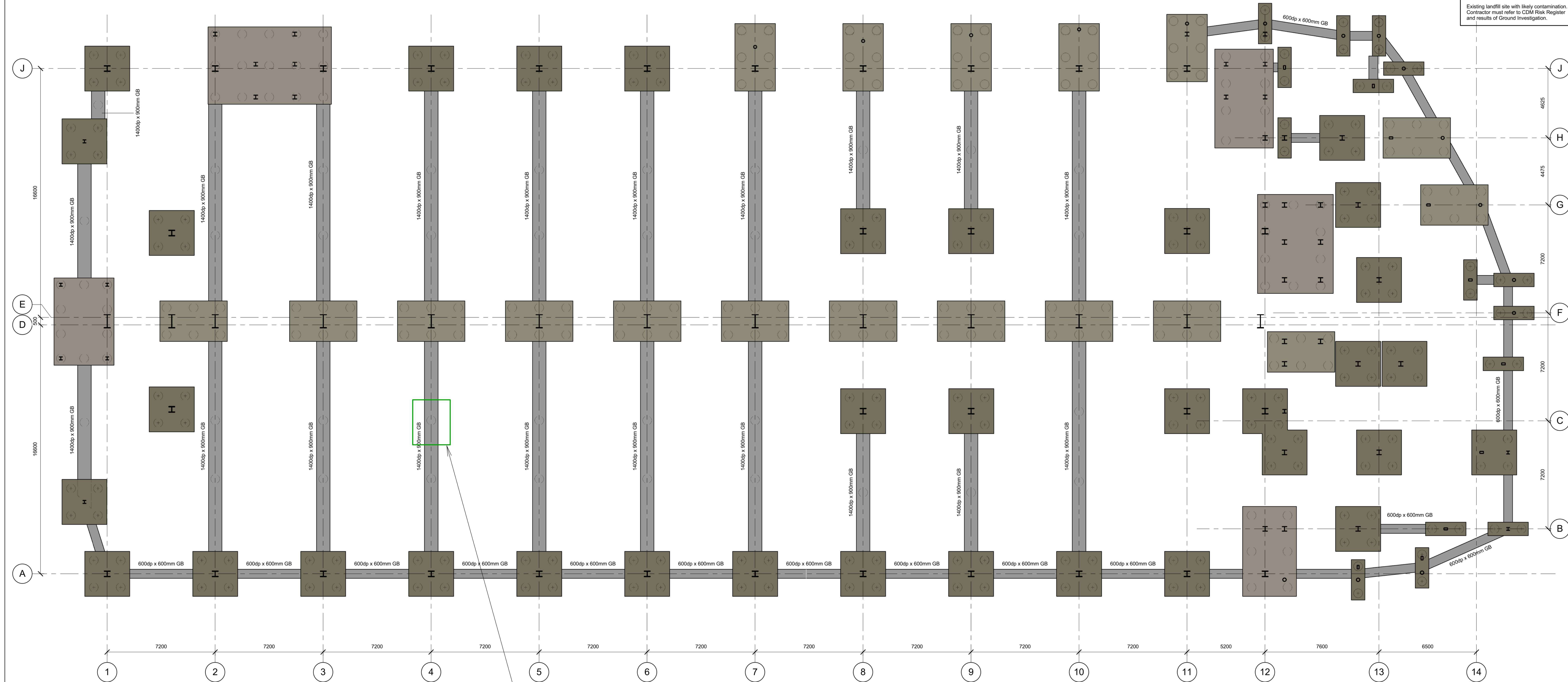
MULTI-STOREY CAR PARK PILING LAYOUT			
Project No:	Scale (if A0):	Date:	Drawn:
1620013486	NTS	MAY '22	MR
Drawing No:	Rev		
13486-RAM-XX-PL-DR-S-00098			P01

COPYRIGHT RAMBOLL UK LIMITED. ALL RIGHTS RESERVED. THIS DOCUMENT IS ISSUED FOR THE PARTY WHO COMMISSIONED IT AND FOR THE SPECIFIC PURPOSES CONNECTED WITH THE PROJECT ONLY. IT SHOULD NOT BE RELIED UPON BY ANY OTHER PARTY OR USED FOR ANY OTHER PURPOSE. RAMBOLL ACCEPTS NO RESPONSIBILITY OR LIABILITY WHICH MAY ARISE FROM RELIANCE OR USE OF THIS DOCUMENT OR THE DATA CONTAINED HEREIN BY ANY OTHER PARTY OR FOR ANY OTHER PURPOSE.

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.

**H & S Note**
Existing landfill site with likely contamination.
Contractor must refer to CDM Risk Register
and results of Ground Investigation.



LOCATION OF PRELIMINARY PILE

Allow for drainage runs to be cast into pilecaps.

This drawing is Indicative only. Final Number of piles and Cap layout TBC

This layout is based on 600mmØ CFA piles asused on the previous site developments.

Top of pilecap shwon indicativley, currentley in abeyance

INFORMATION BASED ON ARUP DRAWING
"MCP-ARP-ZZ-PC-DR-S-1100 - MCP PILE
CAP GENERAL ARRANGEMENT - REV P1"

P01	ISSUED TO SUPPORT PLANNING	XX/XX	MR	DF
Rev	Description	Date	By	App
			CHK	

FOR INFORMATION

ROYAL ELM PARK
PHASE I PLANNING
ENACTMENT WORKS



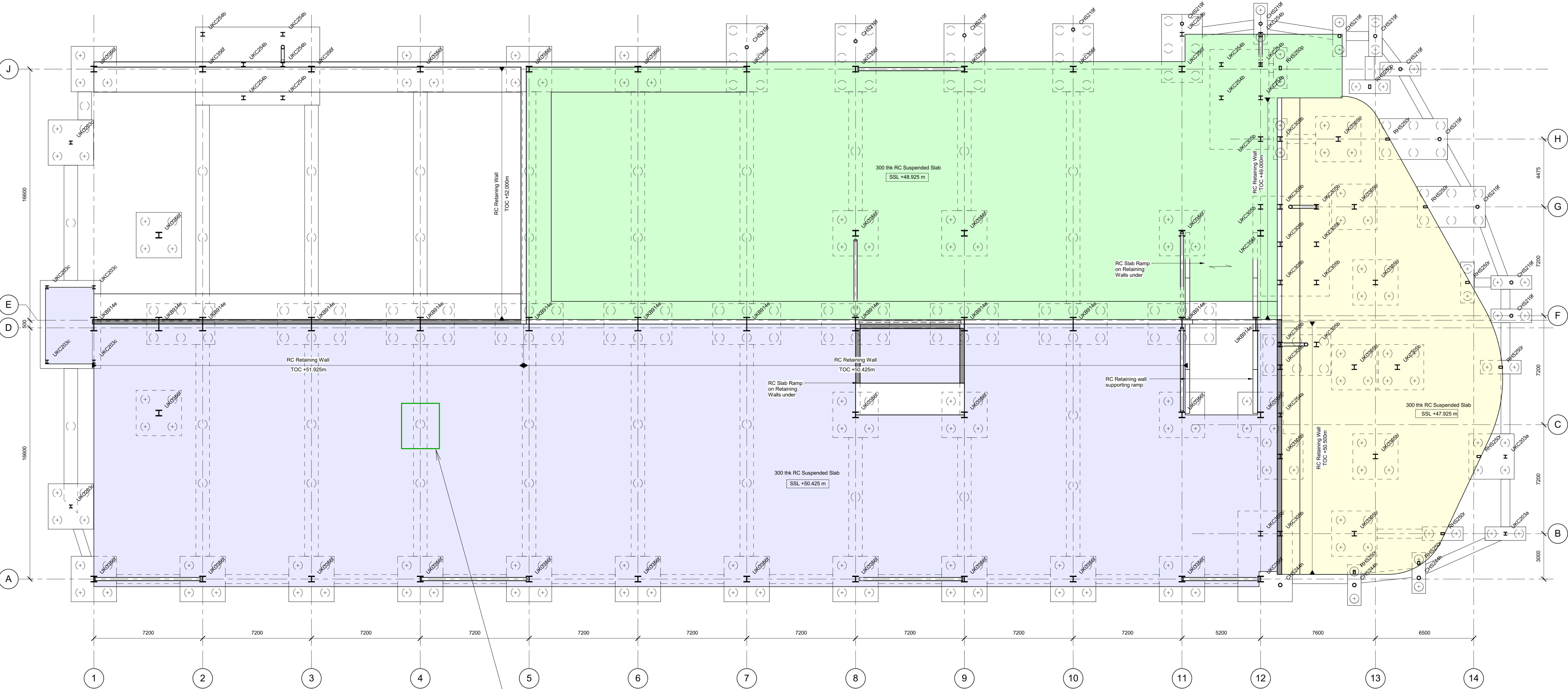
tel 0121 230 1650 birmingham@ramboll.co.uk
www.ramboll.co.uk

MULTI-STOREY CAR PARK
FOUNDATION LAYOUT

Project No:	Scale (if A0):	Date:	Drawn:
1620013486	NTS	MAY '22	MR
Drawing No:			Rev
13486-RAM-XX-FN-DR-S-00099			P01

NOTES

- DO NOT SCALE FROM THIS DRAWING.
- ALL DIMENSIONS ARE IN MILLIMETRES U.N.O.
- ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.



LOCATION OF PRELIMINARY PILE

P01	ISSUED TO SUPPORT PLANNING	XX/XX/2022	MR	DF
Rev	Description	Date	By	App

FOR INFORMATION

ROYAL ELM PARK
PHASE I PLANNING
ENACTMENT WORKS

RAMBOLL

tel 0121 230 1650 birmingham@ramboll.co.uk
www.ramboll.co.uk

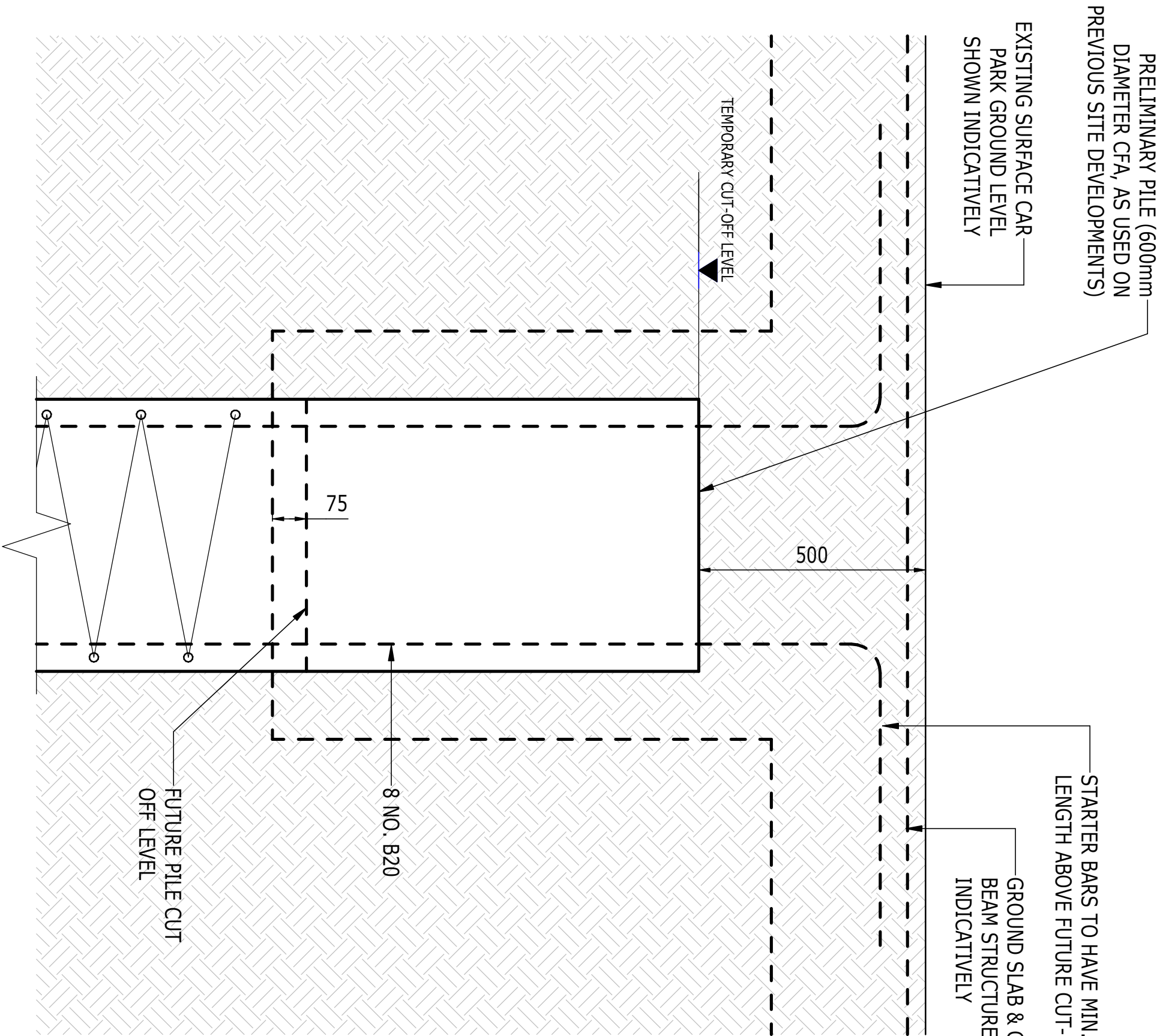
MULTI-STOREY CAR PARK
GROUND SLAB LAYOUT

Project No:	Scale (B A3):	Date:	Drawn:
1620013486	NTS	MAY '22	MR
Drawing No:			Rev:
13486-RAM-XX-00-DR-S-00100			P01

INFORMATION BASED ON ARUP DRAWING
"MCP-ARP-ZZ-LG-DR-S-1200 - MCP GROUND
FLOOR GENERAL ARRANGEMENT - REV P1"

NOTES

- 1. DO NOT SCALE FROM THIS DRAWING.
- 2. ALL DIMENSIONS ARE IN MILLIMETRES U.N.O.
- 3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
- 4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.



tel 0121 230 1650 birmingham@ramboll.co.uk
www.ramboll.co.uk

ROYAL ELM PARK
PHASE I PLANNING ENACTMENT WORKS

TYPICAL PILE CONSTRUCTION

P01	ISSUED TO SUPPORT PLANNING	XX/XX	MR	DF
Rev	Description	Date	By	App
FOR INFORMATION				
Project No:	1620013486	Scale (@ A3):	Date:	Drawn:
		1:10	MAY '22	MR
Drawing No:	13486-RAM-XX-XX-DR-S-00400			Rev:
				P01



Job Title: <i>READING FC RELOCATION</i> <i>WELL POINT SYSTEM LAYOUT</i>		Sketch No. <i>FIGURE 1</i>	
Job No. <i>J460</i>	Date: <i>28/07/97</i>	Drawn by: <i>TR.</i>	Checked by:

SCALE 1:2500 A3
0 50 100m

DISCHARGE
POINT



1.1 1.2 1.3

WELL POINT LINE WITH
MONITORING POINTS

Figure 10.3 Perimeter Dewatering Well Points

Date: 29/10/15 | Status: Information | Name: RN

ARUP

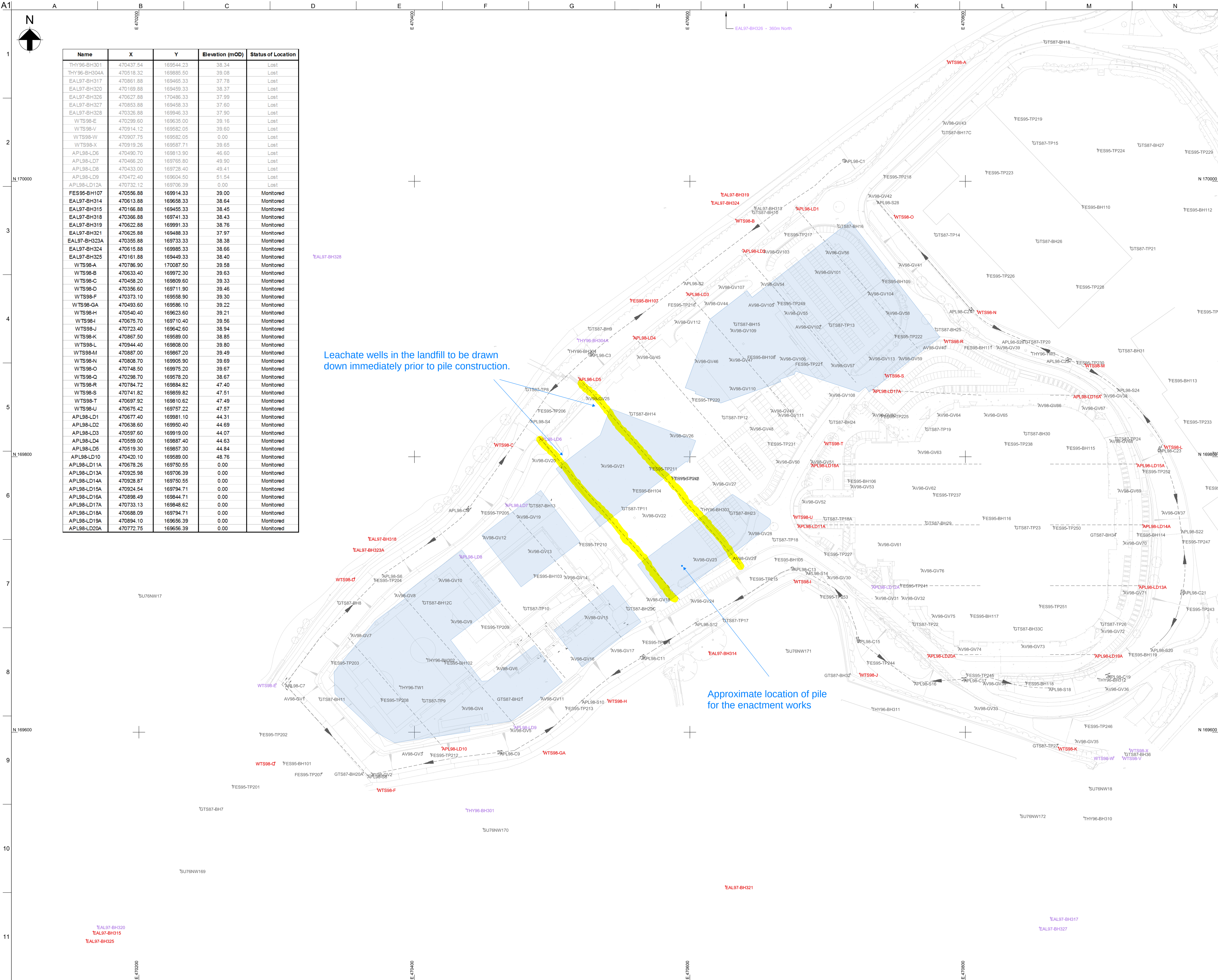
Line 3

Line 2

Line 1

Line 4

Cut-Off Wells Location Plan



Legend:

Monitoring Locations

GIXX-Name

Location Currently Monitored

GIXX-Name

Monitoring Location Lost

GIXX-Name

Historical Location / Not Monitored

Location of Drain

Proposed Building Outlines

GI Name Description:

GI XX - Name

Contractor Year - Hole Name

Notes:

1. Topo Survey dated 2015-02 by Midland Survey LTD

01	04/11/15	IJ	RN	LS
For Information				
Issue	Date	By	Chkd	Appd

ARUP

The Arup Campus, Blythe Gate, Blythe Valley Park
Salford, West Midlands B90 8AE
T +44(0)121 213 3000 F +44(0)121 213 3001

Client
Reading Football Club Ltd

Job Title
Land at Madejski Stadium, Reading
Environmental Impact Assessment

Overlay of proposed building footprints on existing monitoring locations

Scale at A1
1:1250

Discipline
Geotechnical

Job No
244202-00

Drawing Status
Draft

Drawing No
Figure 10.5

Issue
01

Do not scale

© Arup