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PROPOSAL FOR THE DISCHARGE OF SURFACE WATER DRAINAGE INTO THE HIGHWAYS DRAINAGE SYSTEM ON HIGH STREET, ASCOTT-UNDER-WYCHWOOD

09 DECEMBER 2014

TGMS0869.2b

REVISION RECORD					
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0	21/11/14	Document Creation	ITJ	AM	AM
1	18/02/15	Inclusion of trial pit investigation	ITJ	AM	AM
2	13/04/15	Amendment to include additional flow from the field to the south of the playing field.	ITJ	RE	RE



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**PROPOSED DRAINAGE IMPROVEMENTS TO MEMORIAL PLAYING FIELD
ASCOTT-UNDER-WYCHWOOD
OXFORDSHIRE**

SURFACE WATER DRAINAGE DESIGN

1. INTRODUCTION

- 1.1 Ascott-under-Wychwood Parish Council has been provided with a grant to improve the usability of their Memorial Playing Field under Sport England's Protecting Playing Fields funding scheme.
- 1.2 A site investigation to assess the feasibility of improving the drainage of Memorial Playing Field and to reduce localised ponding on site, which limits use of the playing fields during wet periods and the winter, and prevents access to the pavilion for both sports and playgroup users.
- 1.3 Observations on site determined that the playing field slopes down to the north at 3 to 3.5% but receives runoff from the fields upslope to the south.
- 1.4 Soils on site are clay topsoils over clay subsoils with extremely low permeability. These overly Jurassic mudstones at depth. A trial pit was excavated on the lower terrace near to the playing field entrance. This revealed 0-200 mm of clay loam topsoil over a very stony layer of limestone boulders in a clay loam matrix to 0.80 m below ground level (bgl). This overlay a well-structured reddish clay subsoil to 1.50 m bgl. Between 1.50 and 1.70 m bgl there was a sandy gravel bed or lens that contained trapped water. This overlaid a massive, grey clay subsoil which extended beyond the 2.2 m depth of excavation. Soakaway testing was attempted but rates of infiltration were less than the rate of inflow of water from the permeable horizon between 1.50 m and 1.70 m bgl.

These soils are not suitable for soakaway drainage outfall.



Figure 1 Soil profile at Ascott-under-Wychwood Memorial Playing Field.

- 1.5 Run-off on-site and off-site is a problem due to poor infiltration and site gradients. Water flows downslope and onto the access road to the pavilion where it ponds, restricting access.
- 1.6 The usability of the site, by a number of stakeholders, could be improved with the installation of a surface water drainage scheme to increase interception on site and remove water from the surface; however, outfall options are limited. The only proximal watercourse runs through a neighbouring garden to the west of the site and an infiltration outfall would be insufficient due to the soils and geology on site.
- 1.7 For this reason, outfall options are restricted to the highways drainage present in the High Street to the immediate north of the site. It is recognised that by installing the drainage scheme the hydrology of the site will be changed and this will impact on the hydrograph of the highways drainage that connects to a culverted stream.
- 1.8 Whilst the playing field is in Flood Zone 1, the High Street and properties and land to the immediate north are in Flood Zone 2, such that direct drainage outfall into the highways drainage is not appropriate and attenuation is required.

2. DESIGN STRATEGY

- 2.1 The 1.4 ha site is presently a sports playing field. Calculations of the greenfield runoff rate using the IH124 method determine the following:

Qbar	7.17 L/s
1 in 1 year	6.09 L/s
1 in 30 years	16.49 L/s
1 in 100 years	22.87 L/s

- 2.2 It is at this stage that the determination of the possible changes to greenfield discharge rates becomes a little subjective as there is no means of determining precisely what the discharge rate will be from the land drainage system that will be provided in the playing field.
- 2.3 There is not currently a 7.17 L/s discharge into the highways drainage so a restriction of 5 L/s should be applied. The aim of the design is to attenuate a 20 minute storm at the 1:30 year greenfield runoff rate, + 20% for climate change, allowing for a restricted outfall of 2 L/s into the highways drainage in the High Street.
- 2.4 As far as this proposed cricket ground is concerned the process is a little different simply because the site, post development, remains as a greenfield site with no additional hard surfaces being provided.
- 2.5 In that this is a slightly unusual development requiring a slightly unusual ground drainage system we have, after due consideration, come to the conclusion that an estimate will have to be made of the possible increase in run-off over and above the figures quoted by TGMS.
- 2.6 Therefore the design calculation proposed is as follows.

- 2.6.1 Existing greenfield run-off for 1:30 year storm and a 1.48 ha site 16.49 L/s.
- 2.6.2 Assume a 20% addition for the effects of future climate change. 16.49 l/sec + 20% = 19.79 l/sec
- 2.6.3 Assume 20 minute storm duration to determine storage volume.

$$\frac{(19.79-2) \times 60 \times 20}{1000} = 21.3 \text{ m}^3$$

- 2.6.4 According to the Flood Estimation Handbook, a greenfield runoff rate of 5 L/s should be assumed for the 0.9 ha field immediately to the south of the playing field (6 L/s with +20% for climate change). Assuming that this is contributed to the filter drain on the south of the playing field. On this basis and the same 20 minute storm duration the additional storage requirement is:

$$\frac{(6.00) \times 60 \times 20}{1000} = 7.2 \text{ m}^3$$

- 2.6.5 Total storage requirement is **28.5 m³**.

- 2.6.6 Required pipe length depends on pipe diameter as follows:

Pipe Diameter, m	0.45	0.50	0.75	1.00	1.50
Cross Sectional Area, m ²	0.16	0.20	0.44	0.79	1.77
Length Required, m	179.2	145.1	64.5	36.3	16.1

- 2.6.7 The proposal is to install twin parallel 0.50 m diameter pipes over a 70 m length.
- 2.6.8 This assumes no in-pipe storage is provided by the land drainage system.
- 2.6.9 A flow control device to limit the discharge to 2 L/s.
- 2.6.10 The point of discharge into the highways drainage scheme in the High Street to be confirmed, and the pathway to be made good as per the requirements of the authority.
- 2.7 Because of the variable nature of permeable horizons, whether some aspect of soakaway can be included in the attenuation system can only be confirmed in excavation works, but where this is possible, and will not result in groundwater flow into the drainage scheme, this will be included.
- 2.8 Location of the pipe storage system to the north of the playing field at the level of the playground area has been considered but will cause disruption to the newly installed playground. To avoid adding potential to the water and to help increase slope stability, the tanks will be installed in the playing field but at an invert level such that the soffit of the pipe is between at 98.00 m AOD and the bottom of the bank (98.50 m AOD).

- 2.8 In view of the somewhat subjective nature of these proposals we would appreciate it if Oxfordshire County Council would carefully consider this revised submission along with our drawings TGMS0869.1-1 and TGMS0869.3-1 Rev1, both attached, and come back to us with any further thoughts they may have.

Dr Iain James, Technical Director
9 December 2014 (Revised 13 April 2015)

3. CONTACT DETAILS

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