Our Ref: 371487-R5(0)-SuDS

29th June 2017

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Lifecare Residencies Limited
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Dear Sir/Madam,

RE: SUDS REPORT
PROPOSED RESIDENTIAL DEVELOPMENT AT GONDAR GARDENS

1 INTRODUCTION

RSK Land & Development Engineering Ltd were commissioned by the client, Lifecare Residencies, to provide a SuDS Report for redevelopment of the above site located at Gondar Gardens, London.

This report has been produced in support of the detailed planning submission for a proposed residential development at Gondar Gardens, with associated access parking and landscaping.

The purpose of the report is to ensure that flood risk will not increase as a result of the development by providing a strategy to manage and dispose of surface water runoff. The SuDS strategy must demonstrate that runoff from the development will be controlled for its lifetime (in this case assumed to be 100 years) taking account of the vulnerability of its users, without increasing flood risk elsewhere.

This report has been prepared in line with the National Planning Policy Framework (NPPF) (Ref. 1), its corresponding Planning Practice Guidance (PPG) (Ref. 2), the London Plan (Ref. 3) and the Defra non-statutory technical standards (Ref. 4).

The comments given in this report and opinions expressed are subject to RSK Group Service Constraints provided in **Appendix A**.

SITE DETAILS AND PROPOSALS

The site is located in West Hampstead within the London Borough of Camden at grid reference TQ 247 853, **Figure 1.1**. The proposed development site is located on the site of a former freshwater reservoir. Access to the site is currently off Gondar Garden road and is located within a predominantly residential area.

The total site area is 1.24 Ha currently consisting of a covered reservoir and associated infrastructure. The covered reservoir equates to approximately 0.5Ha, with the remaining site area consisting of infrastructure associated with the reservoir and to the east is an area of grassland.

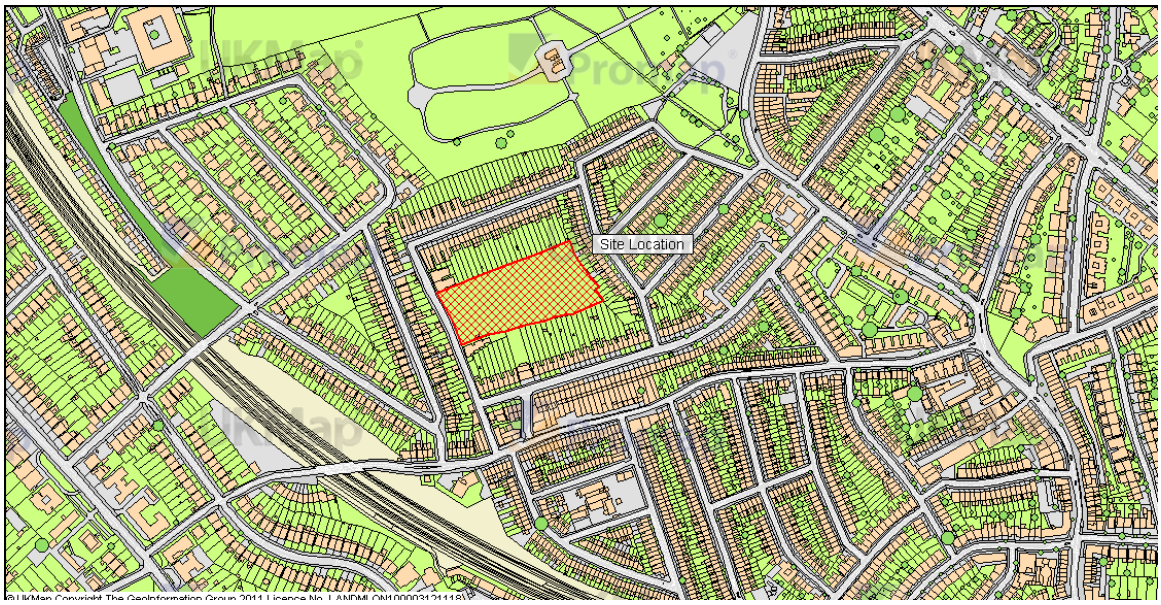


Figure 1.1: Site location

The scheme proposes 82 residential units along the site frontage with an additional 15 bed nursing home. The existing reservoir roof and internal structures would be removed and regraded / landscaped and together with remaining grassland at the rear of the site would become a enhanced wildlife /nature conservation area, as shown in **Appendix B.**

2 SITE CHARACTERISTICS

2.1 Topography

An existing site topographic survey has been carried out, Appendix B. The topography of the site is relatively flat with a gentle fall to the east. The cover of the reservoir is approximately 80.2m AOD. The boundary of the site falls away to a level in the region of 79.7m AOD along the northern boundary, 75.5m AOD to 72.0m AOD along the eastern, 79.0m AOD to 72.0m AOD along the southern and 79.0m AOD along the western.

Access to the site is directly off Gondar Garden Road.

2.2 Hydrology

There are no ponds, streams or drainage ditches on or adjacent to the site, and with reference to current and historical map data the site is not within the vicinity of any sensitive surface water features or surface water catchment and drainage areas.

The nearest identified surface water feature to the site are the Hampstead Heath Ponds, located approximately 2000m north east of the site. Three tributaries of the River Westbourne formerly ran to the north east and south of the site, some 1500m to 2000m from the site, but these watercourses have long since been diverted into the London sewer system.

The geological boundary between the Claygate Beds and the London Clay Formation, which may potentially form a spring line, is mapped as lying approximately 50m to the north of the site. Although not shown on the historical maps, it is likely that springs were present in the area, feeding two water courses running some 1500m to 2000m to the east and south of the site. Since the urbanisation of the area, these watercourses are no longer shown on the maps, and it is very likely that they are culverted. However, the geological conditions found to prevail at the site and its immediate environs do not appear conducive to the formation of springs. It should also be noted that the area surrounding the site is heavily urbanised.

2.3 Geology

The British Geological Survey (BGS) online Open Geoscience resource indicates that the site is underlain by London Clay.

North London is almost entirely underlain by the London Clay formation which overlays a significant chalk aquifer. The London Clay layer varies in thickness from less than 10m near the Lee Valley to over 100m in the areas of higher ground in Camden and Barnet. The clay layer is almost entirely impermeable which has a considerable impact on lead times of fluvial flows in many of the watercourses, especially when combined with intense urban development. The upstream catchment in the River Lee comprises a predominantly chalk soil, which results in increased permeability and slower response times in the watercourse.

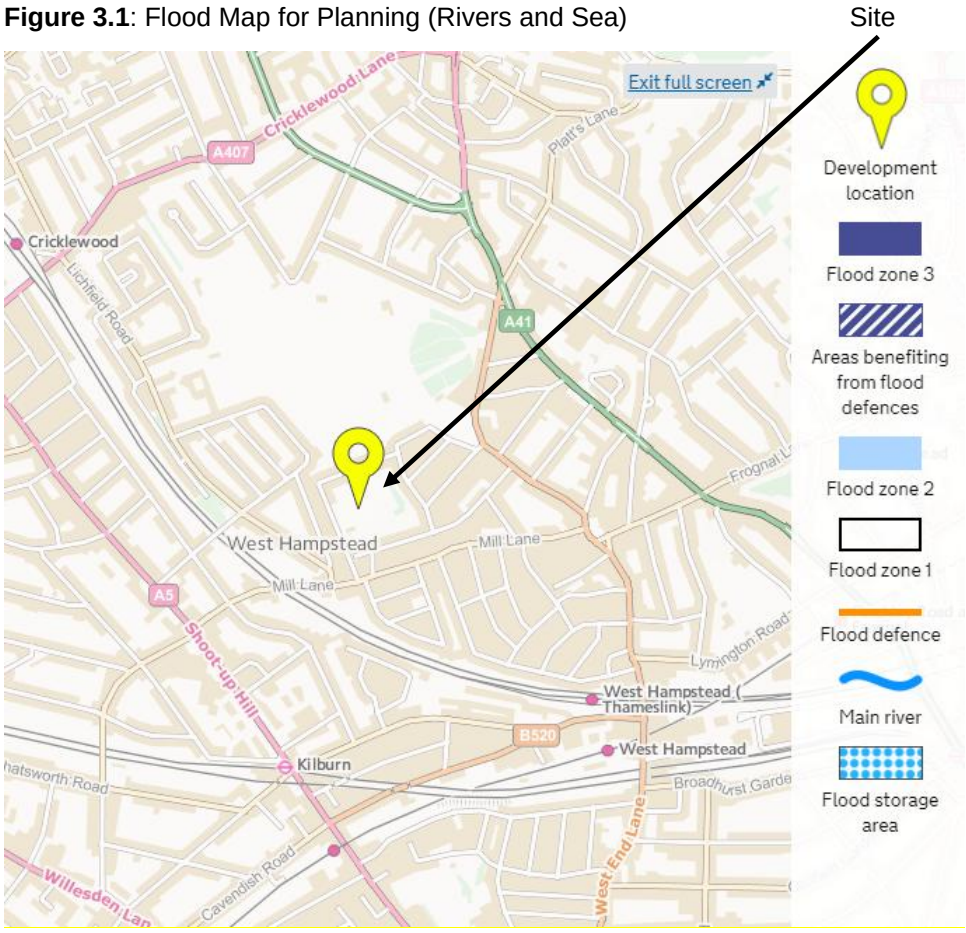
3 SOURCES OF INFORMATION

3.1 Environment Agency

3.1.1 Flood Zone Maps

The EA Flood Zone mapping study for England and Wales is available on their website at https://flood-map-for-planning.service.gov.uk/ The EA has produced Flood Zone maps for much of England and Wales. The current displayed map is reproduced as **Figure 3.1** shows the site lies wholly within Flood Zone 1, showing the site is at low risk of flooding from fluvial or tidal sources.

Figure 3.1: Flood Map for Planning (Rivers and Sea)



3.2 Site specific consultation

3.2.1 London Borough of Camden

The Lead Local Flood Authority (LLFA) for the area is the London Borough of Camden (LBC). LBC was contacted in June 2017 to request guidance and establish any constraints to drainage and flood risk within the site area. The full enquiry and response can be found in **Appendix C**.

Salient points from LBC in relation to drainage are as follows:

- Planning advice for FRAs and Surface Water Drainage Statements can be found online; and
- LBC expect the design of the drainage system to the 20% climate change allowance on top of the 1 in 100 year storms. Then a sensitivity test against the 40% allowance to ensure that the additional runoff is wholly contained within the site and there is no increase in the rate of runoff discharge from the site.

3.2.2 Thames Water

Thames Water is the local sewer company for this area. A pre-development enquiry was submitted to Thames Water in May 2017 to agree surface water and foul water discharge rates from the development. The latest correspondence can be found in **Appendix D**. At the time of writing a formal response confirming discharge rates had not yet been received.

3.3 Drainage

3.3.1 Public Sewer

A number of Thames Water sewers have been identified in close proximity to the site, **Appendix D**. The adopted main sewers in the area are combined accepting both foul and surface water run-off. The nearest sewer to the site is along the western boundary within Gondar Garden Road, where a 940mm x 635mm sewer flows in a southern direction. According to the sewer records supplied by Thames Water, a connection point existing to the southwest corner of the site, it is proposed to utilise this connection for the development.

3.3.2 Private Drainage

No details of the existing on-site drainage were provided.

4 FLOOD RISK

A detailed assessment of flood risk is contained in the corresponding Flood Risk Assessment produced by RSK (Ref. 5).

4.1 Fluvial Flood Risk

The Environment Agency has produced Flood Zone maps for much of England and Wales. The current displayed map is reproduced as **Figure 1.1**. The latest Flood Zone map shows the flood risk to the site is low with the whole site located in Flood Zone 1.

4.2 Tidal Flood Risk

On the coast storm surges and high tides can threaten low lying coastal areas, and can be sometimes large and rapid enough to overtop defence works, causing significantly more damage than river flooding. However, tidal flooding is not considered a risk to the site.

4.3 Surface Water Flood Risk

The Environment Agency's surface water flood map (**Figure 4.1**) shows that some minor sections surrounding the site are at a risk of flooding from pluvial sources, however these flow paths rather than areas of ponding water follow that of the fluvial flood risk. As such the overall risk of pluvial flooding to the site can be considered low and this will be taken into account within the detailed surface water design and layout of the site.

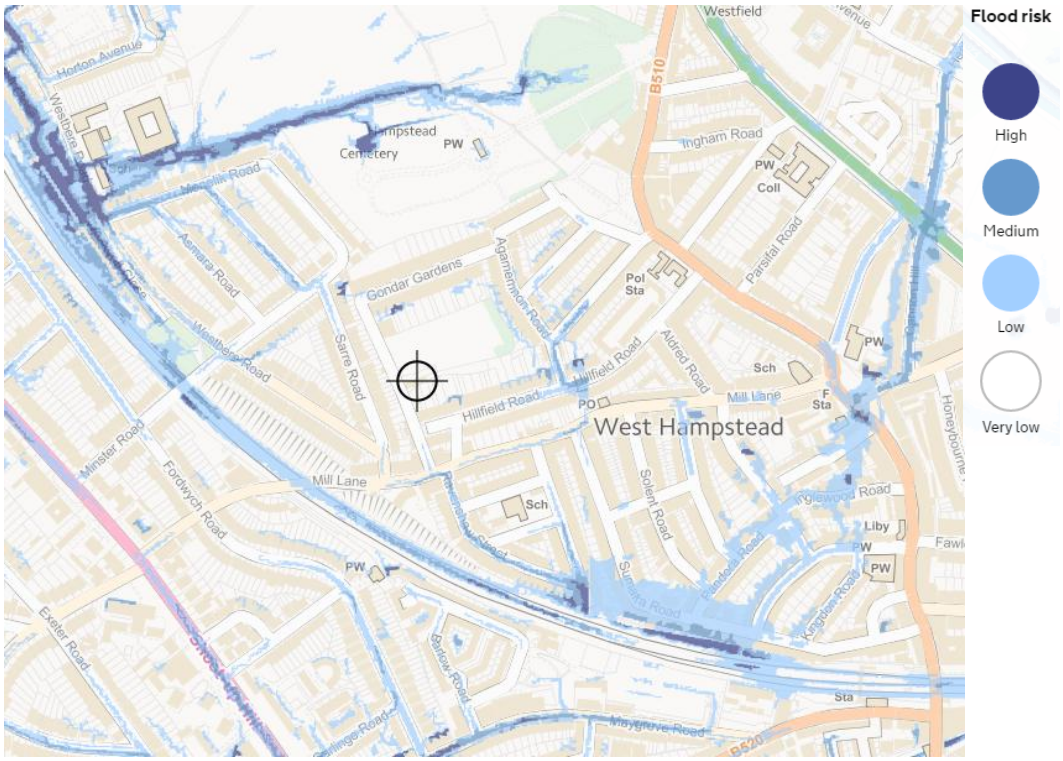


Figure 4.1: Environment Agency surface water flood risk map (Accessed May 2017)

4.4 Groundwater Flood Risk

The presence of London Clays below the base of the reservoir could result in a perched groundwater level. However as the site is to be landscaped away from the properties the flood risk from groundwater flows reaching the surface will be mitigated against. According to the GI for the site groundwater was encountered in the boreholes; however a saturated zone was identified from around 73m AOD.

4.5 Flooding from Sewers

Development has the potential to cause an increase in impermeable area, an associated increase in surface water runoff rates and volumes, and a consequent potential increase in downstream flood risk due to overloading of sewers, watercourses, culverts and other drainage infrastructure.

To ensure that sewer and surface water flooding is not exacerbated; surface water must be considered within the design of the site. This ensures that any additional surface water and overland flows are managed correctly, to minimise flood risk to the site and the surrounding area. The proposed surface water network on the site should be designed to ensure exceedance of the network has been considered.

5 SUSTAINABLE DRAINAGE (SUDS)

5.1 Scope

The NPPF states that SuDS should be considered wherever practical. The use of SuDS is also encouraged by local policy.

In addition, Building Regulations Part H requires that the first choice of surface water disposal should be to discharge to an adequate soakaway or infiltration system, where practicable. If this is not reasonably practicable then discharge should be to a watercourse, the least favourable option being to a sewer (surface water before combined). Infiltration techniques should therefore be applied wherever they are appropriate.

The site has previously been subject to a surface water drainage assessment where Thames Water agreed a connection into the combined water sewer to the west of the site at a rate not exceeding 5l/s.

Therefore, it is essential that the volume of runoff generated as a result of redevelopment should either remain the same as the existing discharge rate or be reduced. Preferably the discharge rate should be restricted to near the greenfield runoff rate if possible, by combining the use of SuDS onsite where feasible. It is proposed to limit the offsite discharge off the site to the Greenfield QBAR run off rate of 4.8l/s.

5.2 Pre-development Situation

Prior to the proposed development of the site, the site was utilised as a covered reservoir. It is not unreasonable to assume that the covering of the reservoir would offer some initial retention of rainwater; however, the majority of the rainwater falling on the covering would result in run-off. The remaining site areas could be considered as greenfield and therefore for the purpose of this assessment, it has been assumed that the existing site use would equate to 60% greenfield.

Table 8.1: Existing site land uses

Land use	Area (m^2)	Percentage
Impermeable	4,988	40%
Permeable	7,483	60%
Total	12,471	100%

In terms of estimating the potential runoff from the site, the pro-rated IOH has been used to estimate the existing runoff from the site as in its current use and in a greenfield condition. Calculations are contained in Appendix A.

Table 8.2: IOH 124 surface water runoff (greenfield)

Return period	Peak flow (l/s)
QBar	4.8
1 in 1 year	4.1
1 in 30 year	10.9
1 in 100 year	15.3

As a developed site, the pre-development surface water runoff from the site has been calculated for a range of return periods using the Modified Rational method. The Modified Rational method uses the following equation to calculate peak runoff rate from an area:

Q = 2.78 Cv Cr i A

Where:

2.78 = Coefficient which accounts for the differences in units used for the inputs and the outputs of the equation.

Cv = Volumetric Runoff Coefficient - a co-efficient that describes the proportion of rainfall appearing in the surface water drainage system, assumed to be 0.95 for impermeable areas

Cr = Routing Coefficient - a routing co-efficient added to the Rational Method to represent runoff characteristics of a particular site or area in a more accurate manner, assumed to be 1.3 for urban areas

i = Rainfall Intensity (mm/hr) based on a 1 hour rainfall event

A = Area (ha)

Table 8.3: Modified Rational Method pre-development surface water runoff

Return period	Rainfall Intensity (mm/hr)	Peak flow (l/s)
QBar	13.51	23.1
1 in 30 year	38.0	65.1
1 in 100 year	51.19	87.7

Rainfall data has been taken from the Design Rainfall calculator contained within the FEH Web App, with the associated screenshots included as **Appendix E**.

5.3 Off-site discharge options

An order of preference exists for drainage receptors. Infiltration drainage should be used where possible. Where this is not possible, or does not provide sufficient capacity, attenuated discharge to watercourses should be sought. Only where neither of these two options is available should discharge to sewers be considered, subject to approvals from the sewerage undertaker.

5.3.1 Infiltration

Discharge to the ground, or infiltration, may be a possible drainage solution for this site; however the effectiveness of infiltration is completely dependent on the physical conditions at the site. Potential obstacles include:

Local Variations In Permeability Preventing Infiltration - This testing should be undertaken in line with the guidance contained in BRE 365 or CIRIA R156 and the results used to firstly check feasibility and secondly to size the necessary infiltration features. Based on the underlying geology it is unlikely that infiltration will be suitable for discharge of surface water from the site.

Shallow Groundwater Table - For infiltration drainage devices Building Regulation approved document H2 states that these, “should not be built in ground where the water table reaches the bottom of the device at any time of the year”.

Source Protection Zones - The site is not located in a source protection zone. If the local ground conditions prove suitable, water could be infiltrated to the ground in a number of different ways, including discharge to infiltration trenches, retention ponds designed to infiltrate water or more laterally extensive systems constructed beneath roadways.

5.3.2 Discharge to watercourse

As infiltration is not suitable on the site or does not provide a sufficient discharge rate, discharge to watercourse is the next option to consider. The nearest and most appropriate watercourse is not within a suitable distance of the site to allow for a connection.

5.3.3 Discharge to sewer

As neither of the above two options are considered suitable for the site then connection to sewer may be required. Attenuation storage will be used to limit off site runoff, as agreed with Thames Water. These should be used to achieve the requisite run-off rates. This method involves restricting site runoff to an agreed limit and then temporarily storing any excess storm water on the site. The way this water is stored and attenuated can vary depending on the context and nature of the development being proposed.

5.4 Post-development situation

It is proposed that the re-development of the site will utilise sustainable drainage techniques where feasible. It has been assumed that the reservoir would have been lined to prevent water leaching and therefore infiltration techniques may not be possible. This does not exclude the use of other SuDs techniques. It is proposed to utilise green roof techniques to reduce the impermeable area post development.

The use of permeable paving should be considered where paving is proposed. Although infiltration may not be possible, on site water passing through the paving system will offer filtration of solids and can be collected below a sub-base within a piped system. However, the main attenuation will be provided within a cellular storage structure, the volume of which has been based on an offsite discharge rate. Run-off from the site will be limited to a maximum rate as permitted by Thames Water, and may therefore be subject to change once further negotiations have taken place.

The area to the east of the site will be landscaped to provide an amenity area, this area can be assumed to be greenfield and will not increase the run off rates or volumes from the pre-development situation. Given the fact that London Clay underlies the site, infiltration will be very limited and therefore ponded water can be expected to occur during times of prolonged precipitation. The area of the base of the reservoir should be graded with a slope away from the proposed properties. This will ensure that the flood risk to the basement level will remain low.

We understand that the development will use a combination of SuDS methods with the proposed development consisting of both Green roof and a sub-terrain cellular storage structure pumped from the lower level up to a controlled discharge point at a rate to be agreed by Thames Water.

The reduction in offsite discharge rates from 66.49l/s for the 100 year event to the rate agreed with Thames Water (**Appendix D**) offers a significant reduction in offsite surface water discharge rates, and therefore complies with the requirements of the London Plan. At the time of writing we still await confirmation of the discharge rate from Thames Water, we based this strategy on the rates agreed in 2012. The proposed discharge rate will need to be agreed with Thames Water.

The Preliminary Surface Water Drainage Strategy is located in **Appendix F**.

5.5 Water Quality

Surface water generated from the site will be accommodated through a drainage treatment train, which will include the use of SuDS where possible.

As quoted from the National Standards for Sustainable Drainage (Ref. 7) 'the minimum number of treatment stages depends on the potential hazards on the site together with the sensitivity of the receiving water body to pollution'. Table 5.1 classifies the hazard level of surface runoff from different sources.

Table 5.1: Water quality – level of hazard

Hazard	Example
Low	Roof drainage
Medium	Residential, amenity, commercial, industrial uses includes car parking and roads
High	Areas used for handling and storage of chemicals and fuels, handling and storage of waste (including scrap-yards). Lorry, bus or coach parking or turning areas

The following tables indicate the number of treatment stages required before surface runoff should reach the infiltration/ water body. The minimum number of treatment stages must be in accordance with the following Tables 5.2 and Table5.3.

Table 5.2: Minimum number of treatment stages to groundwater

Classification	Example	Low	Med	High
G1	Source Protection Zone 1, within 50m of a well, spring or borehole that supplies potable water	1	3	Consult the Environment Agency
G2	Into or immediately adjacent to a sensitive receptor that could be influenced by infiltrated water. includes designated nature conservation, heritage and landscape sites – including Biodiversity Action Plan (BAP) habitats and Protected Species	1	3	
G3	Source Protection Zone II and III or Principal Aquifer	1	3	
G4	Secondary Aquifer	1	2	
G5	Unproductive strata	1	2	

Table 5.3: Minimum number of treatment stages to surface water

Hazard	Normal Surface Water	Sensitive Surface Water
Low	0	1
Medium	2	3
High	Consult the Environment Agency	

As a result of the National Standards, it is recommended that a minimum of 1-2 levels of treatment is required for runoff from the site into the combined sewer.

The use of a combination of SuDS as outlined above should ensure that in line with current guidelines, runoff is limited from the site following redevelopment. The use of greenroofs and permeable paving will also ensure significant water quality benefits.

6 CONCLUSIONS AND RECOMMENDATIONS

This SuDS report complies with the NPPF and Planning Practice Guidance and demonstrates that the surface water flood risk has been considered in the proposed development.

The proposals involve the construction of a residential building. Surface water runoff will be controlled on-site up to the 1 in 100 year plus 40% climate change storm event, providing betterment on the existing scenario.

The assessment concludes that the development should not be precluded on surface water drainage grounds.

We trust the above is useful, but should you require any additional information, please do not hesitate to contact the undersigned.

For RSK LDE Limited,

Yours faithfully,

Sam Williams
Graduate Hydrologist, RSK LDE Ltd
Author

Colin Whittingham
Associate Director, RSK LDE Ltd
Technical Reviewer

APPENDICES

Appendix A: Service Constraints
Appendix B: Proposed Site Layout Plans
Appendix C: London Borough of Camden Correspondence
Appendix D: Thames Water Sewer Records and Correspondence
Appendix E: Surface Water Drainage Calculations
Appendix F: Preliminary Surface Water Drainage Strategy

REFERENCES

1. Communities and Local Government, 'National Planning Policy Framework', 2012.

2. Communities and Local Government, 'Planning Practice Guidance - Flood Risk and Coastal Change, ID 7', March 2014.

http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/

3. Mayor of London, 'The London Plan: Spatial Development Strategy for Greater London – Consolidated with alterations since 2011', March 2015.

4. DEFRA, ‘Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems’, March 2015.

5. RSK, ‘371487-R1(02)-Flood Risk Assessment’, June 2017.

6. WRC “Sewers for Adoption” 7th Edition, 2012.

7. DEFRA ‘National Standards for sustainable drainage systems – Designing, constructing, operating and maintaining drainage for surface runoff’, December 2011.

APPENDIX A

Service Constraints

1. This report and the Drainage design carried out in connection with the report (together the "Services") were compiled and carried out by RSK LDE Ltd (RSK) for Lifecare Residencies Limited (the "client") in accordance with the terms of a contract between RSK and the "client" dated June 2017. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable Civil Engineer at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date hereof, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services, which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between

the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

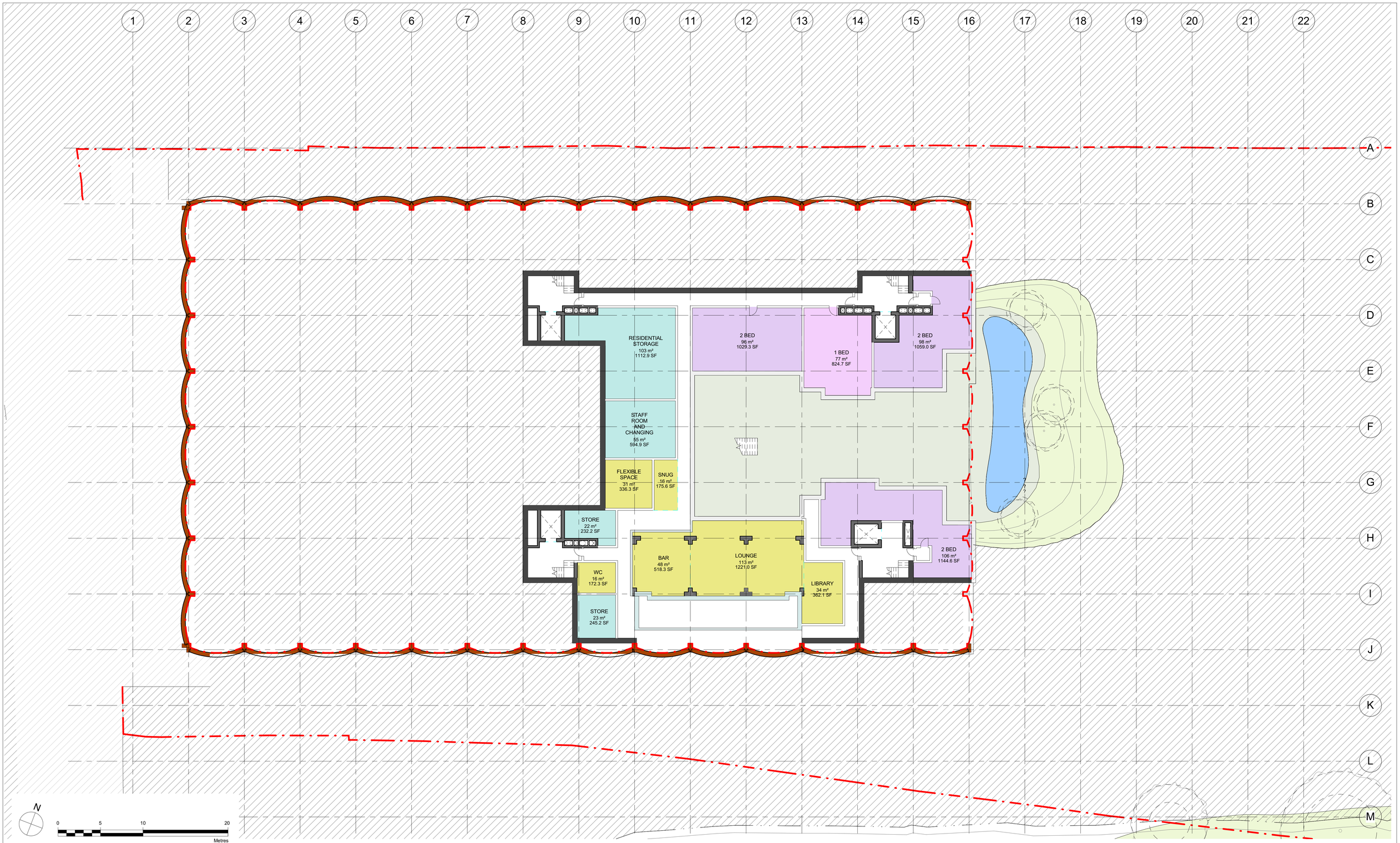
7. The Services are based upon RSK's observations of existing physical conditions at the site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

APPENDIX B

Proposed Site Layout Plans



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Notes

Rev	Reason for Issue	Date	Iss
00	Preliminary Issue	16.12.16	RPP
01	Iteration 01	13.01.17	RPP
02	Iteration 02	15.02.17	RPP
03	Iteration 02 Amendments	17.02.17	RPP
04	Iteration 03 Draft Issue	08.03.17	RPP
05	Iteration 03 Draft Issue 2	14.03.17	RPP
06	Iteration 03	28.04.17	RPP

Key

- 1 Bed
- 2 Bed
- 3 Bed
- Nursing Home
- FOH
- BOH
- Plant
- Parking
- Outside Space
- Avenue
- Circulation
- Hardstanding / Terrace

Consultants

Structural & Civil Engineer:	Waterman Structures
Acoustics, BREEAM, M&E Engineer:	Cudd Bentley
Cost Consultant:	Quantem
Planning Consultant:	Line Planning
Townscape Consultant:	AR Urbanism
RoL, Daylight & Sunlight Analysis:	Point 2
Landscape Designer:	Andy Sturgeon Design
Transport:	Morgan Tucker
Ecology:	James Blake Associates

Key / Site Location

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Client
LifeCare Residences Limited

Project
Gondar Gardens

Drawing Title
Level -02

Scale	Drawn By	Issued By
1 : 200 @ A1	RPP	RPP

Stage 2 - Concept design

Project No.	Drawing No.	Revision
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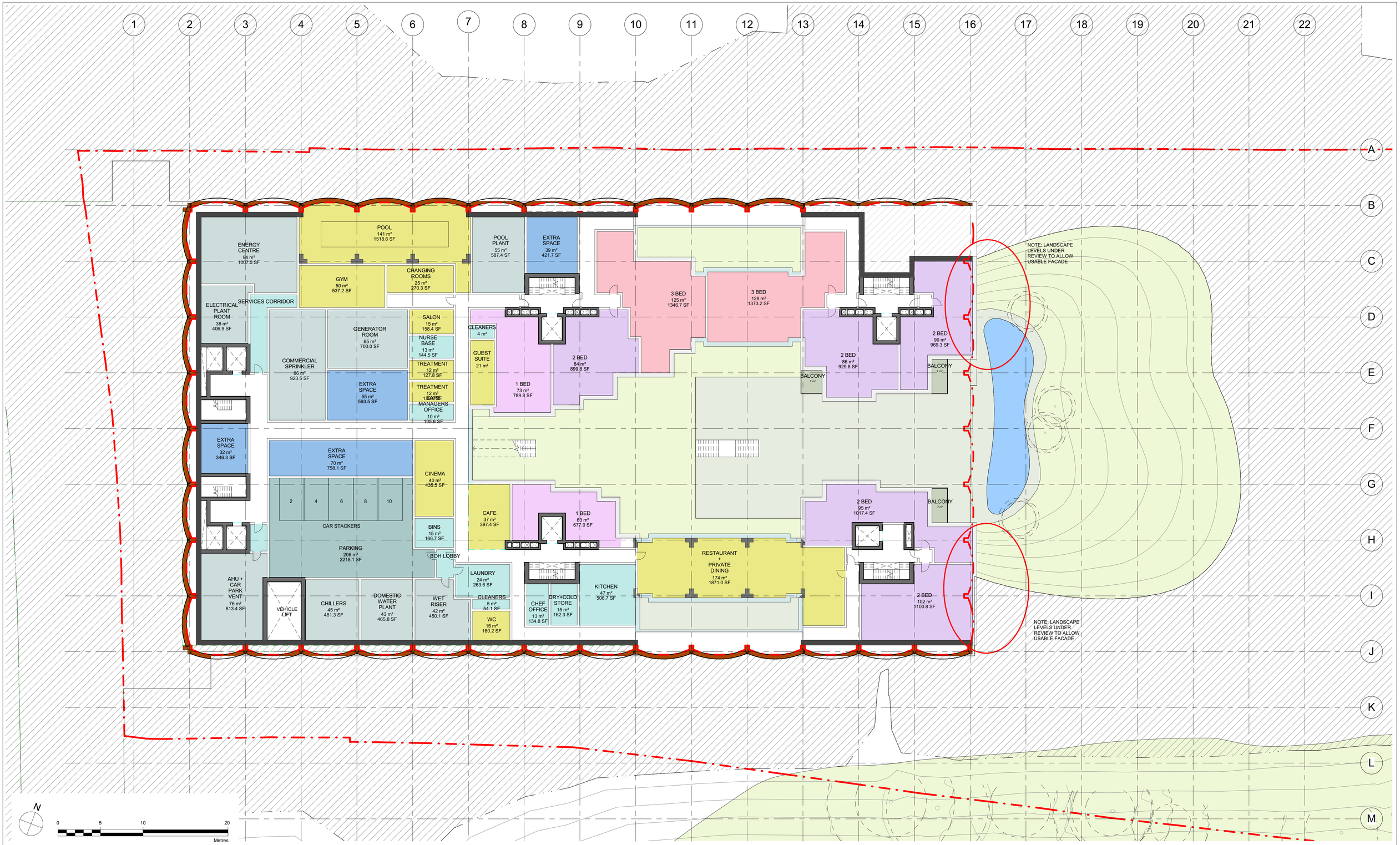

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Client
LifeCare Residences Limited

Project
Gondar Gardens

Drawing Title
Level -01

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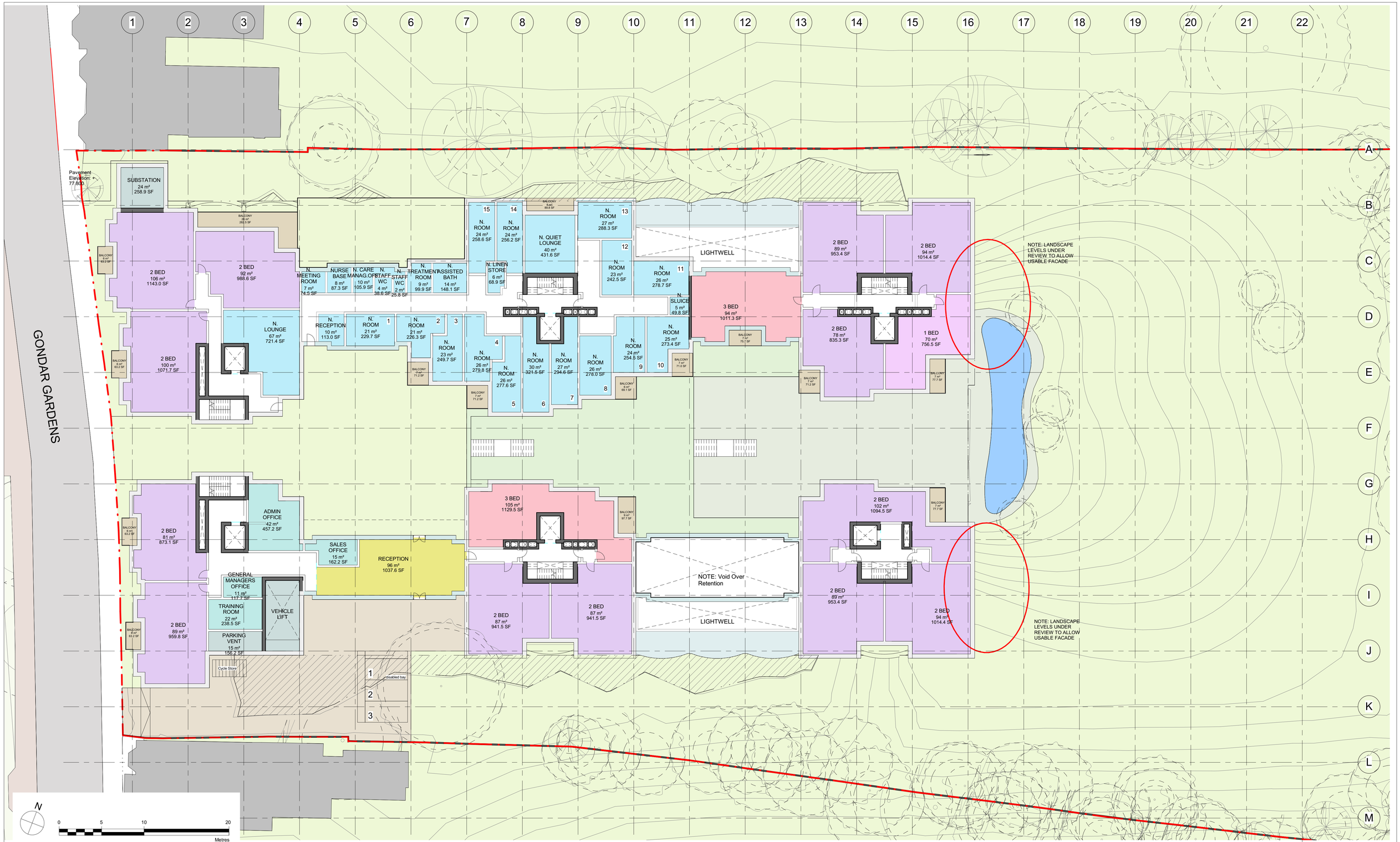

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Notes

Rev	Reason for Issue	Date	Iss
00	Preliminary Issue	16.12.16	RPP
01	Iteration 01	13.01.17	RPP
02	Iteration 02	15.02.17	RPP
03	Iteration 02 Amendments	17.02.17	RPP
04	Iteration 03 Draft Issue	08.03.17	RPP
05	Iteration 03 Draft Issue 2	14.03.17	RPP
06	Iteration 03	28.04.17	RPP

Key

- 1 Bed
- 2 Bed
- 3 Bed
- Nursing Home
- FOH
- BOH
- Plant
- Parking
- Outside Space
- Avenue
- Circulation
- Hardstanding / Terrace

Consultants

Structural & Civil Engineer:	Waterman Structures
Acoustics, BREEAM, M&E Engineer:	Cudd Bentley
Cost Consultant:	Quantem
Planning Consultant:	Line Planning
Townscape Consultant:	AR Urbanism
RoL, Daylight & Sunlight Analysis:	Point 2
Landscape Designer:	Andy Sturgeon Design
Transport:	Morgan Tucker
Ecology:	James Blake Associates

Key / Site Location

Robin Partington & Partners
Castlewood
77-91 New Oxford Street
London
WC1A 1DG
+44 20 7419 3500
mail@rpplondon.com
www.rpplondon.com

Client
LifeCare Residences Limited

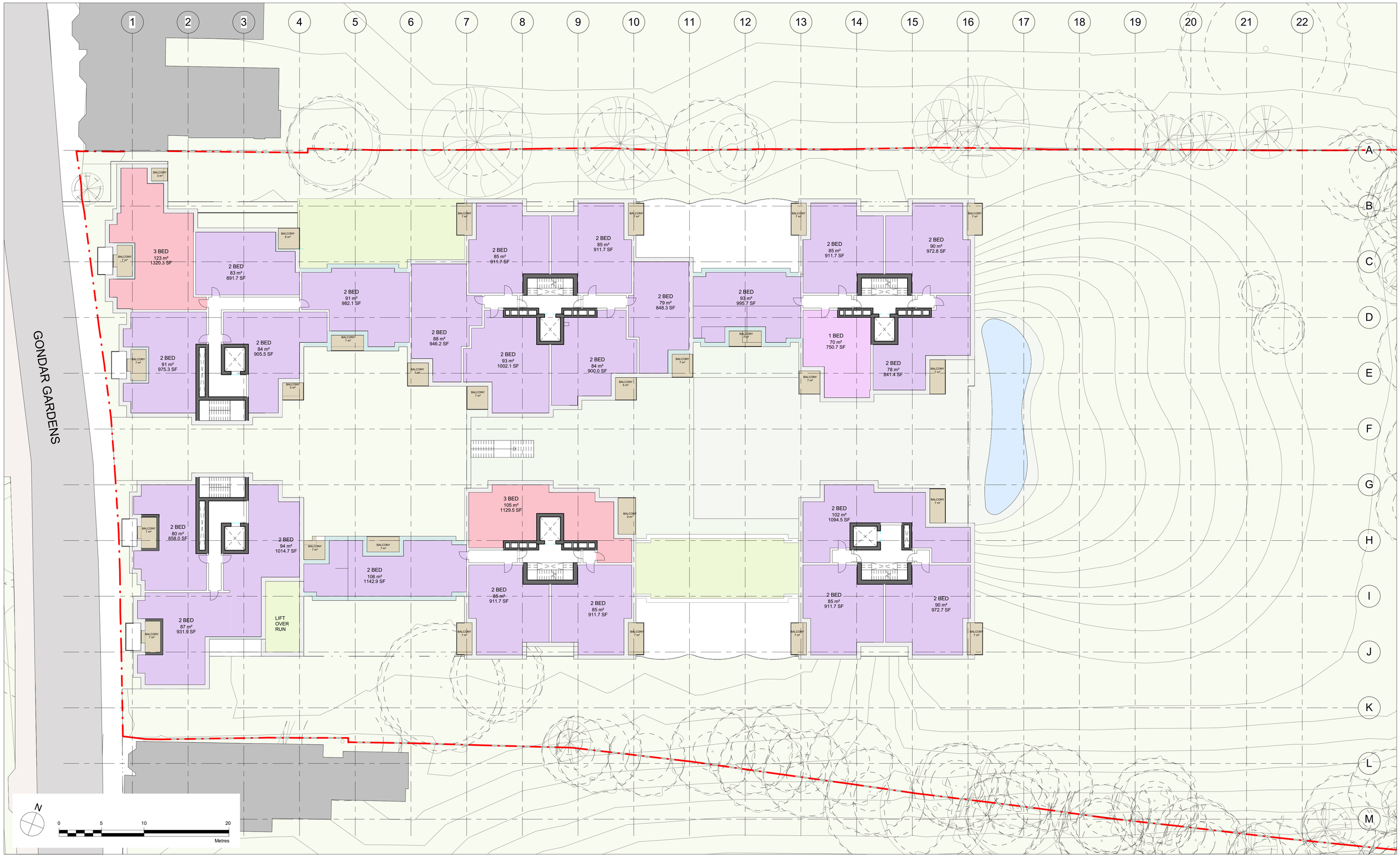
Project
Gondar Gardens

Drawing Title
Level 00 - Street Level

Scale	Drawn By	Issued By
1 : 200 @ A1	RPP	RPP

Stage 2 - Concept design

Project No.	Drawing No.	Revision
16069	A_10_103	06



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Key

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Consultants

Structural & Civil Engineer:	Waterman Structures
Acoustics, BREEAM, M&E Engineer:	Cudd Bentley
Cost Consultant:	Quantem
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Landscape Designer:	Andy Sturgeon Design
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+44 20 7419 3500
mail@rpplondon.com
www.rpplondon.com

Client
LifeCare Residences Limited

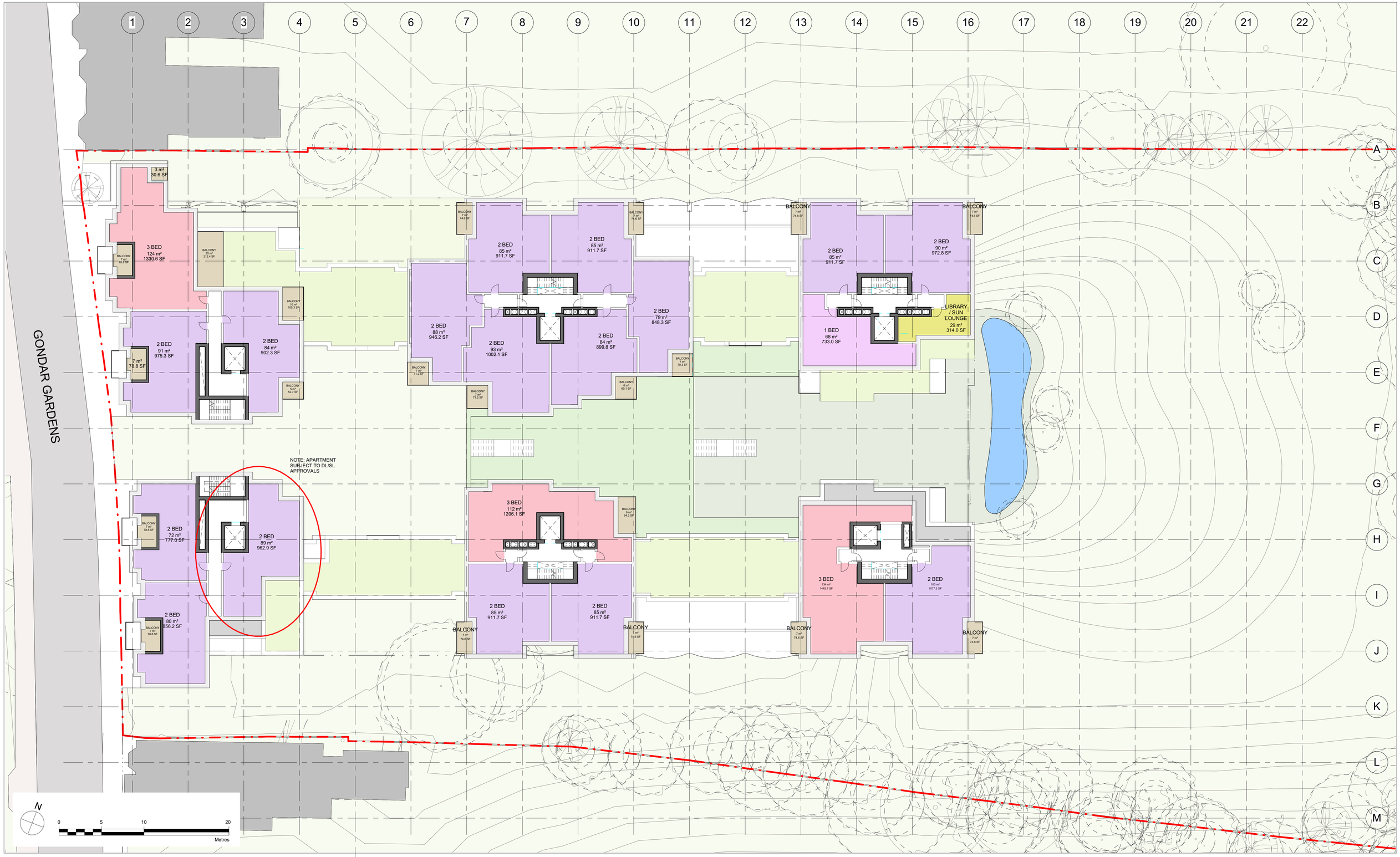
Project
Gondar Gardens

Drawing Title
Level 01

Scale	Drawn By	Issued By
1 : 200 @ A1	RPP	RPP

Stage 2 - Concept design

Project No.	Drawing No.	Revision
16069	A_10_104	06



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06	Iteration 03	28.04.17	RPP

Key

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- BOH
- Plant
- Parking
- Outside Space
- Avenue
- Circulation
- Hardstanding / Terrace

Consultants

Structural & Civil Engineer:	Waterman Structures
Acoustics, BREEAM, M&E Engineer:	Cudd Bentley
Cost Consultant:	Quantem
Planning Consultant:	Line Planning
Townscape Consultant:	AR Urbanism
RoL, Daylight & Sunlight Analysis:	Point 2
Landscape Designer:	Andy Sturgeon Design
Transport:	Morgan Tucker
Ecology:	James Blake Associates

Key / Site Location

Robin Partington & Partners
Castlewood
77-91 New Oxford Street
London
WC1A 1DG
+44 20 7419 3500
mail@rpplondon.com
www.rpplondon.com

Client
LifeCare Residences Limited

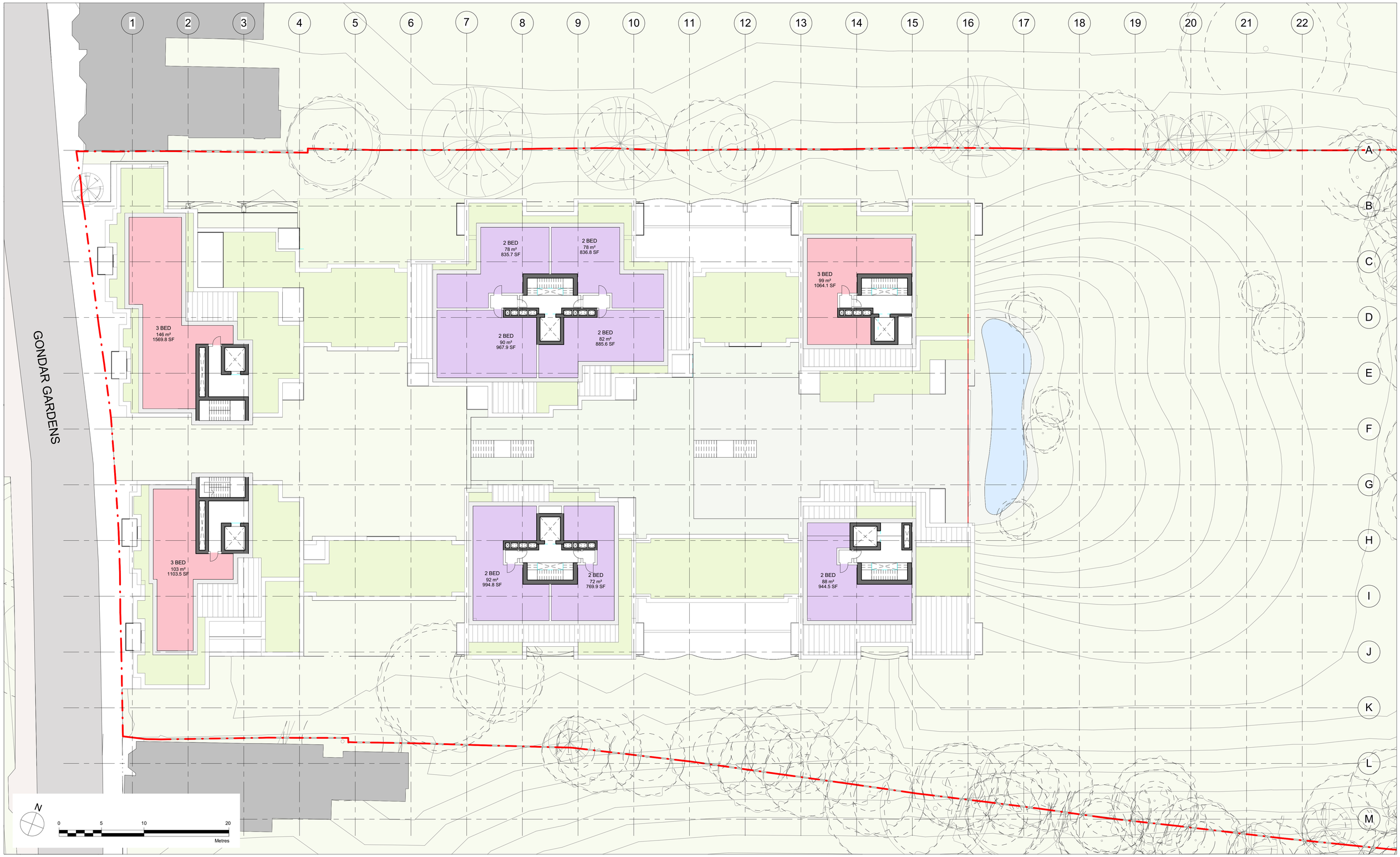
Project
Gondar Gardens

Drawing Title
Level 02

Scale	Drawn By	Issued By
1 : 200 @ A1	RPP	RPP

Stage 2 - Concept design

Project No.	Drawing No.	Revision
16069	A_10_105	06



Notes

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Key

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- BOH
- Plant
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- Outside Space
- Avenue
- Circulation
- Hardstanding / Terrace

Consultants

Structural & Civil Engineer:	Waterman Structures
Acoustics, BREEAM, M&E Engineer:	Cudd Bentley
Cost Consultant:	Quantem
Planning Consultant:	Line Planning
Townscape Consultant:	AR Urbanism
RoL, Daylight & Sunlight Analysis:	Point 2
Landscape Designer:	Andy Sturgeon Design
Transport:	Morgan Tucker
Ecology:	James Blake Associates

Key / Site Location

Robin Partington & Partners
Castlewood
77-91 New Oxford Street
London
WC1A 1DG
+44 20 7419 3500
mail@rpplondon.com
www.rpplondon.com

Client
LifeCare Residences Limited

Project
Gondar Gardens

Drawing Title
Level 03

Scale	Drawn By	Issued By
1 : 200 @ A1	RPP	RPP

Stage 2 - Concept design

Project No.	Drawing No.	Revision
16069	A_10_106	06

APPENDIX C

London Borough of Camden Correspondence

Sam Williams

From: Sam Williams
Sent: 16 May 2017 11:21
To: foi@camden.gov.uk
Subject: Enquiry re. Local Flooding issues in Gondar Gardens area
Attachments: Site location plan.JPG

FAO: Drainage and Flooding team

Good Morning,

We are Engineering Consultants acting for a Client who is considering development of a site within the Gondar Gardens area. We are in the process of producing a Flood Risk Assessment for the site and would be grateful for your input on the following points.

For reference, I have included a site plan.

The site is approximately 1ha in size and the proposals include the construction of approximately 85 residential dwellings.

Flooding records/maps

Are the council aware of any local flooding issues within the Gondar Gardens area? As part of our Flood Risk Assessment we will be documenting any recorded incidents of flooding so any records/anecdotal evidence that the council may have, would be of great help. In particular we would be interested to hear of any reported incidents of surface water, highway or groundwater flooding.

Are there any surface water flood maps available and if so please can we obtain a copy?

We have recently submitted a request for data from the Environment Agency and are currently awaiting their response. We anticipate that they will be able to provide us with any relevant modelled fluvial/tidal flood levels for the site.

Flood Mitigation Measures

Can you provide information on any required flood mitigation measures you may suggest for development in this area, if deemed necessary. Particularly in relation to the River Brent.

Ordinary Watercourse

Can you provide any information, records or constraints in relation to the mains water reservoir located on the site.

Surface Water Drainage Strategy

We understand that there will no longer be a requirement for local authorities to set up SABs, as previously indicated under Schedule 3 of the Flood Water Management Act 2010, however we understand that London Borough of Camden are now a statutory consultee on all major planning applications and will be providing comments on the surface water drainage for new sites.

At this stage, a formal drainage strategy has not yet been produced, however the general principles will likely include:

- Sustainable drainage features (SuDS) where feasible
- Discharge to ground/watercourse/sewer
- Discharge restriction in accordance with current guidance likely to be 4.8l/s (the sites greenfield runoff rate).
- Accommodate the 1 in 100 year plus climate change storm event on site

Therefore we would be grateful if you could please provide your pre-planning advice on the surface water drainage strategy for this site? Are there any particular local requirements that the council wish to raise, relating to the proposed drainage strategy for the area, such as:

- Any discharge restrictions
- Use of SuDS features – what types and level of adoption
- Level of drainage detail required at the planning stage
- Any interim guidance for proposed drainage on new developments in this area?

Following the recent publication of the new climate change allowances from the Environment Agency, please can you confirm what London Borough of Camden consider to be an appropriate climate change allowance for developments in this area.

If you have any formal pre-planning procedure i.e. forms, fees etc, please can you provide details.

The above information would be of great assistance in developing the masterplan, drainage strategies and designs for the project prior to planning submission.

Many thanks for your time.

I look forward to your reply.

Kind regards,

Sam Williams
Graduate Hydrologist

RSK
18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT, UK

Switchboard: +44 (0)1442 437500
Fax: +44 (0)1442 437550
Direct dial: +44 (0)1442 437548
email: sbwilliams@rsk.co.uk

http://www.rsk.co.uk

WINNER OF THE QUEEN'S AWARD FOR ENTERPRISE: INTERNATIONAL TRADE 2016

Sam Williams

From: Hill, Karlos [Karlos.Hill@camden.gov.uk]
Sent: 14 June 2017 12:35
To: Sam Williams
Subject: EIR Response 20971020
Attachments: EIR Response 20971020.pdf

Dear Mr Williams

Please see attached the response to your EIR request.

Yours Sincerely,

Karlos Hill
Information & Records Management Officer
London Borough of Camden

Telephone: 020 7974 2925
Web: camden.gov.uk

Corporate Services
London Borough of Camden
5 Pancras Square
London
N1C 4AG

Tel 020 7974 2925
foi@camden.gov.uk

Date: 14th June 2017
Your reference:
Our reference: 20971020
Enquiries to: foi@camden.gov.uk

Dear Mr Williams

Re: Environmental Information Regulations 2004

Thank you for your Environmental Information Regulations request.

Your request for information, received on the 16th May 2017 has now been considered.

You requested the following:-

We would be interested to hear of any reported incidents of surface water, highway or groundwater flooding.

Are there any surface water flood maps available and if so please can we obtain a copy?

We have recently submitted a request for data from the Environment Agency and are currently awaiting their response. We anticipate that they will be able to provide us with any relevant modelled fluvial/tidal flood levels for the site.

Flood Mitigation Measures

Can you provide information on any required flood mitigation measures you may suggest for development in this area, if deemed necessary. Particularly in relation to the River Brent.

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Can you provide any information, records or constraints in relation to the mains water reservoir located on the site.

Surface Water Drainage Strategy

We understand that there will no longer be a requirement for local authorities to set up SABs, as previously indicated under Schedule 3 of the Flood Water Management Act 2010, however we understand that London Borough of Camden are now a statutory consultee on all major planning applications and will be providing comments on the surface water drainage for new sites.

At this stage, a formal drainage strategy has not yet been produced, however the general principles will likely include:

- **Sustainable drainage features (SuDS) where feasible**
- **Discharge to ground/watercourse/sewer**

- **Discharge restriction in accordance with current guidance likely to be 4.8l/s (the sites greenfield runoff rate).**
- **Accommodate the 1 in 100 year plus climate change storm event on site**

Therefore we would be grateful if you could please provide your pre-planning advice on the surface water drainage strategy for this site? Are there any particular local requirements that the council wish to raise, relating to the proposed drainage strategy for the area, such as:

- **Any discharge restrictions**
- **Use of SuDS features – what types and level of adoption**
- **Level of drainage detail required at the planning stage**
- **Any interim guidance for proposed drainage on new developments in this area?**

Following the recent publication of the new climate change allowances from the Environment Agency, please can you confirm what London Borough of Camden consider to be an appropriate climate change allowance for developments in this area.

If you have any formal pre-planning procedure i.e. forms, fees etc, please can you provide details.

Our Response

1. Most of the information they are seeking is publically available in our Strategic Flood Risk Assessment (SFRA) found here: http://www.camden.gov.uk/ccm/content/environment/planning-and-built-environment/two/planning-applications/making-an-application/supporting-documentation/sustainable-drainage-systems/

2. All of our planning advice for FRAs and Surface Water Drainage Statements is included here: http://www.camden.gov.uk/ccm/content/environment/planning-and-built-environment/two/planning-applications/making-an-application/supporting-documentation/sustainable-drainage-systems/

3. Ordinary Watercourses: please direct questions to Thames Water who will have their own records on this. Also, please review our SFRA (link above).

4. The climate change allowances will not affect Camden as we are in Flood Zone 1. In line with advice from the Environment Agency, the Council expects design of the drainage system to the 20% climate change allowance on top of the 1 in 100 year storms. Then a sensitivity test against the 40% allowance to ensure that the additional runoff is wholly contained within the site and there is no increase in the rate of runoff discharged from the site safe. This is to understand any implications to people from increased flood hazard (e.g. depths, velocities of surface water runoff) and to ensure that under the 40% scenario the development is safe. The additional runoff (volume between the 20% and 40% allowances) may exceed the storage capacity of attenuation basins and spill into different areas of the site temporarily, but the crucial thing is to ensure that the additional runoff is contained within the site safely and does not contribute to an increased flood risk to third parties elsewhere.

5. If you would like pre-application advice, you should contact the planning department: planning@camden.gov.uk. Here is some general advice:

An applicant will be expected to:

- Submit a Flood Risk Assessment if located within a Local Flood Risk Zone (area known to be at risk of surface water flooding – as identified in our SFRA) or >1ha.
- Achieve greenfield run-off rates wherever feasible and as a minimum 50% reduction in existing run off rates. Please note: this is 50% of all peak storm events up to and including the 1:100 year storm event. Volumes will need to be constrained for the 1 in 100 year (plus climate change) 6 hour storm event. This should be achieved through implementing SuDS unless demonstrated to be inappropriate (as set out in the Ministerial Statement by the Secretary of State on 18 December 2014). With this site we would expect greenfield

When designing SuDS the development should follow the drainage hierarchy in policy 5.13 of the London Plan below:

- store rainwater for later use
- use infiltration techniques, such as porous surfaces in non-clay areas
- attenuate rainwater in ponds or open water features for gradual release
- attenuate rainwater by storing in tanks or sealed water features for gradual release
- discharge rainwater direct to a watercourse
- discharge rainwater to a surface water sewer/drain
- discharge rainwater to the combined sewer

This information above should be provided in the form of a Surface Water Drainage Statement. The applicant should submit full details, including drainage plans (showing location and extent of SuDS, invert levels, site levels and exceedance flow routes), Microdrainage modelling results (modelling the whole drainage system) evidencing that no flooding occurs in the proposed system up to and including the 1:100 year + climate change 6 hour storm event, and maintenance plans (including maintenance activity, frequency, responsibility and access requirements). The applicant should also complete and submit the Drainage Pro-forma found on this page.

I hope that this response is useful to you however If you are unhappy with any aspect of the way in that your request has been processed then you have the right to request a review of our response. If you wish to request a review, please set out in writing your grounds of appeal (within 2 months of this correspondence) and send it to: **Information & Records Management Team**, **Camden Town Hall, Judd Street, London, WC1H 9LP** and your complaint will be administered through our Internal Review procedure. You can also email your appeal to foireviews@camden.gov.uk

If you are still not satisfied following the Internal Review, you have a right to appeal to the Information Commissioner's Office. They can be contacted at: Wycliffe House, Water Lane, Wilmslow, Cheshire SK9 5AF Telephone: 01625 545 700 www.ico.gov.uk

Yours sincerely

Karlos Hill
Information Records Management Officer
E-mail: foi@camden.gov.uk
Phone: 020 7974 2925

APPENDIX D

Thames Water Sewer Records and Correspondence

Asset ocation earch e er a A A tan ar | **T**

The width of the displayed area is 258m and the centre of the map is located at OS coordinates 524835,185309

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Sam Williams

From: Sam Williams
Sent: 28 June 2017 11:08
To: DEVELOPER.SERVICES@THAMESWATER.CO.UK
Subject: RE: RE: IRef:1015041230 DS6033796 PDEV NW6 1HG Land at Gondar Ga

Hi David,

Thank you for the response, is there any update on the timescales for this?

Kind regards,

Sam Williams
Graduate Hydrologist

RSK
18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT, UK

Switchboard: +44 (0)1442 437500
Fax: +44 (0)1442 437550
Direct dial: +44 (0)1442 437548
email: sbwilliams@rsk.co.uk

http://www.rsk.co.uk

WINNER OF THE QUEEN'S AWARD FOR ENTERPRISE: INTERNATIONAL TRADE 2016

From: DEVELOPER.SERVICES@THAMESWATER.CO.UK [mailto:DEVELOPER.SERVICES@THAMESWATER.CO.UK]
Sent: 23 June 2017 10:00
To: Sam Williams
Subject: RE: RE: IRef:1015041230 DS6033796 PDEV NW6 1HG Land at Gondar Ga

Thank you Sam,

We have consulted with our Asset Planners and will issue our formal response within the week.

Kind Regards,

David Stamateris BSc (Hons)

Development Engineer

Strategic Partnering

Thames Water Infrastructure Alliance

Office: 0203 5779 018 Mobile: 07747 640 273
Developer.services@thameswater.co.uk
Clearwater Court, Vastern Road, Reading, RG1 8DB

Original Text

From: SBWilliams@rsk.co.uk
To: DEVELOPER.SERVICES@THAMESWATER.CO.UK
CC:
Sent: 16.06.17 14:02:52
Subject: RE: IRef:1015041230 DS6033796 PDEV NW6 1HG Land at Gondar Ga

Hi David,

Please see the attached schedule of accommodation.

Surface water will be pumped up to the storage tank, where it will then be restricted by a hydrobrake and discharge via gravity to the existing sewer.

Please do not hesitate to contact me if you require any further information.

Kind regards,

Sam Williams
Graduate Hydrologist

RSK
18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT, UK

Switchboard: +44 (0)1442 437500
Fax: +44 (0)1442 437550
Direct dial: +44 (0)1442 437548
email: sbwilliams@rsk.co.uk

http://www.rsk.co.uk

WINNER OF THE QUEEN'S AWARD FOR ENTERPRISE: INTERNATIONAL TRADE 2016

From: DEVELOPER.SERVICES@THAMESWATER.CO.UK [mailto:DEVELOPER.SERVICES@THAMESWATER.CO.UK]
Sent: 25 May 2017 09:18
To: Sam Williams
Subject: IRef:1015041230 DS6033796 PDEV NW6 1HG Land at Gondar Ga

Dear Sam,

Thank you for your Pre-development enquiry.

Having looked at the application as it mentioned 85 units however looking at the plans we require further information. Please quantify the breakdown of the development in the spreadsheet attached.

Your application mentions a proposed pump rate of 3.94l/s noticing there is a pool unless we are given a revised proposal of the pump rate we will continue to use this figure.

Please confirm if the surface water discharge of 5l/s will be by gravity or pump.

Kind Regards,

David Stamateris BSc (Hons)

Development Engineer

Strategic Partnering

Thames Water Infrastructure Alliance

07747 640 273
Developer.services@thameswater.co.uk
Clearwater Court, Vastern Road, Reading, RG1 8DB

Sam Williams

From: DEVELOPER.SERVICES@THAMESWATER.CO.UK
Sent: 30 March 2012 09:37
To: Colin Whittingham
Subject: RE: potential new connection to combined sewer
Attachments: new-connection-to-public-sewer-application-form.pd.pdf

Mr Whittingham

Please advice the proposed connection points and the proposed discharge rate for the site. Please note we would not accept any rates exceeding 5l/s.

Regards

Natalya Collins

APPENDIX E

Surface Water Drainage Calculations

ICP SUDS Mean Annual Flood

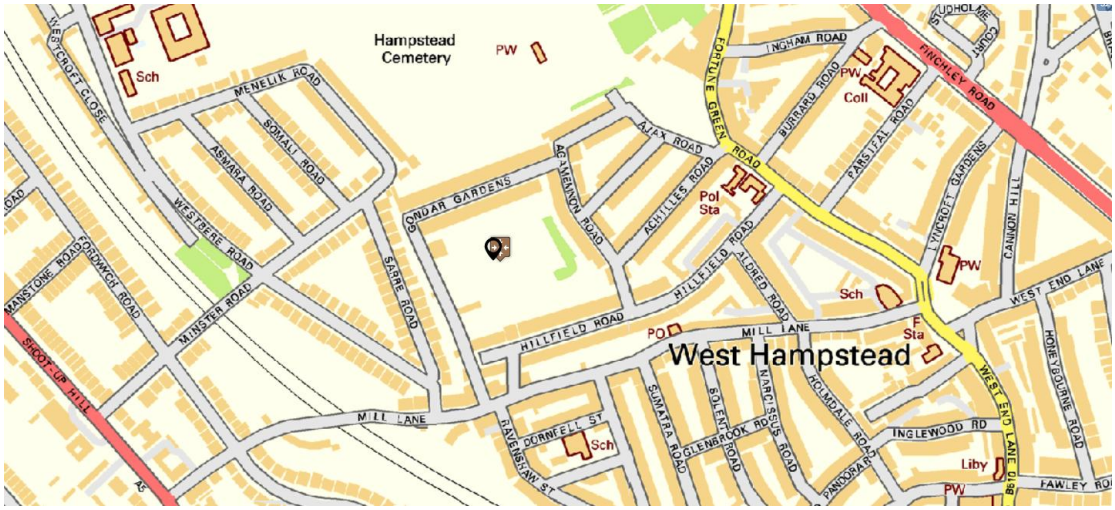
Input

Return Period (years)	30	Soil	0.450
Area (ha)	1.247	Urban	0.000
SAAR (mm)	626	Region Number	Region 6

Results l/s

QBAR Rural	4.8
QBAR Urban	4.8
Q30 years	10.9
Q1 year	4.1
Q30 years	10.9
Q100 years	15.3

371487 – Gondar Gardens – FEH Point data



Qbar rainfall depth

RAINFALL MODELLING FOR 371487 - GONDAR GARDENS POINT DATA AT 524832,185309

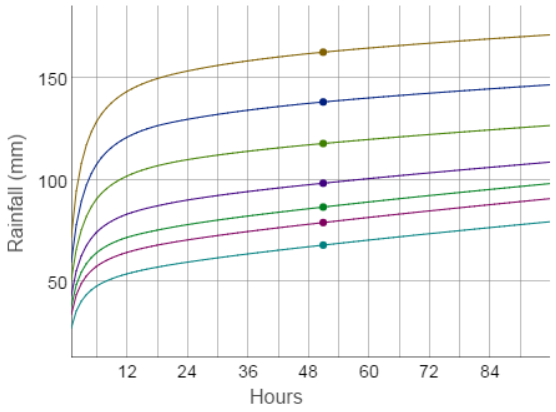
FEH 2013

Point rainfall at 524832, 185309

Design Rainfall Event Rarity

Duration	1	Hours
Return period	2.3	Years
Depth	13.51	mm

Calculate



51.0h (2.1days):
500yr: 162.75mm
200yr: 138.32mm
100yr: 117.94mm
50yr: 98.46mm
30yr: 86.76mm
20yr: 79.15mm
10yr: 68.09mm

Save graph as image Export (CSV)

A design rainfall of 13.51 mm was calculated.

This design rainfall has been calculated for a return period on the annual maximum scale.

1 in 30 year rainfall depth

RAINFALL MODELLING FOR 371487 - GONDAR GARDENS POINT DATA AT 524832,185309

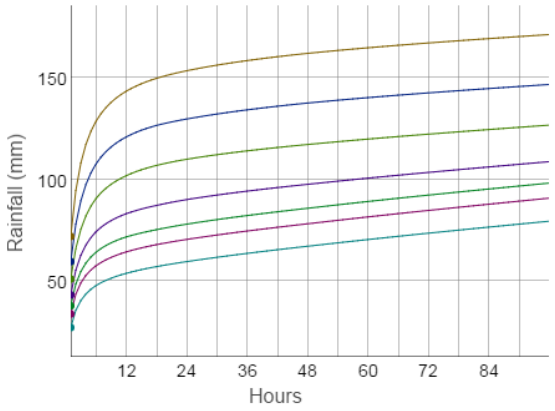
FEH 2013

Point rainfall at 524832, 185309

Design Rainfall Event Rarity

Duration	1	Hours
Return period	30	Years
Depth	38.01	mm

Calculate



1.0h (0.0days):
500yr: 72.07mm
200yr: 59.74mm
100yr: 51.19mm
50yr: 43.36mm
30yr: 38.01mm
20yr: 33.96mm
10yr: 27.31mm

Save graph as image Export (CSV)

A design rainfall of 38.01 mm was calculated.

This design rainfall has been calculated for a return period on the annual maximum scale.

1 in 100 year rainfall depth

RAINFALL MODELLING FOR 371487 - GONDAR GARDENS POINT DATA AT 524832,185309

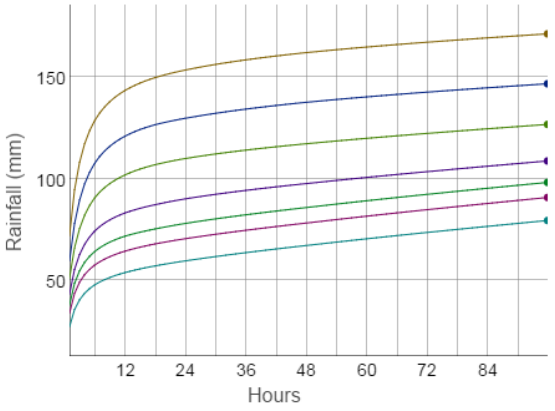
FEH 2013

Point rainfall at 524832, 185309

Design Rainfall Event Rarity

Duration	1	Hours
Return period	100	Years
Depth	51.19	mm

Calculate



96.0h (4.0days):
500yr: 171.25mm
200yr: 146.72mm
100yr: 126.76mm
50yr: 108.80mm
30yr: 98.27mm
20yr: 90.87mm
10yr: 79.55mm

Save graph as image Export (CSV)

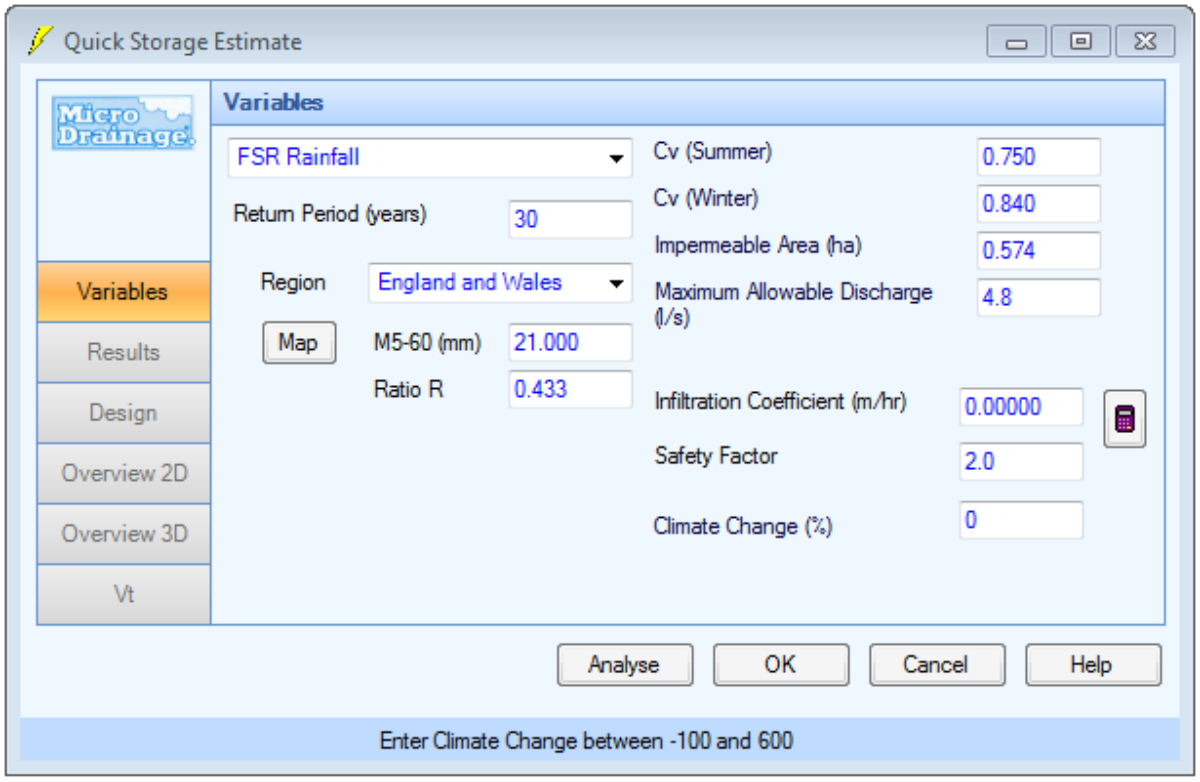
A design rainfall of 51.19 mm was calculated.

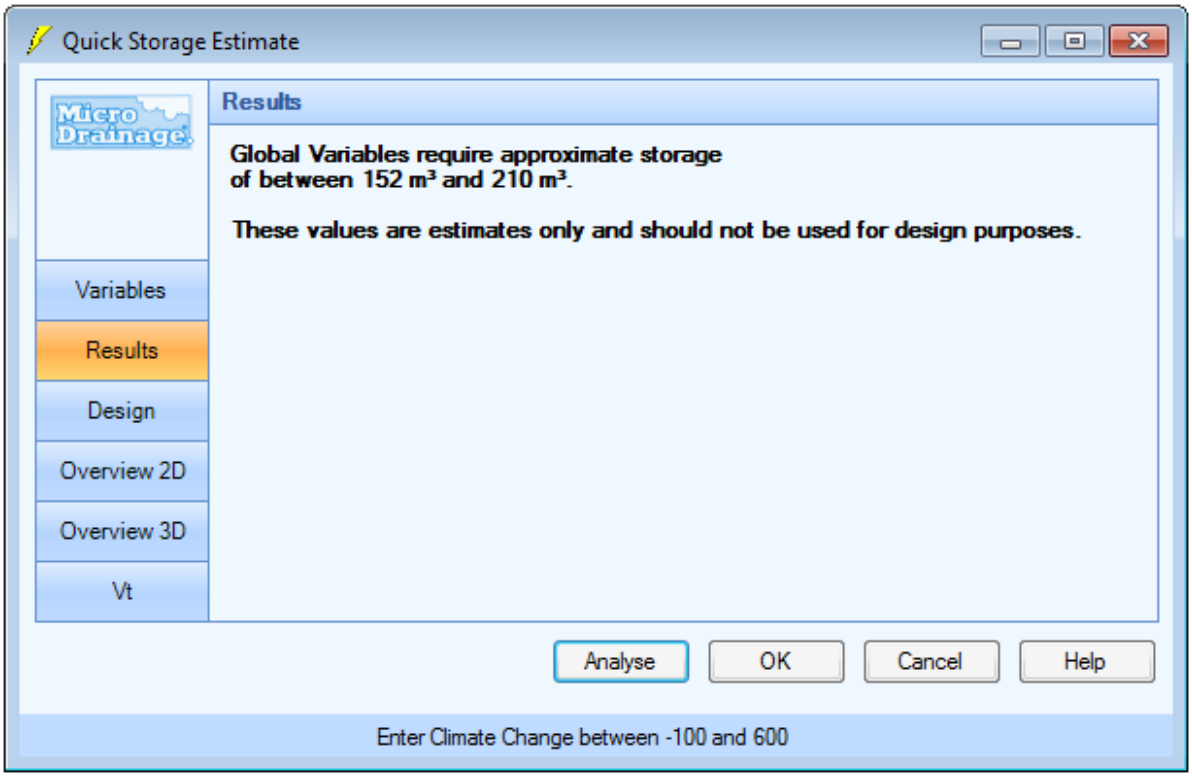
This design rainfall has been calculated for a return period on the annual maximum scale.

371487 – Gondar Gardens

WinDes Quick Storage Estimates – 4.8l/s

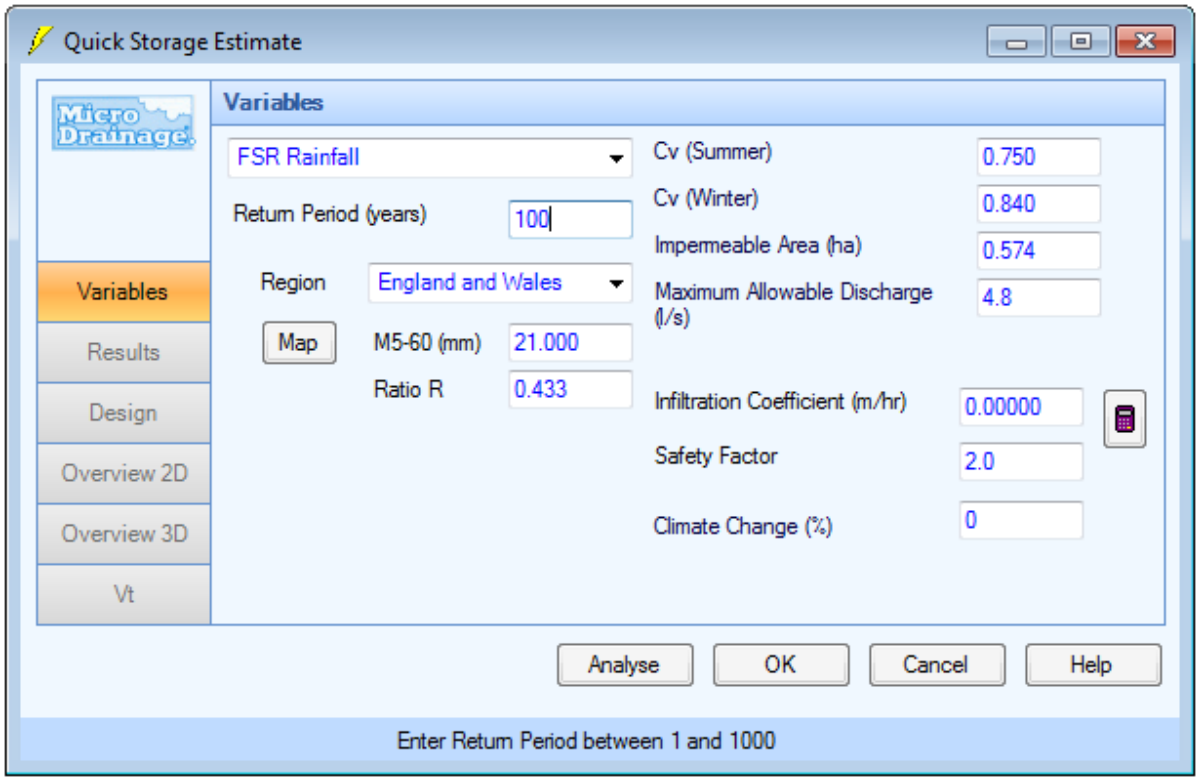
1 in 30 year rainfall event

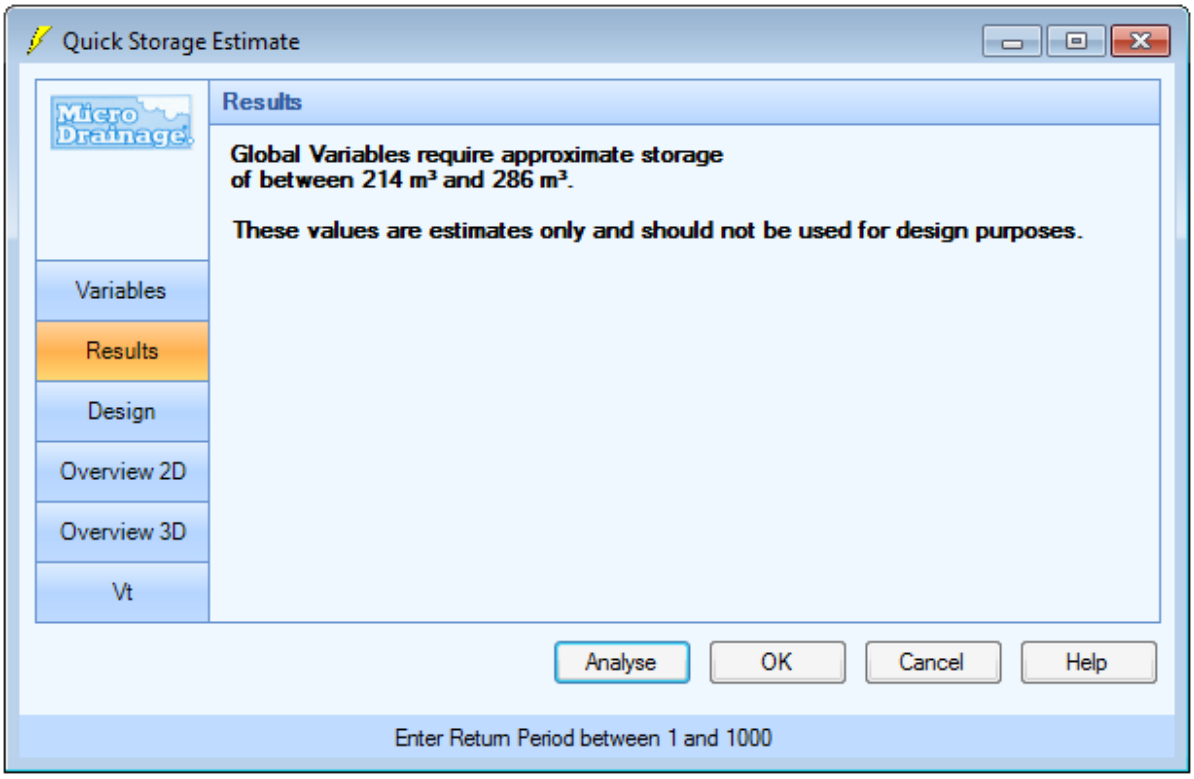




371487 – Gondar Gardens

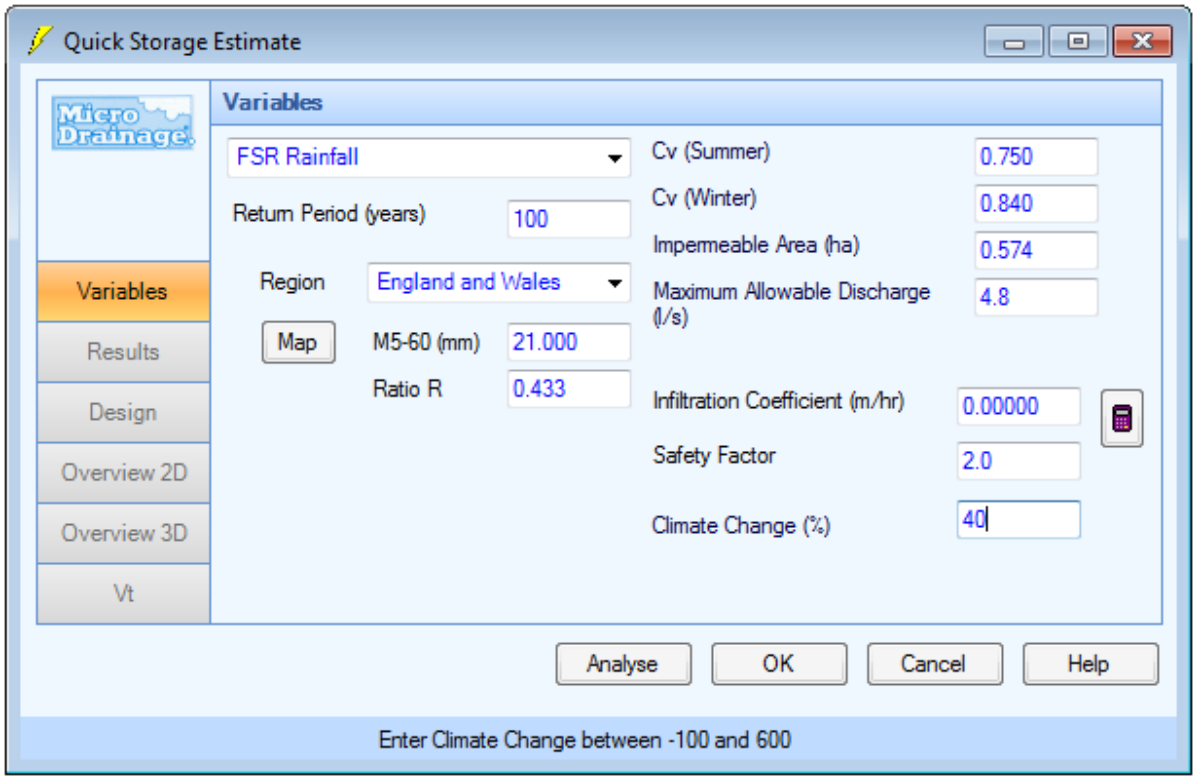
1 in 100 year rainfall event

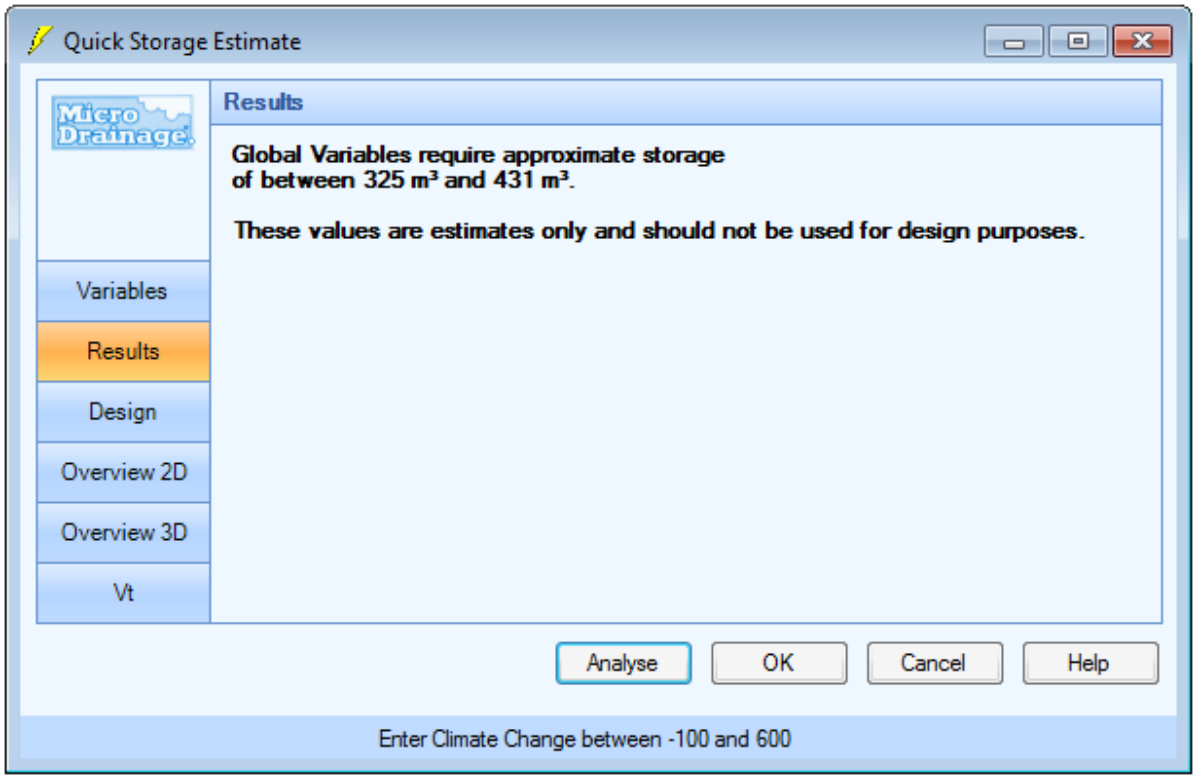




371487 – Gondar Gardens

1 in 100 year plus 40% climate change rainfall event





APPENDIX F

Preliminary Surface Water Drainage Strategy

Viewport 1 - Level 0

Perimeter land drainage, channeling surface water into drainage network, to prevent groundwater ingress. Installed at level -2.

Surface water run off pumped from lower levels to flow by gravity from this point.

Hydrobrake flow control manhole (with discharge limited to 4.8 l/s). Outflow restricted to agreed limit and discharged by gravity to combined sewer in Gondar Gardens.

New outfall manhole (invert level to be verified and confirmed prior to any work commencing).

Viewport 2 - Level -2

Land drainage connects into modular storage.

Balancing pond overflow

Surface water runoff from proposed development collected in a Modular Storage Tank
Area: 215m²
Depth: 1.8m
Void Ratio: 0.95
Anticipated storage volume required before being pumped to higher level: ~ 436m³

Surface water to be pumped from the lower levels up to a controlled discharge point.

SUDS Components

Area Control		
	Modular Storage	Modular plastic geocellular systems with a high void ratio that can be used to create a below ground infiltration (soakaway) or storage structure.

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Notes
1. Proposed site layout taken from Robert Partington & Partners drawing No. A_10_103 and A_10_101

KEY:

- RED LINE PLANNING BOUNDARY
- PROPOSED PRIVATE SURFACE WATER DRAIN AND MANHOLE
- EXISTING COMBINED SEWER AND MANHOLE
- PROPOSED BUILDINGS

Discharge limit quoted is based upon discussions with Thames Water in 2012. This will need confirmation from Thames Water that it remains valid.

Size and location of modular storage and pumps to be confirmed at detailed design.

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P1	17.05.17	Draft	SW		

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Client
LIFECARE RESIDENCES LIMITED

Project Title
LAND AT
GONDAR GARDENS

Status
FINAL

Drawing Title
PRELIMINARY SURFACE WATER DRAINAGE STRATEGY

Drawn	Date	Checked	Date	Approved	Date
SW	29.06.17	SJM	03.07.17	SJM	03.07.17

Scale	Orig Size	Dimensions
1:250	A1	m

Project No.	Drawing File
371487	371487 - SWDS

Drawing No.

Rev. P2

Scale 1:250
0 2.5 5 7.5 10 12.5m