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Drainage Statement

New Phoenix Gymnastics Club
Maidenhead

Document BF/667769/DOC
Revision: P5
Date: 22 December 2016

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Project Revision Sheet

Revision No	Date	Status	Changes	Author	Approved
P1	02/09/2016	Planning	First Issue	D O'Connell	B Freedman
P2	23/09/2016	Planning	Sect. 6.3 - Drainage proposals amended	D O'Connell	B Freedman
P3	19/10/2016	Planning	Section 8.0 – Ordinary Watercourse Application added. Sections 6.3 and 10.1 as marked	D O'Connell	C Bishop
P4	20/12/2016	Planning	Updated following comments and meeting of 14th Dec 2016. Section 6.3 and 10.1 amended, Section 6.3.1 added	D O'Connell	C Bishop
P5	22/12/2016	Planning	Minor changes	C Bishop	B Freedman

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Appendices

1 Introduction

MLM Consulting Engineers Ltd have been appointed by Feltham Construction Ltd to undertake a detailed foul and storm water drainage design and provide supporting documentation for the proposed New Phoenix Gymnasium, Fifield Road, Maidenhead, Berkshire SL6 2PG.

This document sets out the proposed drainage strategy to manage the foul and storm water generated by the new development and has been prepared in response to planning condition number 6 of the Royal Borough of Windsor and Maidenhead (RBWM) Planning Application reference 15/02107. This report will also demonstrate how SuDS techniques are proposed to be used on site.

This report has now been updated as a result of responses received after submission to planning and subsequent meeting of 14 Dec with WSP (working on behalf of RBWM) and Phoenix Gymnastics Club.

A number of documents have previously been submitted as part of the planning process for this development. These documents (listed below) have been reviewed and relevant information has been extracted and included as part of the creation of this document:

- 9 July 2015: "SuDS Drainage Report", Stephen Bowley Planning Consultancy (Ref: 15/02107)
- 30 July 2015: Memo from Simon Lavin, Flood Risk Manager, RBWM
- 19 August 2015: "Run-off calculations to support a Sustainable Drainage Scheme", Hafren Water (project ref: 2051)
- September 2015: "SUDS Strategy" drawing, Pleydell Smithyman
- 9 September 2015: RBMW internal email
- 15 October 2015: Molyneux Planning email with attachments
- 26 October 2015: WSP-PB letter to RBMW Planning Services
- January 2016: Flood Risk Assessment – Hafren Water – Ref: 2051/FRA
- July 2016: Planning Condition 6 letter, Hafren Water: Project ref 2181
- July 2016: Sustainable Drainage Design Statement – Environmental Protection Group (EPG) – Ref: EPG-8484-RG-DOC1 V1.0, Date: July 2016.
- 7 October 2016 – WSP-PB Letter to Feltham Construction Ref: 70012202/RS/SR, Date: October 7th
- 14 October 2016: MLM Letter to Simon Lavin, RBWM – Ref: RE: 667769 - Phoenix Gym: Discharge to a Watercourse Consent
- 18 October 2016: MLM Confirmation Letter to Emma Chilton @ RBWM – Ref: 667769 - Phoenix Gym - Discharge to an Ordinary Watercourse

This document should be read as additional information to the previously submitted documentation.

2 The Site & Outline Proposed Development

The site is approximately 1.80ha (18,000m^2) in area. The site lies approximately 4.3km south-east of Maidenhead, Berkshire and is currently being used for arable farming. The site is bounded by Fifield Road to the west, Longlea House (a nursing home) to the south and adjacent agricultural fields to the north and east.

The proposed development will consist of a new gymnasium building with cycle and bin storage externally at ground level and associated hard landscaped areas, parking facilities and access road.

3 Flood Risk

As set out in previous documentation, the site is located in Flood Zone 1 and as the proposed site is greater than 1 hectare a site specific flood risk assessment is required.

The previous documentation has explored the other potential flood risk sources (ref: Hafren Water FRA – January 2016), summary below:

Fluvial flooding	- Flood Zone 1 (EA Flood Map) "very low flood risk"
Surface water flooding	- EA flood map indicates "risk of flooding from surface water" to the western part of the site, along Fifield Road.

This existing surface water flooding is understood to be attributed primarily to the existing open channel ditch located to the east of Fifield Road.

It should be noted that the existing ditch appears from a visual inspection to be quite overgrown – which may well contribute to the surface water flooding. It is understood that the ditch is a local authority asset.

Groundwater flooding	- overall risk of groundwater flooding is deemed to be "very low"
Flooding from water mains	- no historic incidents have been reported of flooding from utility infrastructure.

Overall the site is deemed to be at low risk of sea or river flooding, however the surface water flooding that has occurred previously around the eastern edge of Fifield Road / western portion of the site remains. As set out previously, and further corroborated by this report, the proposed development of the gym building and external works has been designed not to detrimentally affect the current situation – this is explored further over the following sections of this report.

4 Climate Change

The current planning policy framework "*Climate change allowance for planners*" recommends a factor of 30% to be applied to drainage design calculations. This climate change factor reflects the future predicted increase in rainfall intensity due to climate change.

Therefore, the proposed drainage design has been tested to allow for an additional +30% on the rainfall intensity (Ref: Climate Change Allowances for Planners, Environment Agency, September 2013).

5 Pre-development Drainage

5.1 Existing Foul

The site is currently an undeveloped Greenfield site and there is no foul drainage serving the site.

5.2 Existing Storm

There is no existing below ground storm water drainage serving the site. The site is currently undeveloped Greenfield space on arable land and all storm water flows generated are assumed to follow the natural surface gradients.

Surface water generated on the existing site is assumed to discharge to adjacent drainage ditches to the existing field, predominantly the existing open channel ditch located adjacent to the site and Fifield Road. This ditch drains northwards where it eventually discharges to the River Thames. [Refer to: Hafren Water Flood Risk Assessment Ref: 2051/FRA, Date: Jan 2016].

6 Post-development Drainage

6.1 Foul Discharge

Foul flows within the proposed gymnasium will be collected by 100mm diameter pipes laid to gradients to ensure self-cleansing. These pipes shall connect to a new 100mm dia. pipe and will facilitate flow under gravity to a proposed discharge into the Thames Water 150mm foul water sewer which runs north beneath Fifield Road, to the west of the proposed development. The proposed foul flows are relatively low, originating only from the few facilities within the proposed gymnasium. Permission to connect to the Thames Water sewer shall be required via a Section 106 connection application.

6.2 Proposed Storm Water Drainage

The drainage design for the development shall adopt wherever possible the principles embodied in Sustainable Urban Drainage Systems (SuDS) and follow the principles set out in the Building Regulations Part H and CIRIA C753: 'The SuDS Manual'. The design will incorporate SuDS measures in accordance with the Environment Agency guidance and prevailing site conditions.

The pre-development area is 1.8Ha (18,000m^2) and for the purposes of this report is considered greenfield. The Hafren Water Flood risk assessment (Ref: 2051/FRA, Date: Jan 2016) states that the greenfield runoff rate for the site to be 6.6 l/s. This has been calculated using the IH124 method. MLM have calculated the storm water runoff rate, QBar, (in this case Greenfield runoff rate) to be 7.9 l/s. This has been calculated using the ICP SuDS method which is a more accurate method for a site less than 50Ha in total area.

The proposed discharge for the development shall conform to the drainage hierarchy set out in the building regulations:

6.2.1 Infiltration

The proposed site is underlain by London Clay Formation. This is defined by the Environment Agency as 'Unproductive Strata' with a low permeability. This has been confirmed in the Site Investigation carried out by BRD (Ref: BRD2669-OR2-A).

Therefore, infiltration drainage is not considered to be suitable for the proposed development.

6.2.2 Watercourse

The nearest existing watercourse is the open channel/ditch located to the west of the site alongside Fifield Road.

This has been approved for receipt of surface water from the new gymnasium development and is at a suitable level for discharge. As such, it is proposed that storm water generated by the development will discharge to this drainage ditch at a controlled rate with on-site attenuation.

6.2.3 Discharge to Sewer

The Thames Water asset location search for the site shows that there is no storm water or combined water sewer near to the proposed development, only the foul water sewer within Fifield road. As such, this option is not feasible.

6.3 Discharge Location & Rate

Following the hierarchy of discharge, it is therefore proposed that storm water flows generated from the proposed gymnasium building and associated external works shall discharge to the open watercourse/ditch adjacent to Fifield road.

The proposed discharge of the storm water will be controlled via a flow control prior to discharging to the watercourse/ditch. A discharge rate of 5 l/s is proposed, which is less than the calculated greenfield runoff rate, and is recognized as the practical minimum discharge rate to manage risk of blockages of flow control devices. The flow control has been designed as a vortex flow control in order to maximize aperture size and minimize risk of blockage.

It should be noted that the proposed entrance to the site will cross the existing ditch. Culverting the existing ditch under the proposed entrance will be required and the detail for this will be submitted for approval under the Land Drainage Act (See section 8.0).

On site attenuation is proposed in the form of permeable/porous surfacing and coarse graded aggregate sub-base to parking bays along with swales to the west and north of the proposed development. A 500mm diameter oversized pipe adjacent to the access road will provide additional storm water storage prior to discharge into the ditch. A flow control manhole is proposed at the end of the drainage network before the water discharges into the existing drainage ditch. This houses the HydroBrake, which will restrict storm water discharging to 5 l/s.

The discharge rate of 5 l/s was agreed with Martin Wheeler of WSP, on behalf of the Royal Borough of Windsor and Maidenhead (RBWM), at a meeting on 14th December 2016 between the various stakeholders. The minutes of this meeting have been appended to this report. Further detailed information about the proposed porous parking bays and general drainage layout is attached in the appendices.

The parking bays, swales and oversized pipe will act in sequence in order to provide sufficient storm water storage to ensure that there is minimal surface water flooding, and none that will leave the site uncontrolled. These have been modelled in WinDes/MicroDrainage for a range of storm durations and storm return periods up to and including the 1 in 100 year event with an additional 30% allowance for climate change.

The receiving ditch adjacent to Fifield Road occasionally runs full due to receipt of runoff from areas outside the development boundary for the proposed new gymnasium. This results in the possibility that the discharge pipe from the new development is surcharged by level, reducing or preventing outflow from the new site network for a period of time. This surcharged condition of the ditch has been modelled as a surcharged outfall, with a water depth of 1.45m from the base of the ditch identified as the maximum possible water level, corresponding to the maximum height of the road above ditch invert. The length of time that the ditch remains full is currently unknown, but has been modelled as 10080 minutes for the purposes of the on-site network design.

In the event of a surcharged outfall the network surcharges and shows a small volume of flooding for the critical storm. The analysis shows that 4.2m^3 of flooding occurs at over the porous car park. Since the permeable paving is installed at slightly lower elevations than the remainder of the car park (to receive runoff from the impermeable car park surfacing), the flooded volume will pond on top of the permeable parking bays and not run off site. The maximum water depth for this scenario is 2mm. Detailed calculations for the scenario when the drainage ditch is full, are appended to this report as the 'Surcharged Outfall' case.

Finally, consent to discharge to the drainage ditch has been discussed with the Royal Borough of Windsor and Maidenhead. Please see the confirmation from Simon Lavin, the flood risk manager within the highways and planning department of the borough, confirming that consent to discharge to the drainage ditch does not require consent from the environment agency nor does it require consent under the land drainage act, subject to no projection of the new outfall or headwall into the existing ditch. An additional email to Emma Chilton (RBWM) has been appended, further confirming Simon's email.

6.3.1 Rainfall Data

The proposed drainage layout has been designed and modelled using Flood Estimation Handbook (FEH) Rainfall Data provided by HR Wallingford. FEH Rainfall is the industry standard used to estimate local flood risk and develop resilient infrastructure and has been collected on a catchment by catchment basis over a 30 year period from 1961-1999. It is generally used for designing systems with a storm duration of 60 minutes or greater. For completeness, Flood Studies Report (FSR) rainfall data has also been run on the completed models, and has been found to be less onerous. Both results sets are included in appendices.

7 Pollution control

The proposed site is deemed generally to have a low pollution risk, with the primary risk arising from any leaks or spills from vehicles within the car park.

The proposed combination of porous surfaces and swale features, along with catch-pit manholes will provide the necessary filtration for the development to mitigate any such pollution before reaching the watercourse.

8 Ordinary Watercourse Application

As part of the proposals, a section of the drainage ditch to the west of the site (adjacent to Fifield Road) is required to be culverted in order to provide access to the site. As this alters an existing watercourse, an Ordinary Watercourse Consent is required for the works. An ordinary watercourse application will be made directly to the Royal Borough of Windsor and Maidenhead, who have confirmed that they are the correct recipient for this application. The culvert proposals are covered separately to these drainage proposals and as such do not form a part of this planning condition response, but are mentioned here for completeness.

9 Drainage – General

The design of the drainage generally within the development will be in accordance with the current revisions of the relevant British Standards, Codes of Practice and Building Regulations. These include, but are not limited to the following:

- BS EN 752 - Drain and sewer systems outside buildings.
- BS EN 12056 - Drain and sewer systems inside buildings.
- Building Regulations – Part H: Drainage and waste disposal.
- UKWIR Ltd - Civil engineering specification for the water industry.
- CIRIA C753 - The SUDS manual.
- WRc - Sewers for adoption 7th Edition.

10 Operation & Maintenance

To ensure that below ground drainage networks continue to perform efficiently, it is essential that the networks are appropriately and regularly maintained. Inspection of the storm water chambers, flow restrictions, permeable pavements and swales should be carried out on a regular basis and in particular after every large storm event. Where products are installed, maintenance should be carried out to manufacturers' specifications. Further information on the operation and maintenance of specific components of the drainage network is outlined below.

10.1 Flow Control: HydroBrake

HydroBrake manholes should be checked after a major storm to ensure that they are free from blockage and reviewed annually. The HydroBrake manhole should undergo maintenance in line with the manufacturers' recommendations. The HydroBrake will limit discharge to 5 l/s which is widely recognised as the minimum discharge rate to prevent blockages at the flow control in accordance with Sewers for Adoption 7th Edition.

10.2 Permeable Pavements

The most prevalent maintenance concern of permeable pavements is the potential clogging of the pores. Over time detritus and silt can build up on the surface. Inspections should be carried out regularly to ensure that this build-up does not cause clogging.

TABLE 20.15 Operation and maintenance requirements for pervious pavements

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 glyphospate 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

Pervious pavement Operation & Maintenance requirements [CIRIA C753: The SuDS Manual]

10.3 Swales

Regular maintenance of swales is required in order to ensure that they operate to a high design performance standard. The maintenance of swales is relatively straightforward. The swale should be kept free from rubbish and other debris and grass should be regularly cut / mown. This will ensure that pollutants are removed from storm water prior to discharging to the ditch. Any sediment buildup should also be removed in order to maintain a clear passage for water flow.

TABLE 17.1 Operation and maintenance requirements for swales

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 reseeding	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

Swale Operation & Maintenance requirements [CIRIA C753: The SuDS Manual]