

Flood Risk Assessment

Boundary Lakes Golf Club House

For and on behalf of:

Hampshire County Cricket Club &
Land and Development Advisory

November 2023

**Sustain
Environmental**

Report title:

Flood Risk Assessment

Site name:

Boundary Lakes Golf Club House

For and on behalf of:

**Hampshire County Cricket Club & Land and Development
Advisory**

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1 INTRODUCTION

- 1.1 This Flood Risk Assessment (FRA) has been prepared by Sustain Environmental (SE) on behalf of Hampshire County Cricket Club (HCCC) and Land and Development Advisory (LDA) for the proposed development of a golf club house within the grounds of the existing Boundary Lakes Golf Course and adjacent to the Hampshire County Cricket Club (HCCC).
- 1.2 The Local Planning Authority (LPA) for this area are Eastleigh Borough Council (EBC) and the Lead Local Flood Authority (LLFA) are Hampshire County Council (HCC). Southern Water (SW) are the local sewerage provider.
- 1.3 This FRA was issued in November 2023 to support a planning application.
- 1.4 A planning application for the proposed development of the site was previously submitted in August 2020 (Ref. F/20/88655). This planning application was reviewed by EBC and HCC, who requested for the provision of some additional information, with this including a SuDS Management and Maintenance Strategy (SuDS M&M) prepared in February 2021.
- 1.5 The August 2020 FRA and the February 2021 SuDS M&M were prepared by Andy Clay Consulting (ACC). For clarity and information, ACC is now operating as SE. These previous works have therefore informed the approach and information that has been provided in this FRA.
- 1.6 A wider strategic development of the existing golf course is underway, with other phases also being considered. These are separate to this application.

Background

- 1.7 The proposed development is for a golf club house and associated facilities, which would include a terrace, parking for golf carts and a car parking area.
- 1.8 This FRA has been based on the following appended information:
- **Appendix A** – proposed development plans;
 - **Appendix B** – site topographical survey;
 - **Appendix C** – sewerage network information;

- **Appendix D** –surface water drainage calculations; and
- **Appendix E** – foul and surface water drainage schematic.

Scope of the Assessment

- 1.9 This FRA has been produced to support the submission of a full planning application for the proposed development of the site.
- 1.10 The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG) as well as the local planning policy of EBC as the LPA and of HCC as the LLFA.
- 1.11 The aim of this FRA is to demonstrate that the site can be developed safely, without exposing it to unacceptable risks from flooding or increasing the flood risk to third parties.

Limitations of the Assessment

- 1.12 The general limitations of this assessment are that:
- A number of sources have been used to compile this FRA. Whilst SE believes them to be trustworthy; SE is unable to guarantee the accuracy of the information provided by others.
 - This FRA is based on information available at the time of preparation. Consequently, there is potential for further information to become available. This may lead to future alteration to the conclusions that have been drawn in this report, for which SE cannot be held responsible.

2 SITE DESCRIPTION

- 2.1 The site is within the West End part of Southampton and in the south-western part of the Boundary Lakes golf course. It is adjacent to an access road off Moorhill Road (A27) to the west, with Charles Watts Way (A334) to the south.
- 2.2 The site has a central post code of SO30 3AY and OS NGR of E: 447304 and N: 113199. The site has an area of 1.10 ha and is roughly rectangular in shape. A site location plan is included as **Figure 2.1**.

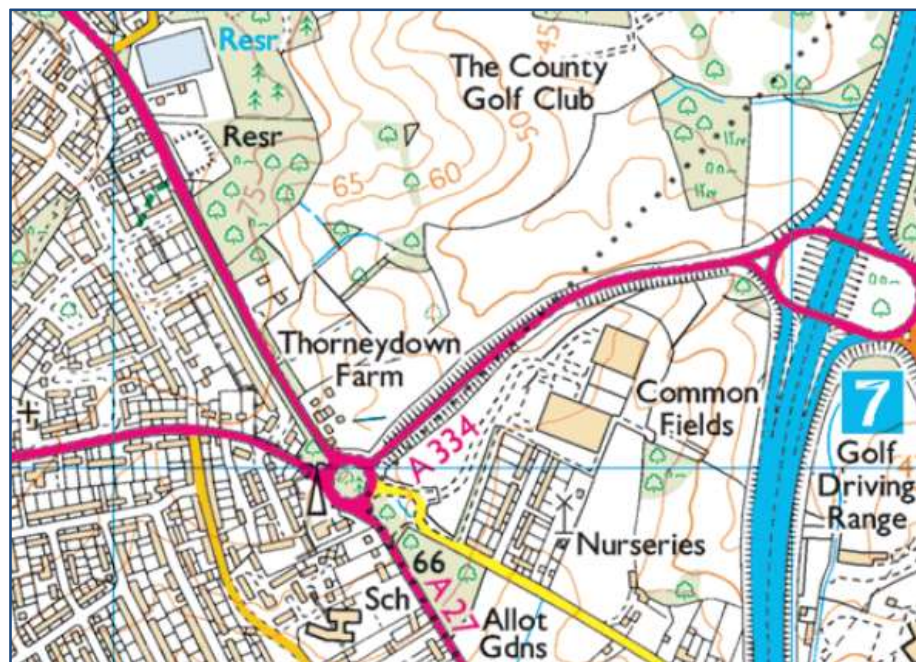


Figure 2.1 – Site Location Plan

- 2.3 The site is within the following setting:
- To the north is a part of the existing golf course. There is a row of residential properties affronting Moorhill Road. The southern part of Telegraph Woods is also to the north of the site. There is a watercourse draining eastwards from Telegraph Woods across the golf course.
 - The existing golf course is to the east, which continues north towards the HCCC. There are woodland and wet woodland areas to the east of the site and other drainage channels, which the watercourse from Telegraph Woods drains north-eastwards towards.

- To the south of the site is a drainage ditch which drains to the east and beyond this an open area of land, associated with HCCC. To the south of this is Charles Watts Way (A334) which heads east towards the M27.
- To the west is Moorhill Road (A27) as well as Moorhill Gardens within the West End area of Southampton, which has a number of residential dwellings. There is an access to the Boundary Lakes golf course from Moorhill Road, which would provide an access for the golf club house.

Proposed Development

- 2.4 The proposed development layout is included as **Appendix A**.
- 2.5 The proposed development is for a golf club house which would include an entrance foyer, changing rooms (male and female) with toilet facilities, studio room, office, storage rooms and terrace on the ground floor and a kitchen, bar, cellar, storage room and bar lounge on the floor above.
- 2.6 The existing access road from Moorhill Road into the site would be realigned, so that it follows a route around the northern boundary of the new scheme.

Topography

- 2.7 Based on OS mapping of the site and surrounds, ground levels in the wider area fall from Telegraph Woods to the north of the site to the east towards the M27 as well as to the south-east towards Charles Watts Way (A334).
- 2.8 A topographical survey of ground levels across the site was completed by Sterling Surveys Ltd in August 2020, and included as **Appendix B**. All surveyed levels were completed in accordance with an ordnance datum (m AOD).
- 2.9 Ground levels are highest towards the western site boundary, adjacent to Moorhill Road and lowest adjacent to the eastern and southern boundaries.
- 2.10 Moorhill Road is slightly more elevated than the adjacent parts of the site, and with levels that fall away to the south-east. The access road into the site from Moorhill Road is also slightly more elevated than the adjacent areas of land.

Geology

- 2.11 The 1 to 50,000 scale British Geological Survey (BGS) online mapping provides an understanding of the bedrock geology and also whether there are any superficial deposits recorded.
- 2.12 The bedrock geology under this part of the site is shown to be of the Wittering Formation (sand, silt and clay), although with the bedrock geology in the area to the south shown to be of the London Clay Formation (clay, silt and sand).
- 2.13 There is not shown to be superficial deposits on the site, although there are superficial deposits of river terrace deposits further to the west and north-west.

Hydrogeology

- 2.14 The GeoIndex Onshore Maps available as 1 to 625,000 scale online mapping from the BGS provides an understanding of the underlying hydrogeology.
- 2.15 The site and the area to the west and south are underlain by what is classified as rocks with essentially no groundwater. They are a predominantly clayey sequence up to 140m thick and confining the underlying aquifer. There are occasional springs at the base of this which would have very hard water.
- 2.16 Whereas the remaining area of the golf course and cricket ground to the north are underlain by what is classified as a moderately productive aquifer. There is a variable and multi-layered aquifer which is of local importance.
- 2.17 The BGS online mapping shows there to be two boreholes to the south of the site, adjacent to Charles Watts Way (SU41SE40 and SU41SE41). These boreholes were part of a series completed by the Ministry of Transport in 1968 and which recorded rocks of the Thames Group and with no groundwater.
- 2.18 The western borehole (SU41SE40) was taken to 45.70m and recorded a topsoil layer, silty clay with sand, followed then by a stiff sandy clay. Whereas the eastern borehole (SU41SE41) was taken to 57.91m and recorded a topsoil layer, soft clay, firm sandy clay, silty clay with sand, and then a stiff sandy clay.

Soils

- 2.19 The soils on the site will be influenced by the underlying geology, as described above, and also by the historical uses of the land. There is understood to have been previous works on the site with the addition and subsequent removal of material, which are therefore likely to alter the character of the local soils.
- 2.20 The Cranfield University Soilscales website has been used to characterise the local soils. This provides a simplified data-set at 1:250,000 scale, to provide a general understanding of the variations that occur between different natural soil types across England and Wales, and how these affect the environment.
- 2.21 The site is situated on the boundary between two different soil types. It is likely that the main soil type across the site is sandy and loamy and which would typically be naturally wet. However, in the area to the south of the site, the soil type is a loamy clay and which would typically have impeded drainage.

Catchment Hydrology

- 2.22 The site is in the overall catchment of the River Hamble, located ~4.3km to the east of the site. This watercourse then drains south-west into Southampton Water near Hamble-le-Rice ~8.4km to the south of the site. The River Hamble is tidal for approximately half of its length, and navigable in its lower reaches.
- 2.23 The drainage of water from the site into the River Hamble is achieved through a tributary of Pudbrook Lake. This flows within a culverted section to the east of the M27, which is adjacent to the eastern boundary of the overall site.
- 2.24 There are designation and sensitivities in the wider hydrological catchment of relevance to the proposed development. This includes the Solent Maritime Special Areas of Conservation (SAC) and the Solent and Southampton Water Special Protection Area (SPA). The proposed development will need to ensure that it does not adversely affect the features protected by these designations.

Local Hydrology

- 2.25 The Boundary Lakes golf course is separated into a northern drainage catchment (which also includes the HCCC) and a southern drainage catchment. The site is located within the southern drainage catchment.
- 2.26 There is a watercourse from the southern part of Telegraph Wood, which drains to the east through the southern part of the golf course. This then drains to the north-east within a culverted section. There are other drainage channels that adjoin this watercourse, including from the central part of the golf course and another to the south of the proposed development.
- 2.27 This watercourse then continues to the east, passing under the M27 and the adjacent built-up area to the east of the Boundary Lakes golf course via a culvert. The culvert is understood to discharge into an open channel tributary of Pudbrook Lake somewhere east of the site and then into the River Hamble.
- 2.28 There is a drainage ditch within a wooded area adjacent to the southern site boundary. This drains east to adjoin the watercourse from Telegraph Wood. Levels for this feature were picked up in the topographical survey, included as **Appendix B**.

Soil Infiltration

- 2.29 Soakaway testing has not been completed at the site, partly due to the need to remove material covering the surface of the site therefore restricting the ability for this to be completed. However, soakaway testing completed for adjacent schemes has been reviewed and is referenced below.
- 2.30 An FRA was produced for the proposed development of Thorneydown Farm (F-18-83908). The proposals were to extend the current golf course and to use the fairways of the expanded golf course as temporary car parking area.
- 2.31 Soil infiltration testing was completed for the Thorneydown Farm scheme. This site is located to the south and south-east of the proposed development of the golf club house.

- 2.32 This soakaway testing was undertaken in November 2017 by Ruddlesden Geotechnical in accordance with the BRE Digest 365 methodology.
- 2.33 The soil types encountered were a mix of dark grey-brown slightly gravelly and slightly clayey silt and orange brown-grey silty clay. The soakaway testing concluded that the ground in this area has low permeability and no infiltration rate calculations were possible.
- 2.34 Based on the soakaway testing completed in the adjacent scheme, it is reasonable to conclude that an infiltration-led surface water drainage solution would not be viable for the proposed development of the site.

Existing Drainage Infrastructure

- 2.35 Consultation with SW was completed to obtain information on the type and location of public sewerage in the area, with this included as **Appendix C**.
- 2.36 There are no public sewers across the site or in the immediate vicinity, including along Moorhill Road and Moorhill Gardens. This indicates that the existing residential properties in these areas are not served by a public sewerage infrastructure. Presumably they instead have private foul drainage arrangements. SW have been contacted to confirm whether this is the case.
- 2.37 The nearest foul sewer is on Moorhill Road to the south of the site, adjacent to Thorneydown Farm. Manhole 3001 is shown on the plans from SW, with this ~130m to the south of the access to the site. However, SW holds no information on the cover or invert levels of this manhole. This foul sewer drains to the south-west, and then to the west along Thornhill Park Road.
- 2.38 The SW information shows that there are foul and surface water sewers associated with the residential area to the west of the site, however, these are not located in Moorhill Gardens but further to the west in Kootenay Avenue. These public sewers drain into Thornhill Park Road, and then head to the west.

3 PLANNING POLICY AND CONSULTATION

National Planning Policy

- 3.1 The NPPF sets out the national policies for flood risk management in a land use planning context within England and how these are expected to be applied, with the latest update published in July 2021.

Planning Practice Guidance

- 3.2 The PPG accompanies the NPPF and defines how the planning policies should be applied. The tables in the section on Flood Risk and Coastal Change define the approach for assessing flood risk vulnerability and compatibility.
- 3.3 Table 1 of the PPG (Flood Zones) classifies each Flood Zone, which refer to the probability of river and sea flooding, ignoring the presence of flood defences (and are also current day flood extents without the projected increase resulting from climate change). These Flood Zones are shown on the Flood Map for Planning (Rivers and Sea), available on the EA's web site.
- 3.4 Table 2 of the PPG (Flood Risk Vulnerability Classification) then considers the vulnerability of the proposed land use or development to flooding. Buildings that are for a residential use are classified as 'More Vulnerable' whereas those that are for recreational purposes would typically be 'Less Vulnerable'.
- 3.5 Table 3 of the PPG (Flood Risk Vulnerability and Flood Zone Compatibility) compares Tables 1 and 2. This confirms that all types of development are considered to be appropriate for locating in Flood Zone 1, and therefore that the Sequential Test and Exception Test would not need to be applied.

Non-Statutory Technical Standards

- 3.6 The NTS for sustainable drainage systems were produced by the Department for Environment, Food and Rural Affairs (DEFRA) in March 2015.
- 3.7 For greenfield developments, the peak runoff rate to a highway drain, sewer or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event should not exceed the peak greenfield rate for the same event.

- 3.8 Similarly, where reasonably practicable, the runoff volume to a highway drain, sewer or surface water body in the 1 in 100-year, 6 hour duration rainfall event should not exceed the greenfield runoff volume for the same event.
- 3.9 Surface water conveyance routes under exceedance conditions must also be planned for to ensure that life and property over the site and surrounding area are not put at risk in the event of drainage system failure or from storms in excess of the design standards.

Strategic Flood Risk Assessment

- 3.10 The Strategic Flood Risk Assessment (SFRA) for the Partnership for Urban South Hampshire (PUSH) was updated in 2016. PUSH is a partnership of a number of authorities, including EBC. The SFRA provides information of relevance to the assessment of flood risk, such as surface water flooding and groundwater.

Local Planning Policy

- 3.11 The draft Local Plan for EBC (2011-2029) sets out a number of policies with sections of relevance to flood risk and drainage as summarised below.
- 3.12 Policy DM2 on environmentally sustainable development provides guidance on what non-residential development should achieve in terms of BREEAM standards and also of particular relevance to this FRA, aim to achieve a predicted mains internal water consumption of no more than 90 litres / day.
- 3.13 Policy DM3 on adaptation to climate change requires for all development to be designed to reduce the potential impacts of surface water flooding using sustainable drainage systems implemented as part of an integrated SuDS strategy and as part of the landscape framework for the site including green open space and green roofs where appropriate.
- 3.14 Policy DM5 on managing flood risk advises that development should not increase flooding elsewhere and will only be permitted within the areas at risk of flooding, now and in the future, provided that:

- a) It meets the sequential and exception test (where required) as outlined in Government guidance;
- b) A site-specific flood risk assessment demonstrates that the development, including the access, will be safe without increasing flooding elsewhere, and where possible, will reduce flood risk overall;
- c) The scheme incorporates flood protection, flood resilience and resistance measures appropriate to the character and biodiversity of the area and the specific requirements of the site;
- d) Appropriate flood warning and evacuation plans are in place; and
- e) New site drainage systems are designed taking account of events which exceed the normal design standard.

3.15 Policy DM6 on sustainable surface water and watercourse management advises that development in flood risk areas or with more than 10 dwelling (etc) will only be permitted if they include SuDS systems which should:

- a) Manage surface water runoff as close to its source as possible and include at least three forms of naturalised filtration within the treatment train wherever feasible;
- b) Be designed in accordance with the CIRIA C697 SuDS Manual or equivalent national or local guidance;
- c) Ensure that discharge rates at least mirror greenfield rates before development;
- d) Where discharge is to a wetland or wet woodland habitat, flows off site must mirror the natural hydrological pathways;
- e) Include clear arrangements for their whole life management and maintenance.

3.16 The subsequent paragraphs of Policy DM6 recommend that a SuDS system be provided which either infiltrates directly into the ground at source or contains three forms of naturalised forms of filtration, either within or at the end of the treatment train.

Lead Local Flood Authority

- 3.17 The LLFA for this area are HCC. This means that HCC have a leadership and co-ordinating role for flood risk resulting from surface water runoff, ordinary watercourses and groundwater across the planning authority area of EBC.
- 3.18 HCC provide Surface Water and Sustainable Drainage guidance for developers, designers and planners. This guidance has been used to inform the approach of the surface water drainage strategy for the golf club house.
- 3.19 The guidance encourages applicants to seek pre-application advice, in particular for major developments. This guidance from HCC has been achieved as a consequence of there being a previous planning submission, with the advice from this being used to inform the approach with this FRA.
- 3.20 HCC advise that SuDS should be designed to mimic the natural drainage of surface water, typically managing rainfall close to where it falls. Surface water flows are then slowed down and discharged at a controlled rate before it enters a watercourse. They can also store water, allow it to soak into the ground or enable evaporation.
- 3.21 HCC go on to advise that SuDS offer a wide range of benefits, as they can:
- Manage flood risk;
 - Maintain and improve water quality;
 - Maintain and increase biodiversity;
 - Provide amenity and green open spaces; and
 - Maintain groundwater recharge through infiltration.

Sequential Test

- 3.22 The NPPF states that developers and LPAs should try to locate development in zones with the lowest probability of flooding. This should be achieved using the Sequential Test, which aims for a sequential approach to be followed to steer new development to areas with the lowest probability of flooding.

- 3.23 The flood zones provide the basis for the Sequential Test. The aim is to steer development to sites located in Flood Zone 1 (low probability of river or sea flooding). Where there are no reasonably available sites in Flood Zone 1, then consideration should be given to sites located in Flood Zone 2 (medium probability of river or sea flooding) followed by sites in Flood Zone 3 (high probability of river or sea flooding), applying the Exception Test if required.
- 3.24 The site is within Flood Zone 1, with this considered appropriate for locating all types of land use. As such, the proposed development is considered to be an appropriate land use and the Sequential Test does not need to be applied.

Summary

- 3.25 The approach taken with the management of flood risk and surface water drainage for the proposed development of a golf club house on the site is consistent with the policies within the NPPF and practices of the PPG and also with the requirements of EBC as the LPA and HCC as the LLFA.

4 ASSESSMENT OF FLOOD RISK

Fluvial and Tidal Flood Risk

- 4.1 An extract from the Flood Map for Planning is included as **Figure 4.1**. The dark blue areas are Flood Zone 3, light blue areas are Flood Zone 2 and areas with no colour are Flood Zone 1. This shows the site to be wholly located in Flood Zone 1, indicating a low level of flood risk from fluvial and tidal sources.
- 4.2 These flood extents do not account for the impact of climate change over the development design life. However, given the distance of the site from the nearest flood zone and also the elevation, this is not likely to have an impact.

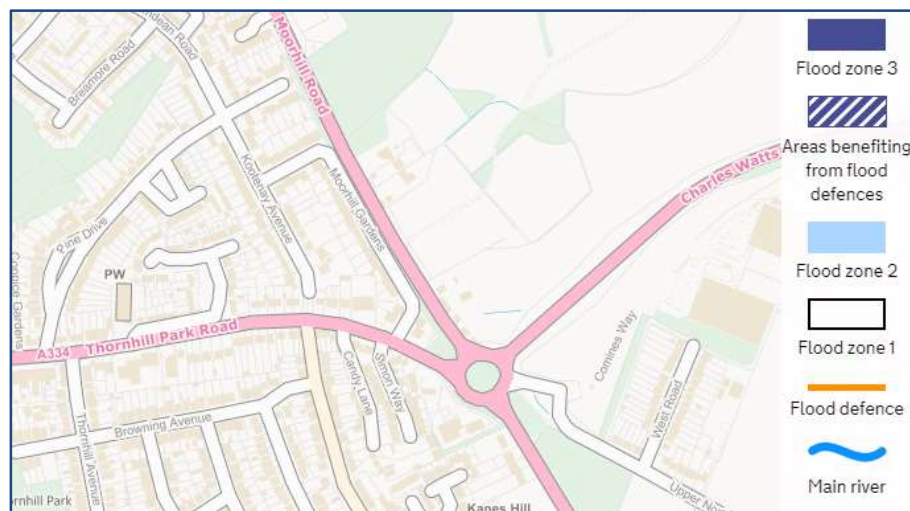


Figure 4.1 – Flood Map for Planning (Fluvial and Tidal Flooding)

- 4.3 Flood Zone 1 is described in the NPPF as an area of low fluvial and/or tidal flood risk, with the flood risk vulnerability of this area deemed to be compatible for all development types.

Surface Water Flood Risk

- 4.4 Surface water flooding is a result of overland flow and ponding due to saturated ground and overloaded drains or sewers that can follow a heavy rainfall event and before the runoff enters a watercourse or sewer. This is shown on the Long Term Flood Map, with an extract included as **Figure 4.2**.



Figure 4.2 – Long Term Flood Risk Map Extract (Surface Water)

- 4.5 This shows the risk from surface water flooding across the site to be very low, with a less than 1 in 1000-year chance of occurrence. There are flow paths to the east of the site where the risk of surface water flooding is higher, associated with the drainage channels in this part of the golf course.

Groundwater Flood Risk

- 4.6 Groundwater flooding can occur when the water table enters basements and cellars or rises above the ground surface. This type of flooding is more typically associated with low-lying areas underlain by permeable rocks, although it can occur where the groundwater table is perched. This is where groundwater is held within a porous media at an elevation that is higher than the local or regional groundwater table, such as with superficial floodplain deposits.
- 4.7 Based on the underlying geology and hydrogeology as described earlier, groundwater flooding is not considered to be a risk for the proposed development of the site. Furthermore, as the site is locally elevated compared to the surrounding area, if groundwater were to issue from the ground it would tend to drain away to lower lying areas to the east and not affect the site.

Drainage and Infrastructure Flood Risk

- 4.8 Drainage and infrastructure flooding can occur when sewers become overwhelmed and result in flooding. This type of flooding may occur alone or be combined with other flood sources (e.g. fluvial or surface water).
- 4.9 A summary of the local sewerage infrastructure is provided earlier, which describes there to be no public sewers across the site or in the immediate surrounds. As such, there is not likely to be a history of infrastructure flooding.

Artificial and Other Sources of Flood Risk

- 4.10 Artificial and other sources of flooding include impounded waters, such as reservoirs, lakes and canals. However, there are no known impounded waters in the vicinity of the site, and as such no risk from these sources of flooding.

5 FLOOD MITIGATION

- 5.1 Following the assessment of flood risk, a series of mitigation and management measures are suggested for the proposed development of the site.

Fluvial and Tidal Flooding

- 5.2 The site is wholly located in Flood Zone 1, with this classified as an area of low fluvial and tidal flood risk. The proposed development is considered to be an appropriate land use for this area.
- 5.3 From the assessment of fluvial and tidal flooding, there is no requirement for specific flood mitigation measures to manage the identified risks.

Surface Water Flooding

- 5.4 The risk of surface water flooding across the site is very low, and would not therefore represent a flood risk to the proposed development.
- 5.5 From the assessment of surface water flooding, there is no requirement for specific flood mitigation measures for the management of the identified risks.
- 5.6 It will be important to ensure that there will be no adverse impacts resulting from the proposed development on surface water flooding in other areas. In addition, to ensure that there are no adverse impacts to the SAC and SPA designation and sensitivities in the wider hydrological catchment.
- 5.7 The approach to achieving this will be the measures to manage the surface water runoff from the developed site, as described next section in this FRA.

Groundwater Flooding

- 5.8 From the assessment of groundwater flooding, there is no requirement for specific flood mitigation measures for the management of the identified risks.

Drainage and Infrastructure Flooding

- 5.9 From the assessment of drainage and infrastructure flooding, there is no requirement for specific flood mitigation measures for the management of the identified risks.

Artificial and Other Sources of Flooding

- 5.10 From the assessment of other sources of flooding, there is no requirement for specific flood mitigation measures for the management of the identified risks.

Additional Mitigation Measures

- 5.11 It is suggested for the finished floor levels (FFL) of buildings to be elevated above surrounding ground levels by at least 150mm.
- 5.12 This measure is in accordance with building regulations and to protect against the possibility of shallow ponding, which can sometimes occur after heavy or prolonged rainfall.

6 SURFACE WATER DRAINAGE STRATEGY

- 6.1 The NPPF states that flood risk to land and property must not be increased as a result of development, and would need to make an appropriate allowance for the projected impacts resulting from future climate change.
- 6.2 The national guidance in the NPPF and PPG, the technical design requirements of the NTS, and the local guidance of HCC as the LPA and LLFA have been taken into consideration in the assessment.
- 6.3 These requirements form the basis of the surface water drainage strategy for the proposed development of the site, as described below.
- 6.4 The key components of a surface water drainage strategy are to consider the potential for infiltration; to determine an appropriate and available discharge receptor; to define the conveyance routes across and from the site; and then, to assess the impact of the development on surface water runoff, and the mitigation measures required to manage these to an acceptable level.

Surface Water Discharge Receptor

- 6.5 The guidance in the NPPF promotes the use of the sustainable discharge hierarchy for the discharge of surface water from a site.
- 6.6 The sustainable discharge hierarchy requires that the following preference should be given when identifying an appropriate discharge receptor:
1. Into the ground (infiltration); then
 2. To a surface water body; then
 3. To a surface water sewer; and then
 4. To a combined sewer.

Into the ground:

- 6.7 An infiltration-led drainage solution is not anticipated to be appropriate, based on the underlying soil type and geology. Whilst soakaway testing has not been

completed within the site, results from an adjacent area indicate that an infiltration-led surface water drainage solution is not likely to be viable.

- 6.8 Whilst infiltration features that promote source control could still be used, an attenuation-led surface water drainage strategy will be required. Attenuation features will be incorporated into the site to manage the surface water runoff from the proposed development to an appropriate discharge receptor.

To a surface water body:

- 6.9 There are no watercourses crossing or immediately adjacent to the site. The nearest watercourse is ~160m to the north of the site. This watercourse drains from the southern part of Telegraph Wood, and drains to the east and then to the north-east through the southern part of the golf course.
- 6.10 There is a drainage ditch to the north of the site that drains north-east and into the watercourse from Telegraph Woods. There is another drainage ditch adjacent to the southern site boundary, which drains east and also into the watercourse. This is the closest discharge receptor to the site. Levels for this feature were collected in the topographical survey, included as **Appendix B**.

To a surface water / combined sewer:

- 6.11 There are no public sewers across the site or in the immediate vicinity, including along Moorhill Road and the adjacent Moorhill Gardens.
- 6.12 The nearest public surface water sewers are associated with the residential area to the west of the site, as shown in **Appendix C**. These sewers drain into Thornhill Park Road, and then head away from the site to the west. There do not appear to be any combined sewers in the area.
- 6.13 Unless there are private or un-mapped sewerage systems, then a sewerage discharge would require a new or extended sewer.

Summary:

- 6.14 A discharge to a surface water body is towards the top of the sustainable drainage hierarchy. The drainage ditch adjacent to the southern site boundary

provides a viable discharge option. Features would be included within the site to attenuate the surface water runoff from developed areas to an appropriate runoff rate and volume and also to protect and enhance the surface water quality.

Surface Water Drainage Design

- 6.15 The site is currently a greenfield area. The greenfield runoff rates for the impermeable area of the site were calculated in MicroDrainage. These calculations are included as **Appendix D**, and summarised in **Table 6.1**.

Return Period	Runoff Rate
1 in 1-year (Q_1)	0.2 l/sec
1 in 30 year (Q_{30})	0.6 l/sec
1 in 100-year (Q_{100})	0.8 l/sec
Mean Annual Flood Flow (Q_{BAR})	0.3 l/sec

Table 6.1: Greenfield Runoff Rates (MicroDrainage)

- 6.16 The surface water drainage strategy would be designed to manage the 1 in 100-year rainfall event with a 40% allowance for future climate change.
- 6.17 The flow rate from the surface water drainage strategy would ordinarily be set at the Q_{BAR} rate, however this would require a flow control that could be at risk of blockage. The flow rate from the basin has instead been set at 2 l/sec.
- 6.18 This flow rate would be achieved through inclusion of sustainable drainage features, with the location and conceptual design included as **Appendix E**.

Car Park:

- 6.19 The car park has been designed as a permeable self-draining system through the use of a gravel filled cellular paving (gridforce or similar). This would be separate to the drainage network for the golf club house and surrounds.
- 6.20 The base of the car park construction will not be lined. The use of gravel provides a permeable surface to enable rainfall to permeate into the ground.
- 6.21 There will be no formal drainage connection between the car park and the drainage strategy for the golf club house. Levels across the car park will have

a gentle fall towards the golf club house. However, as it is a permeable self-draining system, there will be no flows directed towards the building.

- 6.22 The car park construction will incorporate two layers of Terram 1000 filter geotextile, one over the subgrade and one beneath the surface layer. These provide effective filtration of potential contaminants. Further treatment will be provided inherently through bio-retention within the granular sub-base.

Golf Club House:

- 6.23 The proposed development includes raised landscaping planters, adjacent to the golf club house building. The downpipes from the roof would drain into these raised planters, and would be designed as rain gardens. They are therefore bioretention systems that provide additional water quality benefit.
- 6.24 These features make good use of the rain water falling on the roof, with the rain gardens planted with native vegetation to add biodiversity and water quality benefits. They also provide additional attenuation over and above that which has been provided in the detention basin.
- 6.25 There are also drainage runs around the perimeter of the golf club house collecting water from the golf cart collection point and also downpipes from the building roof, draining into raised landscaping planters. These then drain to the detention basin, which is located to the east of the golf club house.
- 6.26 In addition, it is proposed for a rainwater harvesting system to be included within the golf club house. A preliminary concept has been considered, which would collect water from the building roof and used for flushing toilets and urinals.
- 6.27 This rainwater harvesting system helps to reduce water resource demands of the completed development, with the re-use of water at the top of the sustainable drainage hierarchy. It would also provide additional attenuation over and above that which has been provided in the detention basin.

Detention Basin:

- 6.28 A detention basin is included to the east of the golf club house, with this sized for the impermeable area of the building, terrace and golf cart collection point. A typical plan of a detention basin from the SuDS Manual is included as **Figure 6.1**, with this being used to inform what has been proposed.
- 6.29 In accordance with the comments on the August 2020 FRA, the detention basin includes a forebay area where water would first be received, before draining into the main basin. The SUDS Manual advises that the forebay area would help to accumulate sediments, and therefore benefit water quality.
- 6.30 The part of the basin in between the forebay and pond would include stepped terraced areas, to offer transitional wet and dry environments.
- 6.31 The upper level of the main basin would provide the required volume of attenuation. This drains via an outfall to a swale connection and to the drainage ditch that is to the south of the site. This drainage ditch then drains in an easterly direction towards the watercourse from Telegraph Woods.
- 6.32 The lower level of the main basin would be beneath the level of the outfall to the drainage ditch. When the upper level has drained, water beneath the level of this outfall would therefore be stored to create a wetter part.

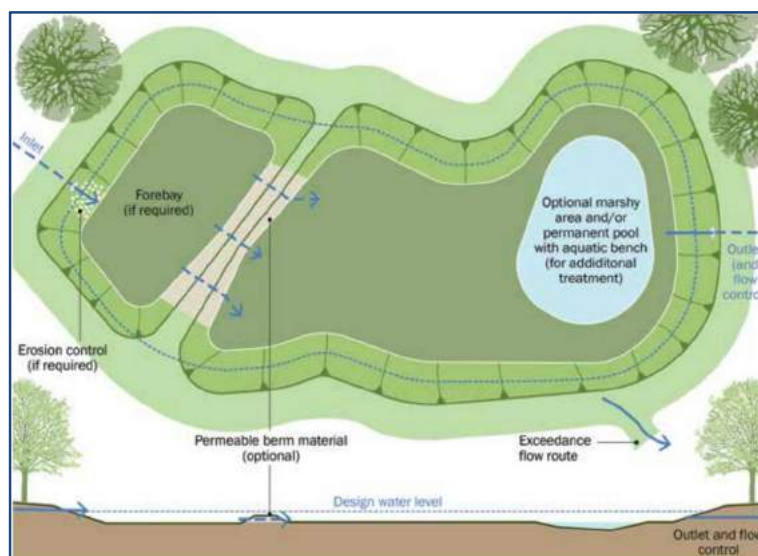


Figure 6.1: Vegetated Detention Basin Plan (CIRIA SuDS Manual)

- 6.33 The detention basin therefore gives a number of environmental benefits, notably by providing a variety of habitats, resulting in a biodiverse feature. In addition to the management of surface water runoff, the detention basin would provide other environmental and community benefits (e.g. benefits to water quality, landscape, recreational amenity, ecology and biodiversity).

Swale:

- 6.34 The drainage outlet from the swale drains to a vegetated swale, with this draining towards the drainage outlet into a drainage channel.
- 6.35 The drainage outlet from the detention basin would be fitted with a flow control (Hydrobrake or similar), to control the runoff rate and flow velocity.

Conveyance of Surface Water Exceedance

- 6.36 The surface water drainage strategy has been designed to manage a 1 in 100-year rainfall event with a 40% allowance for future climate change. This therefore provides additional attenuation for managing current rainfall events.
- 6.37 Furthermore, the detention basin include a forebay area, freeboard and the drainage strategy includes rain gardens planters and a rainwater harvesting tank that are included in addition to the required attenuation volume.
- 6.38 In an exceedance event, surface water runoff from the site would still drain to the detention basin. A lower section around the southern edge of the detention basin could be included to provide an overflow route for surface water, also where the swale that drains to the drainage channel is located.
- 6.39 The inclusion of this measure means that surplus water would surcharge to the drainage ditch and therefore drain away from the site to the east. The fall in levels across the wider area is already to the east and south-east, and this flow path is therefore in keeping with the natural catchment hydrology.

Water Quality

- 6.40 Water quality control features have been considered in accordance with the CIRIA SuDS Manual. This advises that any proposed drainage scheme must

demonstrate that the hazard index for the particular land use is less than the mitigation index of the proposed SuDS features.

- 6.41 The car park has been designed as a permeable self-draining system through the use of a gravel filled cellular paving. Whereas from the golf club house building, surface water runoff would drain to the raised landscaping planters (assessed here as a bioretention system), to the detention basin (which additionally include a forebay and pond area) and then to the swale.
- 6.42 It is considered that the SuDS provided as part of the surface water drainage strategy would offer sufficient water quality mitigation for the land use classification, as demonstrated in **Table 6.2** and then **Table 6.3** for the golf club house building and **Table 6.4** for the car park (informed by Table 26.2 and then by Table 26.3 and 26.4 of the CIRIA SuDS Manual, respectively).

Land Use	Pollution Hazard Indices		
	Total Suspended Solids	Metals	Hydrocarbons
Golf club house building	0.20	0.20	0.05
Golf club house car park	0.50	0.40	0.40

Table 6.2: Pollution Hazard Indices for Proposed Development

Mitigation Measure	Pollution Mitigation Indices		
	Total Suspended Solids	Metals	Hydrocarbons
Bioretention System	0.80	0.80	0.80
Detention Basin	$0.50 * 0.5 = 0.25$	$0.50 * 0.5 = 0.25$	$0.60 * 0.5 = 0.30$
Swale	$0.50 * 0.5 = 0.25$	$0.60 * 0.5 = 0.30$	$0.60 * 0.5 = 0.30$
Total	1.30	1.35	1.40

Table 6.3: SuDS Mitigation Indices for Golf Club House Building

Mitigation Measure	Pollution Mitigation Indices		
	Total Suspended Solids	Metals	Hydrocarbons
Pervious Pavement	0.70	0.60	0.70
Total	0.70	0.60	0.70

Table 6.4: SuDS Mitigation Indices for Golf Club House Car Park

- 6.43 A factor of 0.5 has been applied to the pollution mitigation values typically associated with certain SuDS features. As advised in the CIRIA SuDS Manual, this is to account for the reduced performance of secondary or tertiary components associated with the already reduced inflow concentrations.
- 6.44 Furthermore, the detention basin has a forebay area, which would help to accumulate sediments, and therefore benefit water quality. It would also have a wet base and could therefore be argued as a pond; however the indices for a detention basin have been used so as to be more conservative.
- 6.45 The LLFA require that water quality is assessed to satisfy the methodology in CIRIA SuDS Manual. In all of the assessed parameters and even without the inclusion of certain features, the total of the pollution mitigation indices far exceeds the total of the pollution hazard indices. The assessment of water quality based on the CIRIA SuDS Manual approach therefore demonstrates that an adequate level of mitigation would be provided for the potential polluting effects resulting from the proposed development of all land uses.
- 6.46 Policy DM6 recommends that a SuDS system be provided which either infiltrates directly into the ground at source or contains three forms of naturalised forms of filtration, either within or at the end of the treatment train.
- 6.47 The proposed drainage strategy for the car park has been designed as a permeable self-draining system through the use of a gravel filled cellular paving and will incorporate two layers of Terram 1000 filter geotextile.
- 6.48 Whereas the discharge of water from the golf club house building would pass through at least three forms of naturalised filtration, with the detention basin additionally including a forebay and pond area.

Operation and Maintenance

- 6.49 It is anticipated that the surface water drainage infrastructure across and from the site would be maintained by a private management company. As the site is a part of an active golf course, these maintenance requirements would be brought into the current operational works of the groundskeeper.

6.50 The operation and maintenance requirements as suggested within the CIRIA SuDS Manual are replicated below as **Figure 6.2** for the gravel filled cellular grid, **Figure 6.3** for the detention basin, **Figure 6.4** for the rain garden (bioretention system) and **Figure 6.5** for the swale connection.

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Figure 6.2: Pervious Pavement Operation and Maintenance

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Figure 6.3: Detention Basin Operation and Maintenance

Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Figure 6.4: Rain Garden (Bioretention System) Operation and Maintenance

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeded	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Figure 6.5: Swale Operation and Maintenance

Foul Drainage

- 6.51 The nearest public foul sewer to the site according to the records provided by Southern Water is to the south of the site along Moorhill Road. There is a manhole adjacent to Thorneydown Farm (MH 3001), which is ~130m to the south of the site entrance.
- 6.52 Southern Water were not able to provide cover or invert levels for MH 3001, and it was not possible to collect these levels during the topographical survey works as the manhole is within an active carriageway. However, ground levels along Moorhill Road fall from the site entrance to the south, and therefore the manhole will be at a lower elevation to the site to allow a gravity connection.
- 6.53 As such, it is proposed for a foul drainage connection from the site along Moorhill Road to MH 3001 to be discussed with Southern Water, as this appears to be the nearest point of connection. Given the rise in levels, a foul pumping station is likely to be needed in order to achieve a connection from the site. This has been shown on the drainage strategy included as **Appendix E**.

- 6.54 However, if this foul drainage connection is not viable or cannot be agreed, then an alternative would be to include a package treatment works within the site. This would need to make a drainage connection to a flowing watercourse and therefore either to the north-east or east of the site.

7 CONCLUSIONS

- 7.1 This FRA has been prepared by SE on behalf of HCCC and LDA to support a planning application to EBC for a proposed golf club house within the grounds of the Boundary Lakes golf course.
- 7.2 A wider strategic development of the existing golf course is underway, with other phases also being considered. These are separate to this application.
- 7.3 A planning application for the proposed development of the site was previously submitted in August 2020. This application was reviewed by EBC and HCC, who requested for the provision of some additional information.
- 7.4 A background understanding was provided including on the site setting and surrounds, the topography, geology, hydrogeology, soils, catchment and local hydrology, the soil infiltration results from some nearby soakaway testing and the existing drainage infrastructure.
- 7.5 The site is located within the southern drainage catchment of the golf course. There is a watercourse from Telegraph Wood, which drains north-east across the golf course. Drainage ditches near the site drain into this watercourse. This then drains via a culvert under the M27 and the adjacent built-up area.
- 7.6 An assessment of flood risk sources was completed. This concluded that there was a low level of risk from and to all identified flood sources, and that no specific mitigation measures were required. A raised finished floor level for the club house building was suggested, in keeping with building regulations.
- 7.7 A surface water drainage assessment considered the impact of the proposed development on surface water runoff. This assessed viable discharge options for the runoff, and suggested a discharge to the drainage ditch adjacent to the southern site boundary with this then draining to an on-site watercourse.
- 7.8 A surface water drainage strategy for the proposed development has been provided, which incorporated features for the management of the surface water runoff including permeable self-draining system for the car park surface and raised landscaping planters, a detention basin and swale for the golf club

building. In addition, it is proposed for a rainwater harvesting system to be included within the golf club house and used for flushing toilets and urinals.

- 7.9 The surface water drainage strategy has been designed to manage a 1 in 100-year rainfall event with a 40% allowance for future climate change. This therefore provides additional attenuation for managing current rainfall events. Furthermore, the detention basin include a forebay area, freeboard and the drainage strategy includes rain gardens planters and a rainwater harvesting tank included in addition to the required attenuation volume.
- 7.10 The LLFA require that water quality is assessed to satisfy the methodology in CIRIA SuDS Manual. In all of the assessed parameters and even without the inclusion of certain features, the total of the pollution mitigation indices far exceeds the total of the pollution hazard indices. The assessment of water quality based on the CIRIA SuDS Manual approach therefore demonstrates that an adequate level of mitigation would be provided for the potential polluting effects resulting from the proposed development of all land uses.
- 7.11 Policy DM6 recommends that a SuDS system be provided which either infiltrates directly into the ground at source or contains three forms of naturalised forms of filtration, either within or at the end of the treatment train.
- 7.12 The proposed drainage strategy for the car park has been designed as a permeable self-draining system through the use of a gravel filled cellular paving and will incorporate two layers of Terram 1000 filter geotextile.
- 7.13 Whereas the discharge of water from the golf club house building would pass through at least three forms of naturalised filtration, with the detention basin additionally including a forebay and pond area.
- 7.14 It is anticipated that the surface water drainage infrastructure across and from the site would be maintained by a private management company. As the site is a part of an active golf course, these maintenance requirements would be brought into the current operational works of the groundskeeper.
- 7.15 The nearest public foul sewer is understood to be south of the site along Moorhill Road. There is a manhole adjacent to Thorneydown Farm, which is to the south

of the site entrance. Ground levels along Moorhill Road fall from the site entrance to the south to allow a foul connection from the site.

- 7.16 Given the rise in levels, a foul pumping station is likely to be needed in order to achieve a connection from the site. This foul drainage connection would need to be discussed and agreed with SW. It is anticipated that the drainage infrastructure across and from the site would be adopted by SW.
- 7.17 In summary, the proposed development of the site is considered to be appropriate in terms of flood risk. A surface and foul water strategy would be incorporated to manage the drainage resulting from the proposed development of the site in an appropriate way. This strategy would provide additional benefits in particular to landscape, biodiversity and water quality.

Appendix A

Proposed Development Plans

Appendix B

Site Topographical Survey

REVISIONS		
No.	DESCRIPTION	DATE
A	PLANNING ISSUE	21/08/20
B	AMENDMENT TO ATTENUATION POND AND RED LINE TO SOUTHERN BOUNDARY	25/08/20



Existing Site Survey produced by Sterling Surveys Limited in August 2020

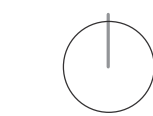
DISCLAIMER
This drawing is for design intent purposes only and is based on:
1) Ordnance Survey data supplied by the client.
2) Topographical survey information produced by Sterling Surveys Limited (issued by client on 11/08/2020).
Drawing is subject to further design development.

It is also subject to confirmation of legal ownership boundaries, approvals and agreements of all statutory authorities and individuals necessary for all aspects, way leaves and easements, all of which are unknown at the time of preparing this drawing. The design information on this drawing is also subject to review by a client appointed Principal Designer, who will have overall responsibility for the coordination of the construction design and management regulations 2015.

The drawing is subject to design development and to Local Authority Planning Department and Building Control/Approved Inspector approval/comments.

Do not scale off this drawing. Work to figured dimensions only. Any discrepancies should be brought to the attention of DLA Architecture immediately. All dimensions are in millimetres, unless otherwise stated.

NORTH



ARCHITECTURE

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PROJECT
GOLF CLUBHOUSE
AGEAS BOWL HAMPSHIRE

TITLE
EXISTING SITE PLAN/SURVEY

SCALE
1 : 200 @ A0

DATE
08/14/20

DRAWN
AS

REVIEWED
JK

DLA REF
2020-050

NUMBER
103

REVISION
B

STATUS
PLANNING



Appendix C

Sewerage Network Information



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Date: 16/07/20

Scale: 1:1250

Map Centre: 447316,113143

Data updated: 15/06/20

Our Ref: 416657 - 2

Wastewater Plan A3

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2020 Ordnance Survey 100031673. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

andy@andyclayconsulting.co.uk

Moorhill Road



Appendix D

Surface Water Drainage Calculations

Tumu Consulting		Page 1
20 East Sands Burbage Marlborough Wiltshire SN8 3AN	Drainage Strategy Hampshire Golf Club	
Date 12/08/2020 File 19320-SW-NT1-D.MDX	Designed by AB Checked by PS	
Micro Drainage	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.700	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	0	Maximum Backdrop Height (m)	5.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.075	4-8	0.024

Total Area Contributing (ha) = 0.099

Total Pipe Volume (m³) = 2.162

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	16.341	0.170	96.1	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	11.230	0.230	48.8	0.007	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	6.806	0.400	17.0	0.019	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.002	12.658	0.800	15.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	10.223	0.110	92.9	0.027	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	20.560	0.210	97.9	0.025	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.002	9.430	2.380	4.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	0.00	5.27	69.500	0.021	0.0	0.0	0.0	1.03	18.1	0.0
1.001	0.00	5.40	69.330	0.028	0.0	0.0	0.0	1.44	25.5	0.0
2.000	0.00	5.06	69.500	0.019	0.0	0.0	0.0	1.88	14.8	0.0
1.002	0.00	5.48	67.550	0.047	0.0	0.0	0.0	2.55	45.0	0.0
3.000	0.00	5.16	68.900	0.027	0.0	0.0	0.0	1.04	18.4	0.0
3.001	0.00	5.50	68.790	0.052	0.0	0.0	0.0	1.02	17.9	0.0
3.002	0.00	5.53	69.130	0.052	0.0	0.0	0.0	5.10	90.1	0.0

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20 East Sands Burbage Marlborough Wiltshire SN8 3AN	Drainage Strategy Hampshire Golf Club	
Date 12/08/2020 File 19320-SW-NT1-D.MDX	Designed by AB Checked by PS	
Micro Drainage	Network 2018.1	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.003	9.883	0.400	24.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	16.660	4.165	4.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.003	0.00	5.59	66.750	0.099	0.0	0.0	0.0	2.64	105.1	0.0
1.004	0.00	5.65	66.200	0.099	0.0	0.0	0.0	5.08	89.7	0.0

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20 East Sands Burbage Marlborough Wiltshire SN8 3AN	Drainage Strategy Hampshire Golf Club	
Date 12/08/2020 File 19320-SW-NT1-D.MDX	Designed by AB Checked by PS	
Micro Drainage		Network 2018.1

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	70.100	0.600	Open Manhole	450	1.000	69.500	150				
2	70.100	0.770	Open Manhole	450	1.001	69.330	150	1.000	69.330	150	
4	70.350	0.850	Open Manhole	450	2.000	69.500	100				
3	70.250	2.700	Open Manhole	450	1.002	67.550	150	1.001	69.100	150	1550
								2.000	69.100	100	1500
5	70.200	1.300	Open Manhole	450	3.000	68.900	150				
6	70.300	1.510	Open Manhole	450	3.001	68.790	150	3.000	68.790	150	
7	70.350	1.770	Open Manhole	450	3.002	69.130	150	3.001	68.580	150	
8	67.500	0.750	Open Manhole	450	1.003	66.750	225	1.002	66.750	150	
								3.002	66.750	150	
9	67.000	0.800	Open Manhole	1200	1.004	66.200	150	1.003	66.350	225	225
DITCH	62.600	0.565	Open Manhole	0		OUTFALL		1.004	62.035	150	

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20 East Sands Burbage Marlborough Wiltshire SN8 3AN	Drainage Strategy Hampshire Golf Club	
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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	1	70.100	69.500	0.450	Open Manhole	450
1.001	o	150	2	70.100	69.330	0.620	Open Manhole	450
2.000	o	100	4	70.350	69.500	0.750	Open Manhole	450
1.002	o	150	3	70.250	67.550	2.550	Open Manhole	450
3.000	o	150	5	70.200	68.900	1.150	Open Manhole	450
3.001	o	150	6	70.300	68.790	1.360	Open Manhole	450
3.002	o	150	7	70.350	69.130	1.070	Open Manhole	450
1.003	o	225	8	67.500	66.750	0.525	Open Manhole	450
1.004	o	150	9	67.000	66.200	0.650	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	16.341	96.1	2	70.100	69.330	0.620	Open Manhole	450
1.001	11.230	48.8	3	70.250	69.100	1.000	Open Manhole	450
2.000	6.806	17.0	3	70.250	69.100	1.050	Open Manhole	450
1.002	12.658	15.8	8	67.500	66.750	0.600	Open Manhole	450
3.000	10.223	92.9	6	70.300	68.790	1.360	Open Manhole	450
3.001	20.560	97.9	7	70.350	68.580	1.620	Open Manhole	450
3.002	9.430	4.0	8	67.500	66.750	0.600	Open Manhole	450
1.003	9.883	24.7	9	67.000	66.350	0.425	Open Manhole	1200
1.004	16.660	4.0	DITCH	62.600	62.035	0.415	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.021	0.021	0.021
1.001	-	-	100	0.007	0.007	0.007
2.000	-	-	100	0.019	0.019	0.019
1.002	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.027	0.027	0.027
3.001	-	-	100	0.025	0.025	0.025
3.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.099	0.099	0.099

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.004	DITCH	62.600	62.035	0.000	0	0
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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Storm Duration (mins)	30
Ratio R	0.350		

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20 East Sands Burbage Marlborough Wiltshire SN8 3AN	Drainage Strategy Hampshire Golf Club	
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Micro Drainage	Network 2018.1	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 9, DS/PN: 1.004, Volume (m³): 1.3

Unit Reference	MD-SHE-0074-2000-0500-2000
Design Head (m)	0.500
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	74
Invert Level (m)	66.200
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	2.0	Kick-Flo®	0.342	1.7
Flush-Flo™	0.149	2.0	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	0.800	2.5	2.000	3.8	4.000	5.2	7.000	6.8
0.200	2.0	1.000	2.7	2.200	3.9	4.500	5.5	7.500	7.1
0.300	1.8	1.200	3.0	2.400	4.1	5.000	5.8	8.000	7.3
0.400	1.8	1.400	3.2	2.600	4.3	5.500	6.1	8.500	7.5
0.500	2.0	1.600	3.4	3.000	4.6	6.000	6.3	9.000	7.8
0.600	2.2	1.800	3.6	3.500	4.9	6.500	6.6	9.500	8.0

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Micro Drainage	Network 2018.1	

Storage Structures for Storm

Tank or Pond Manhole: 9, DS/PN: 1.004

Invert Level (m) 66.350

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	95.4	0.650	182.9

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Micro Drainage	Network 2018.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia Status OFF

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
									(m)	(m)	(m³)
1.000	1 15	Winter	1	+0%					69.541	-0.109	0.000
1.001	2 15	Winter	1	+0%					69.369	-0.111	0.000
2.000	4 15	Winter	1	+0%					69.529	-0.071	0.000
1.002	3 15	Winter	1	+0%					67.588	-0.112	0.000
3.000	5 15	Winter	1	+0%	1/15	Summer			69.202	0.152	0.000
3.001	6 15	Winter	1	+0%	1/15	Summer			69.189	0.249	0.000
3.002	7 15	Winter	1	+0%					69.158	-0.122	0.000
1.003	8 15	Winter	1	+0%					66.806	-0.169	0.000
1.004	9 60	Winter	1	+0%	1/15	Summer			66.395	0.045	0.000

PN	US/MH Name	Pipe Flow / Overflow		Flow (l/s)	Status	Level Exceeded
		Cap.	(l/s)			
1.000	1	0.16		2.7	OK	
1.001	2	0.15		3.5	OK	
2.000	4	0.19		2.5	OK	
1.002	3	0.15		5.9	OK	
3.000	5	0.21		3.4	SURCHARGED	
3.001	6	0.37		6.2	SURCHARGED	
3.002	7	0.08		6.2	OK	
1.003	8	0.14		12.2	OK	
1.004	9	0.02		2.0	SURCHARGED	

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Micro Drainage	Network 2018.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
1.000	1	15 Winter	30	+0%					69.566	-0.084	0.000
1.001	2	15 Winter	30	+0%					69.396	-0.084	0.000
2.000	4	15 Winter	30	+0%					69.548	-0.052	0.000
1.002	3	15 Winter	30	+0%					67.614	-0.086	0.000
3.000	5	15 Winter	30	+0%	1/15 Summer				69.423	0.373	0.000
3.001	6	15 Winter	30	+0%	1/15 Summer				69.393	0.453	0.000
3.002	7	15 Winter	30	+0%					69.177	-0.103	0.000
1.003	8	15 Winter	30	+0%					66.844	-0.131	0.000
1.004	9	120 Winter	30	+0%	1/15 Summer				66.522	0.172	0.000

PN	US/MH Name	Pipe Flow / Overflow		Flow (l/s)	Status	Level Exceeded
		Cap.	(l/s)			
1.000	1	0.40		6.7	OK	
1.001	2	0.39		9.0	OK	
2.000	4	0.46		6.1	OK	
1.002	3	0.37		15.0	OK	
3.000	5	0.53		8.7	SURCHARGED	
3.001	6	0.98		16.6	SURCHARGED	
3.002	7	0.21		16.7	OK	
1.003	8	0.36		31.7	OK	
1.004	9	0.02		2.0	SURCHARGED	

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Date 12/08/2020 File 19320-SW-NT1-D.MDX	Designed by AB Checked by PS	
Micro Drainage	Network 2018.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.700 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

 Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia Status OFF

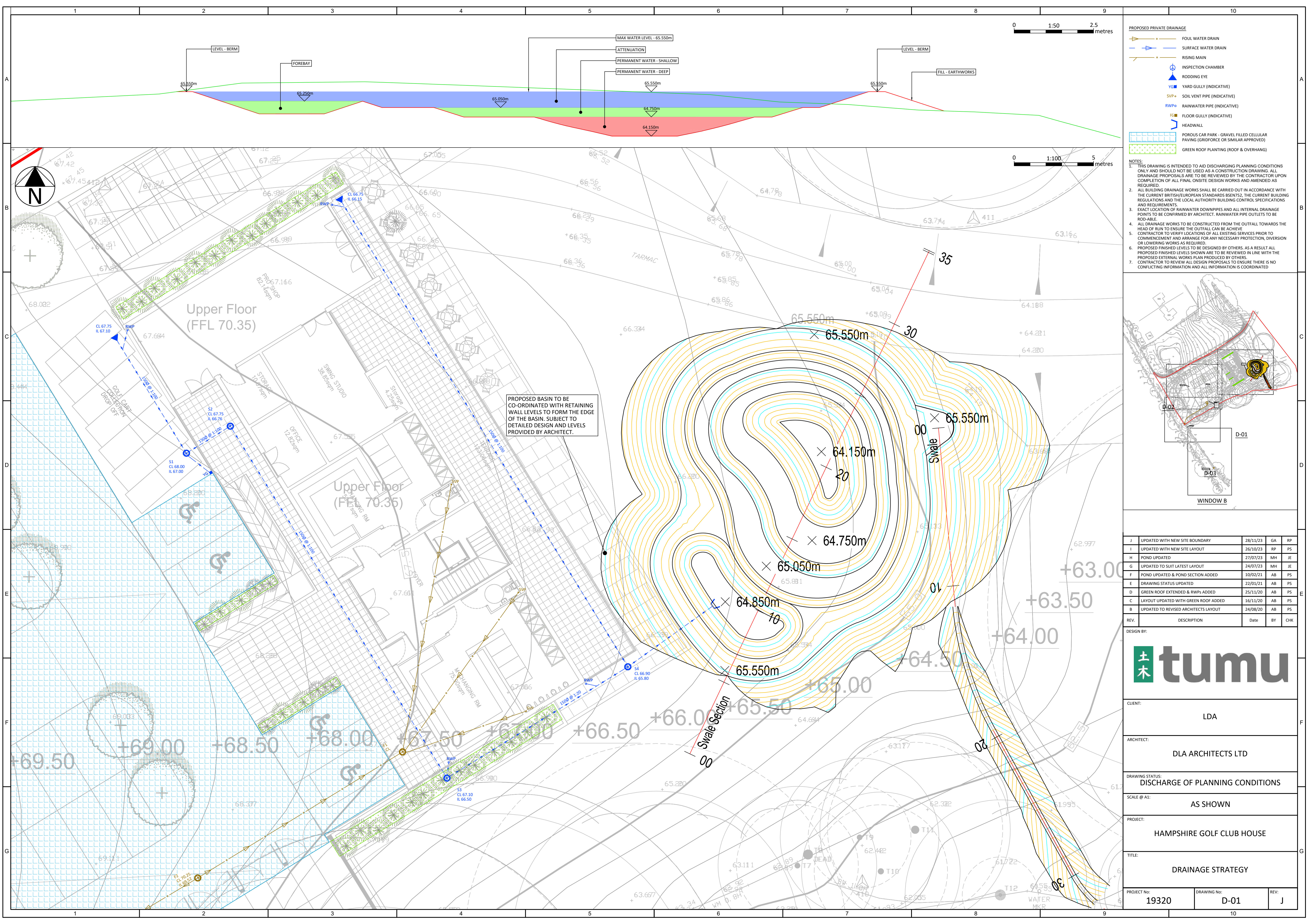
 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	1	15 Winter	100	+40%					69.596	-0.054	0.000
1.001	2	15 Winter	100	+40%					69.425	-0.055	0.000
2.000	4	15 Winter	100	+40%					69.570	-0.030	0.000
1.002	3	15 Winter	100	+40%					67.641	-0.059	0.000
3.000	5	15 Winter	100	+40%	1/15 Summer				69.955	0.905	0.000
3.001	6	15 Winter	100	+40%	1/15 Summer				69.860	0.920	0.000
3.002	7	15 Winter	100	+40%					69.193	-0.087	0.000
1.003	8	15 Winter	100	+40%					66.883	-0.092	0.000
1.004	9	180 Winter	100	+40%	1/15 Summer				66.715	0.365	0.000

		Pipe		Level	
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status
1.000	1	0.72		12.1	OK
1.001	2	0.71		16.3	OK
2.000	4	0.83		11.1	OK
1.002	3	0.66		27.2	OK
3.000	5	0.95		15.6	FLOOD RISK
3.001	6	1.75		29.5	SURCHARGED
3.002	7	0.37		29.6	OK
1.003	8	0.65		56.7	OK
1.004	9	0.02		2.0	FLOOD RISK

Appendix E

Foul and Surface Water Drainage Schematic

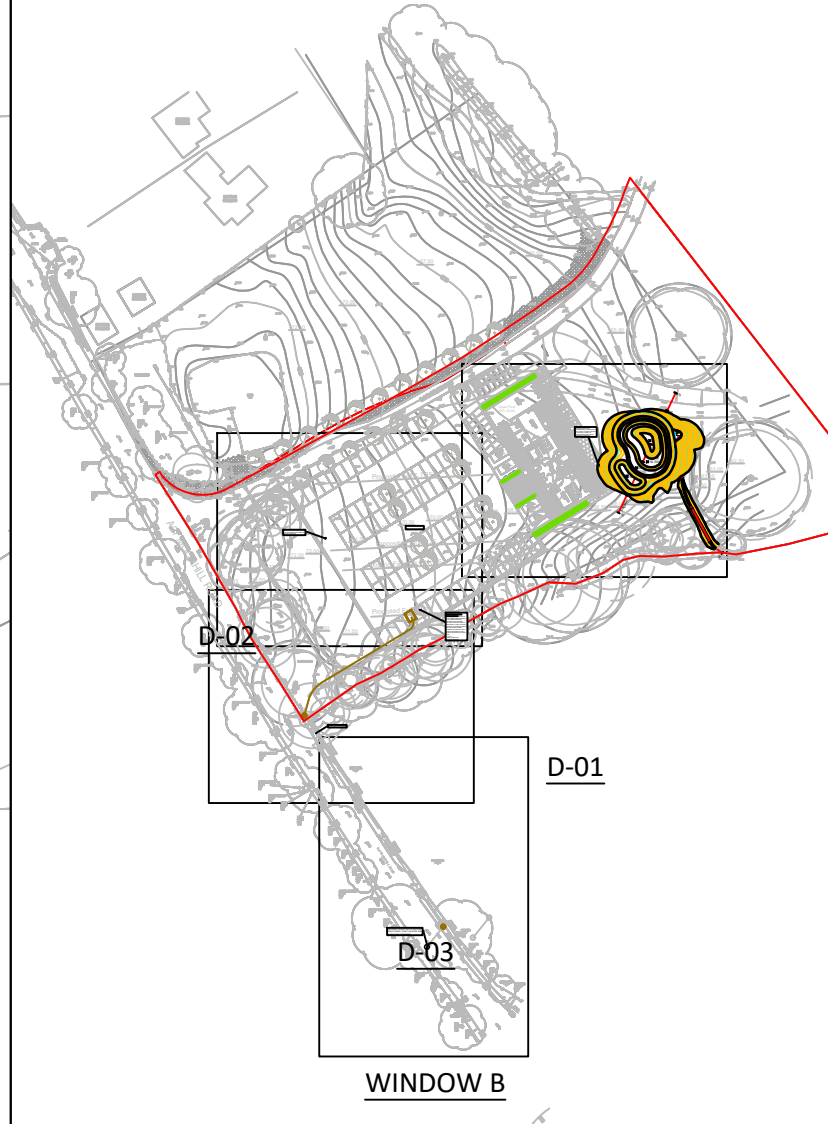


PROPOSED PRIVATE DRAINAGE

- FOUL WATER DRAIN
- SURFACE WATER DRAIN
- RISING MAIN
- INSPECTION CHAMBER
- RODDING EYE
- YARD GULLY (INDICATIVE)
- SOIL VENT PIPE (INDICATIVE)
- RAINWATER PIPE (INDICATIVE)
- FLOOR GULLY (INDICATIVE)
- HEADWALL
- POROUS CAR PARK - GRAVEL FILLED CELLULAR PAVING (GRIDFORCE OR SIMILAR APPROVED)
- GREEN ROOF PLANTING (ROOF & OVERHANG)

NOTES:

1. THIS DRAWING IS INTENDED TO AID DISCHARGING PLANNING CONDITIONS ONLY AND SHOULD NOT BE USED AS A CONSTRUCTION DRAWING. ALL DRAINAGE PROPOSALS ARE TO BE REVIEWED BY THE CONTRACTOR UPON COMPLETION OF ALL FINAL ONSITE DESIGN WORKS AND AMENDED AS REQUIRED.
2. ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BRITISH/EUROPEAN STANDARDS BSEN752, THE CURRENT BUILDING REGULATIONS AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.
3. EXACT LOCATION OF RAINWATER DOWNPIPES AND ALL INTERNAL DRAINAGE POINTS TO BE CONFIRMED BY ARCHITECT. RAINWATER PIPE OUTLETS TO BE ROAD-ABLE.
4. ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
5. CONTRACTOR TO VERIFY LOCATIONS OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT AND ARRANGE FOR ANY NECESSARY PROTECTION, DIVERSION OR LOWERING WORKS AS REQUIRED.
6. PROPOSED FINISHED LEVELS TO BE DESIGNED BY OTHERS. AS A RESULT ALL PROPOSED FINISHED LEVELS SHOWN ARE TO BE REVIEWED IN LINE WITH THE PROPOSED EXTERNAL WORKS PLAN PRODUCED BY OTHERS.
7. CONTRACTOR TO REVIEW ALL DESIGN PROPOSALS TO ENSURE THERE IS NO CONFLICTING INFORMATION AND ALL INFORMATION IS COORDINATED.



J	UPDATED WITH NEW SITE BOUNDARY	28/11/23	GA	RP
I	UPDATED WITH NEW SITE LAYOUT	26/10/23	RP	PS
H	POND UPDATED	27/07/23	MH	JE
G	UPDATED TO SUIT LATEST LAYOUT	24/07/23	MH	JE
F	POND UPDATED & POND SECTION ADDED	10/02/21	AB	PS
E	DRAWING STATUS UPDATED	22/01/21	AB	PS
D	GREEN ROOF EXTENDED & RWPS ADDED	25/11/20	AB	PS
C	LAYOUT UPDATED WITH GREEN ROOF ADDED	16/11/20	AB	PS
B	UPDATED TO REVISED ARCHITECTS LAYOUT	24/08/20	AB	PS
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

tumu

CLIENT: LDA

ARCHITECT: DLA ARCHITECTS LTD

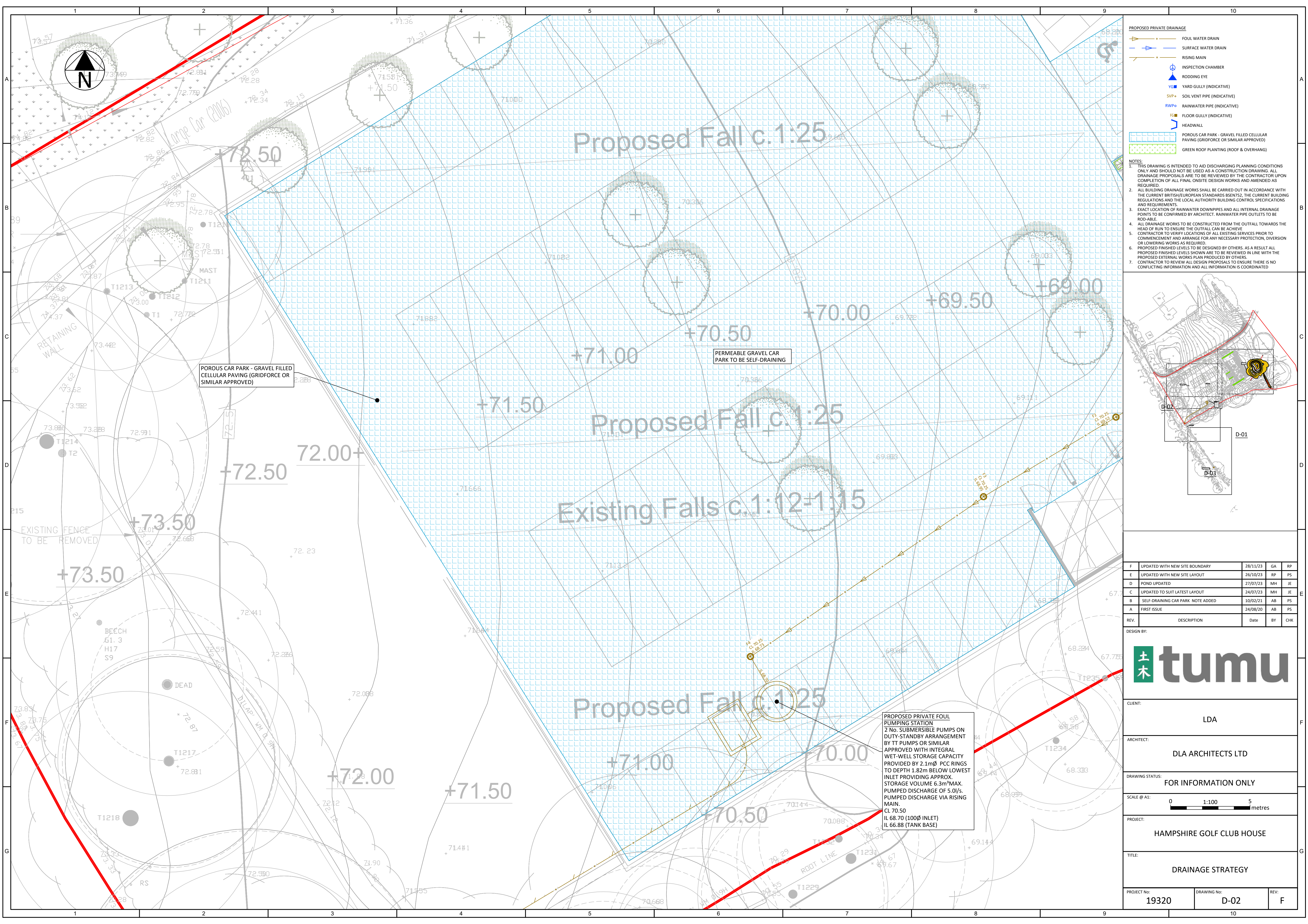
DRAWING STATUS: DISCHARGE OF PLANNING CONDITIONS

SCALE @ A1: AS SHOWN

PROJECT: HAMPSHIRE GOLF CLUB HOUSE

TITLE: DRAINAGE STRATEGY

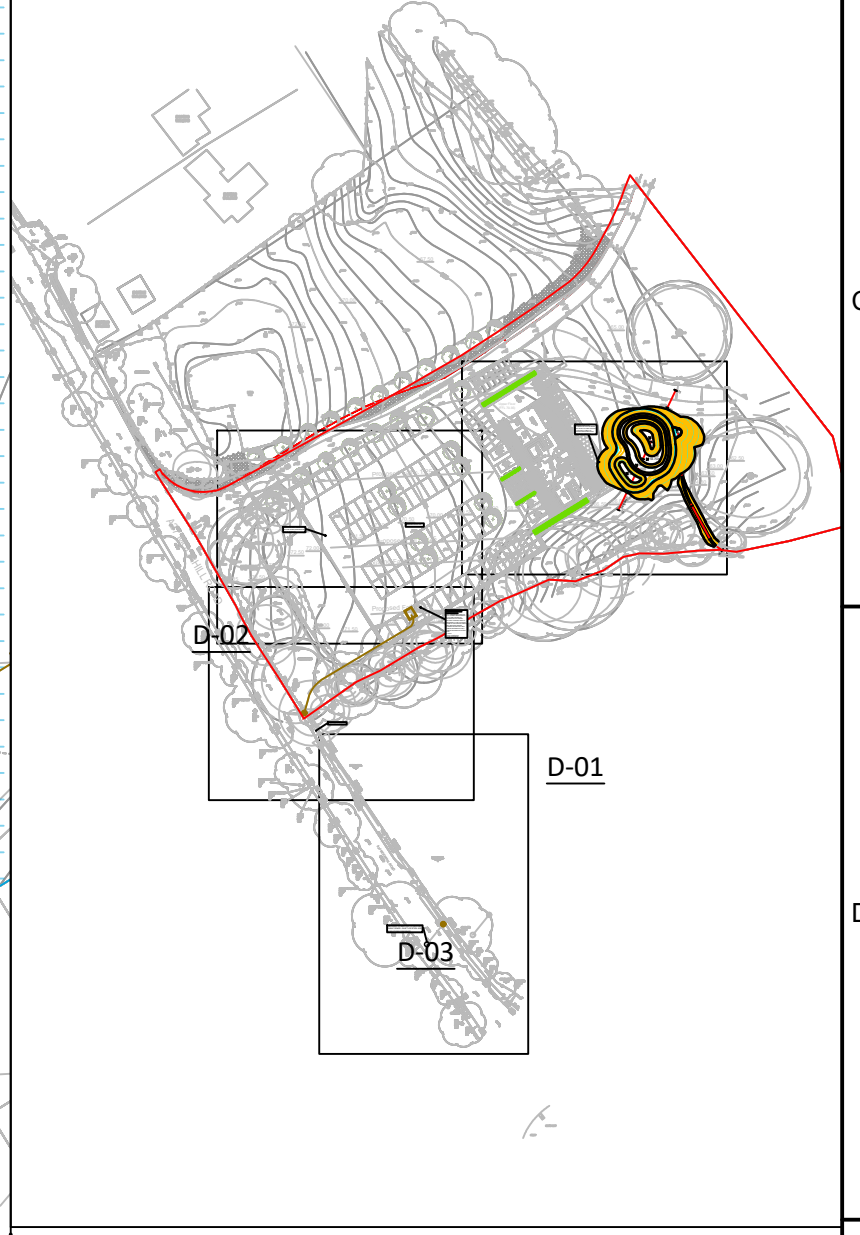
PROJECT No:	DRAWING No:	REV:
19320	D-01	J



PROPOSED PRIVATE DRAINAGE

- FOUL WATER DRAIN
- SURFACE WATER DRAIN
- RISING MAIN
- INSPECTION CHAMBER
- RODDING EYE
- YARD GULLY (INDICATIVE)
- SOIL VENT PIPE (INDICATIVE)
- RAINWATER PIPE (INDICATIVE)
- FLOOR GULLY (INDICATIVE)
- HEADWALL
- POROUS CAR PARK - GRAVEL FILLED CELLULAR PAVING (GRIDFORCE OR SIMILAR APPROVED)
- GREEN ROOF PLANTING (ROOF & OVERHANG)

- NOTES:**
- THIS DRAWING IS INTENDED TO AID DISCHARGING PLANNING CONDITIONS ONLY AND SHOULD NOT BE USED AS A CONSTRUCTION DRAWING. ALL DRAINAGE PROPOSALS ARE TO BE REVIEWED BY THE CONTRACTOR UPON COMPLETION OF ALL FINAL ONSITE DESIGN WORKS AND AMENDED AS REQUIRED.
 - ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT BRITISH/EUROPEAN STANDARDS BSEN752, THE CURRENT BUILDING REGULATIONS AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.
 - EXACT LOCATION OF RAINWATER DOWNPIPES AND ALL INTERNAL DRAINAGE POINTS TO BE CONFIRMED BY ARCHITECT. RAINWATER PIPE OUTLETS TO BE ROD-ABLE.
 - ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
 - CONTRACTOR TO VERIFY LOCATIONS OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT AND ARRANGE FOR ANY NECESSARY PROTECTION, DIVERSION OR LOWERING WORKS AS REQUIRED.
 - PROPOSED FINISHED LEVELS TO BE DESIGNED BY OTHERS. AS A RESULT ALL PROPOSED FINISHED LEVELS SHOWN ARE TO BE REVIEWED IN LINE WITH THE PROPOSED EXTERNAL WORKS PLAN PRODUCED BY OTHERS.
 - CONTRACTOR TO REVIEW ALL DESIGN PROPOSALS TO ENSURE THERE IS NO CONFLICTING INFORMATION AND ALL INFORMATION IS COORDINATED.



F	UPDATED WITH NEW SITE BOUNDARY	28/11/23	GA	RP
E	UPDATED WITH NEW SITE LAYOUT	26/10/23	RP	PS
D	POND UPDATED	27/07/23	MH	JE
C	UPDATED TO SUIT LATEST LAYOUT	24/07/23	MH	JE
B	SELF-DRAINING CAR PARK NOTE ADDED	10/02/21	AB	PS
A	FIRST ISSUE	24/08/20	AB	PS

REV. DESCRIPTION Date BY CHR

DESIGN BY:

CLIENT: LDA

ARCHITECT: DLA ARCHITECTS LTD

DRAWING STATUS: FOR INFORMATION ONLY

SCALE @ A1: 0 1:100 5 metres

PROJECT: HAMPSHIRE GOLF CLUB HOUSE

TITLE: DRAINAGE STRATEGY

PROJECT No:	DRAWING No:	REV:
19320	D-02	F

PROPOSED PRIVATE FOUL PUMPING STATION
2 No. SUBMERSIBLE PUMPS ON DUTY-STANDBY ARRANGEMENT BY TT PUMPS OR SIMILAR
APPROVED WITH INTEGRAL WET-WELL STORAGE CAPACITY PROVIDED BY 2.1mØ PCC RINGS TO DEPTH 1.82m BELOW LOWEST INLET PROVIDING APPROX. STORAGE VOLUME 6.3m³ MAX.
PUMPED DISCHARGE OF 5.0l/s.
PUMPED DISCHARGE VIA RISING MAIN
CL 70.50
IL 68.70 (100Ø INLET)
IL 66.88 (TANK BASE)

PERMEABLE GRAVEL CAR PARK TO BE SELF-DRAINING

POROUS CAR PARK - GRAVEL FILLED CELLULAR PAVING (GRIDFORCE OR SIMILAR APPROVED)