

Proposed Golf Course Improvement works Portsmouth Golf Course

Flood Risk Assessment

June 2012



CLIENT

Glendale Golf Ltd

SCHEME DESCRIPTION AND LOCATION

Proposed landscaping improvement works to Portsmouth Golf Club, Crookfield Lane, Waterloooville, Portsmouth, PO7 5QL. OS Grid reference 468600, 106720.

The site covers an area of approximately 55.3 Ha.

SCOPE OF REPORT

Flood Risk Assessment to support Planning Application.

INSTRUCTION:

Received from Chloe Chatt of Parkwood Consultancy Services.

REPORT FORMAT:

This Flood Risk Assessment report has been prepared in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated Technical Guidance (TG) document. References in this report to sections, or tables, will relate to the TG, unless otherwise noted.

Prepared by	Gemma Roberts M Eng (Hons)
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Reviewed by	Chris Lewis M Eng (Hons)
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Approved by	Peter Jones, BSc (Hons) CEng CWEM MICE MCIWEM
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Appendices

- A – Location Plan and Aerial Image
- B – Proposed Development Drawing
- C – Envirocheck report
- D – Environment Agency Flood Maps and Correspondence
- E – Surface Water Run-off Calculations

1 Development description and Vulnerability Classification

- 1.1 The proposed development is for landscaping and drainage improvement works at Portsmouth Golf Club. The site is located in Flood Zone 1 on the Environment Agency (EA) Flood Map.
- 1.2 The course is located to the north-east of Portsmouth Central Business District, in an area called Purbrook. The western side of the site generally slopes in a north-westerly direction, from around 90m AOD to 65m AOD. The eastern side of the site generally slopes in an easterly direction from around 65m AOD to 30m AOD. Man-made, localised flat spots and pits occur throughout the course in the form of greens, tees, bunkers and water features where these types of landform have been worked into the sites' natural topography.
- 1.3 A location plan and an aerial image are included in Appendix A; and proposed development plan including cross sections are included in Appendix B. The site is divided into an east and west side by Crookfield Lane.
- 1.4 The total site covers an area of approximately 55.3Ha, with the landscaping works covering an area of approximately 6.2Ha. This is divided into 5 areas as follows:
- Area 1 = 2,178m²
Area 2 = 13, 393m²
Area 3 = 32, 484m²
Area 4 = 7, 941m²
Area 5 = 6, 277m²
- 1.5 Development areas 1 and 2 are located to the west of Crookfield Lane, with areas 3, 4 and 5 to the east of Crookfield Lane. The proposals consist of undertaking improvements to the golf course through ground re-modelling in a cut and fill operation.
- 1.6 The development can be described as 'outdoor sports and recreation' and, in accordance with Table 2 of NPPF, therefore falls within the vulnerability classification of 'water compatible' development'.

2 Application of Sequential and Exception Test

- 2.1 In accordance with the NPPF the risk-based 'Sequential Test' should be applied to steer new development into areas at lower probabilities of flooding. The site is located within Flood Zone 1 – an area considered to have the lowest probability of fluvial/tidal flooding. It is assessed as having a less than 0.1% (1 in 1000 year) probability of flooding. Therefore it is considered that this development passes the Sequential Test.
- 2.2 Table 3 of the NPPF indicates that development classified as 'water compatible' is appropriate in all flood zones and the exception test is not required.

3 Scope of site specific flood risk assessment

- 3.1 In accordance with Table 1 of the NPPF, for development proposals in Flood Zone 1 on sites comprising one hectare or above, the vulnerability to flooding from other sources as well as from river and sea flooding, and the effect to increase flood risk elsewhere through the addition of hard surfaces and the effect of the development on surface water run-off, should be incorporated into a flood risk assessment.
- 3.2 The potential sources of flooding to be considered, in the following sections, are therefore as follows: Tidal; Fluvial - from rivers and streams; Pluvial – from rainfall on the surface; Rising Groundwater; Overwhelmed Sewers and Drainage Systems; Reservoirs, Canals, Lakes and Artificial.
- 3.3 An Envirocheck Report (included in Appendix C) has been obtained to inform the assessment. Historical research has also been undertaken and the Partnership for Urban South Hampshire Strategic Flood Risk Assessment (SFRA) produced in December 2007 has been reviewed for site specific information.
- 3.4 The effects of climate change are to be taken into account, in accordance with the NPPF guidance document sections 11-15.
- 3.5 A pre-application enquiry was submitted to the Environment Agency (EA) on 01/05/2012 to check on any site specific requirements for this FRA. A response was received on 18/05/2012 (included in Appendix D). The EA has stated that the FRA should fully outline any impacts upon surface water drainage resulting from the works and any mitigation required. The works

should not result in any increase in flow rates or volumes to receiving watercourses or sewers.

3.6 The EA has also stated that 'the works in areas 1, 2 & 3 are located relatively close to residential areas and Crookfield Lane. The works must not result in any increase in surface water runoff, or flood risk in general to these areas, i.e. there should be no adverse impacts upon any natural drainage routes'.

3.7 These issues are addressed in the following sections of this report.

4 Fluvial risk - from rivers and streams

4.1 The nearest watercourse to this site is approximately 340m north of the western boundary of the site at Privet Road. This watercourse is unnamed but is classified as 'main river' on the EA flood map. This flows in a northerly direction and is culverted through the built up areas of Purbrook before re-emerging as an open watercourse to the west of the A3 (London Road). The watercourse flows in a westerly direction to its confluence with a tributary of the Wallington River approximately 3.4km north west of the western boundary of the site.

4.2 There are two drains in the north-eastern area of the site which flow in an easterly direction. One of the drains appears to end in a small pond. The EA has stated that this is an ordinary watercourse, with part of it being culverted. Any works to the existing culvert or that would result in further culverting of the watercourse will require prior written permission from Hampshire County Council. Further details on who to contact are included in the EA correspondence in Appendix D. The second drain runs under the A3(M) towards Bedhampton.

4.3 There are no records of any fluvial flooding previously affecting this site. The site is in Flood Zone 1 on the EA flood map and is therefore at low risk of fluvial flooding.

5 Tidal risk

5.1 The site is not affected by any tidal influences.

6 Pluvial risk – from rainfall on the surface

- 6.1 Pluvial flooding is defined as local flooding in areas not normally associated with natural or manmade watercourses that results from rainfall generated overland flow, before the run-off enters any watercourse or sewer. It is usually associated with high intensity rainfall events, but can also occur with lower intensity rainfall or melting snow, where the ground is saturated, frozen or developed resulting in overland flow and ponding in depressions in the topography. Pluvial flooding is unpredictable, to the extent that localised heavy rainfall can occur anywhere without any warning. However, flow paths and depths can be determined by consideration of contours and relative levels.
- 6.2 The Envirocheck Professional Flood Report shows that only very small areas of the site are at risk of pluvial flooding during the 1 in 75, 1 in 100 and 1 in 1000 year events.
- 6.3 The Partnership for Urban South Hampshire (PUSH) Strategic Flood Risk Assessment (SFRA) completed by Atkins in December 2007 includes a variety of maps available to view on the internet (It has not been possible to obtain copies of these maps for the purpose of this report). The following SFRA maps in relation to surface water (pluvial) flooding are discussed below.

Potential Sources of Overland Flow: This map can be used to identify areas which have a potential for generating overland flow. The assessment has taken account of slope, surface geology and whether or not existing development is present. The map shows that the majority of the site is a very high potential source of overland flow. The south easterly side of the site is a moderate potential source. This is assumed to be due to the undulating nature of the site.

Impact on surface water run-off: This is based on a geological assessment of surface permeability and shows the relative impact of developing on greenfield areas based on a change in run-off rates before and after development. This map shows that the western side of the site is classified as 'developed' area which means a change in land use is unlikely to significantly affect the existing surface water run-off rates and volumes. The eastern side of the site is not shown to be developed and has a 'low' and 'high' potential impact on surface water run-off. There will be no change in impermeable area following the development, therefore the development will have minimal impact on surface water run-off (discussed further in section 11).

- 6.4 The SFRA also includes EA Flood Maps. Those relating to surface water are discussed below:

Surface Water Flooding – Pluvial: This shows the areas surrounding the drains (classified by the EA as ordinary watercourses) to the east of the site are at low susceptibility to surface water flooding. The map shows a larger area at risk where the drain crosses the A3(M), where it appears that surface water flows could back up behind the road. The EA map shows that parts of the areas could be at risk of deep flooding, although the definition of 'deep' flooding is not given.

Surface water flood map for a 1 in 30 year rainfall event: This shows the area surrounding the drain to the north-east of the site is slightly at risk of flooding during this event, with only a small area at risk of deep flooding where the drain crosses the road.

- 6.5 The majority of the site is not at risk of surface water flooding and there are no records of surface water flooding affecting this site in the past. It is understood that the site does currently have some drainage problems relating to the course drainage, but this is not believed to be a significant problem or a problem that affects elsewhere. Surface water drainage from the site will be managed appropriately as discussed in section 11. Providing the existing ditches and any proposed surface water drainage features are maintained, it can be concluded that the risk of surface water flooding is low.

7 Risk of Rising Groundwater

- 7.1 Groundwater flooding occurs when water levels in the ground rise above surface elevations. It is most likely to occur in low-lying areas underlain by permeable rocks. Prolonged, heavy rainfall soaking into the ground can cause the ground to become saturated.
- 7.2 The SFRA groundwater flooding maps shows there have been no historical groundwater flooding records at the site and that the majority of the site has a high bedrock permeability with the areas to the north of the site being at low and moderate bedrock permeability.
- 7.3 The EA maps in the SFRA show that the site is in a minor and major groundwater vulnerability zone.
- 7.4 The Envirocheck Report gives details of BGS groundwater flooding data and shows that the southern part of the site is at 'negligible' susceptibility with the remaining areas of the site not being susceptible to groundwater flooding.

- 7.5 It can therefore be concluded that the risk of groundwater flooding is low.

8 Risk of Overwhelmed Sewers and Drainage Systems

- 8.1 The site is currently 'greenfield' and is it not expected that the site has a significant sewer network that could pose a risk of sewer flooding to the site.
- 8.2 The SFRA includes a map showing historic incidents of surface water flooding caused solely by the incapacity of the drainage infrastructure recorded by Southern Water. This shows there are no records of Southern Water surface water sewer flooding incidents at this site. However, there is a recorded incident to the east of the site near Penhurst Road which is directly in line with the drain which flows through the site and under the A3(M), suggesting this could be due to capacity issues relating to the drain.
- 8.3 It is understood that existing drainage pipework on fairways 6, 17 and 18 and on the existing practice area will be replaced with a new drainage scheme and connected to existing ditches and ponds. Bering in mind the historical Southern Water sewer flooding at Penhurst Road, it should be ensured that there is no increase in surface water run-off into the existing ditches compared to the current situation. Any increase should be mitigated by the use of attenuation, such as attenuation ponds.
- 8.4 Providing existing and proposed drainage systems are maintained and surface water run-off from the re-profiled ground is dealt with appropriately it can be concluded that the risk of sewer flooding is low.

9 Risks from Reservoirs, Canals, Lakes and Artificial Sources

- 9.1 The site is not shown to be at risk of flooding from reservoirs on the EA Flooding from Reservoirs Flood Map included in Appendix C. There are no canals within the vicinity of the site. Therefore the there is no risk of flooding from artificial sources.

10 Summary of Site Specific Flood Risk Assessment

10.1 From the preceding sections the following conclusions can be drawn:

Section	Description of Risk	Evaluation	Measures required
4	Tidal	N/A	N/A
5	Fluvial	Low	None
6	Pluvial	Low	Appropriate surface water drainage & maintenance
7	Groundwater	Low	None
8	Sewers and Drainage	Low	Appropriate surface water drainage & maintenance
9	Artificial Sources	Low	None

Table 10.1 – Summary of flood risk

10.2 It can be concluded that the risk of flooding from all sources is low. The surface water run-off management is discussed in the following section.

11 Surface Water Run-off Management

11.1 There is currently no detailed information available about the existing surface water drainage system at the course. However, there are a number of ponds and ditches that all aid surface water collection from the course. It is understood that the proposed development will include drainage improvement works to avoid further water logging issues, including replacing existing drainage pipework on fairways 6, 17 and 18.

11.2 The site covers an area of some 55.3Ha, which is currently entirely permeable and is to remain so post-development. Surface water run-off rates and volumes have been estimated using the spreadsheet calculation included in Appendix E, with the results summarised in tables 11.1 and 11.2 below. In accordance with NPPF a 30% allowance is to be included in the post-development surface water runoff assessment, which has caused an increase in surface water run-off rates and volumes as shown in the figures below:

Event	Pre-development (l/s)	Post-development (l/s)	Change (l/s)
1-1yr	149.27	194.05	+ 44.78
1-30yr	453.87	590.03	+ 136.16
1-100yr	643.49	836.54	+ 193.05

Table 11.1 - Comparison of pre- and post-development run-off rates

Event	Pre-development (m³)	Post-development (m³)	Change (m³)
1-100 yr	13725.87	17843.63	+ 4117.76

Table 11.2 – Comparison of pre- and post-development run-off volumes

- 11.3 The EA has stated that the FRA should fully outline any impacts upon surface water drainage resulting from the works and any mitigation measures required. The works should not result in any increase in flow rates or volumes to receiving watercourses or sewers. The EA has also stated that the works must not result in any increase in surface water run-off or flood risk to the residential areas to the north of the site and Crookfield Lane.
- 11.4 The proposed landscaping works will naturally shed surface water. Strategically placed ponds, ditches and other drainage routes should be designed to ensure this run-off does not have an effect elsewhere. There are already existing ditches and ponds which may be utilised; it should be ensured that there is no increase in surface water run-off into the existing ditches compared to the current situation
- 11.5 It is expected that the drainage system can be conditioned as part of the planning application if necessary. To assist in the detailed design of the course drainage it is recommended that overland flow regimes be modelled to determine the most suitable locations for the ponds, ditches and other drainage features and to ensure the works have no effect elsewhere. Providing surface water run-off from the re-profiled ground is dealt with appropriately, there will be minimal risk of surface water flooding affecting the course or elsewhere. The water bodies may also provide water for course irrigation during dry periods. If practical the attenuation storage volume should be increased by around 4100m³ to take account of the future impact of climate change. All surface water attenuation ponds, ditches and other drainage features should be regularly maintained to ensure storage capacity is maintained.
- 11.6 No flood protection measures are considered necessary for the proposed development. During extreme flood events water will be allowed to flow onto the site. This residual risk is discussed further in section 12 below.

12 Summary and conclusions

- 12.1 The proposed work at Portsmouth Golf Course is in Flood Zone 1, as identified on the Environment Agency Flood Map. The proposed development is 'water-compatible' in accordance with the NPPF.
- 12.2 The proposals consist of undertaking improvements to the existing golf course through ground re-modelling in a cut and fill operation. This will also include drainage improvement works. As the development is greater than 1 Ha (approximately 55.3Ha in total, with approximately 6.2Ha of this being developed) all potential sources of flooding and the effect of surface water run-off have been considered.
- 12.3 The potential sources of flooding that have been considered are fluvial, tidal, pluvial, groundwater, sewer and artificial. This has shown that the site is at low risk of flooding from all sources.
- 12.4 The existing site is currently greenfield and entirely permeable. There will be no increase in impermeable area following the proposed works. In accordance with the NPPF, a 30% allowance has been included in the post-development surface water run-off calculations. This has caused an increase in surface water run-off rates and volumes.
- 12.5 The EA has stated that the works should not result in any increase in flow rates or volumes to receiving watercourses or sewers or to the surrounding area. The proposed landscaping works will naturally shed surface water and strategically placed ponds, ditches and other drainage routes should be designed to ensure this run-off does not have an effect elsewhere. There are already existing ditches and ponds which may be utilised. The water bodies may also provide water for course irrigation during dry periods.
- 12.6 Providing surface water run-off from the re-profiled ground is dealt with appropriately, there will be minimal risk of surface water flooding affecting the course or elsewhere. It is expected that the drainage system can be conditioned as part of the planning application if necessary

13 Recommendations

- 13.1 To assist in the detailed design of the course drainage it is recommended that overland flow regimes be modelled to determine the most suitable locations for the ponds, ditches and other drainage features and to ensure the works have no effect elsewhere. There should be no increase in surface water run-off into the existing ditches compared to the current situation. Any increase should be mitigated by the use of attenuation, such as attenuation ponds.
- 13.2 All surface water attenuation ponds, ditches and other drainage features should be regularly maintained to ensure storage capacity is maintained.
- 13.3 If practical the attenuation storage volume should be increased by around 4100m³ to take account of the future impact of climate change.
- 13.4 This Flood Risk Assessment Report should be submitted to the Planning Authority in support of the Planning Application.

Appendix

A – Location Plan and Aerial Image