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LAND DRAINAGE AND FLOOD DEFENCE CONSULTANT

Mrs T Harris-McNee
Managing Director
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Grimston
East Riding of Yorkshire
HU11 4QE

Your reference: 1040

13 September 2010

Dear Mrs Harris-McNee

ATC Building for West Midlands Reserve Forces and Cadets Association in Grounds of Village Hall at Ewyas Harold in Herefordshire
Flood Risk Assessment

I refer to your request for me to address the land drainage and flood protection and mitigation issues arising from this leisure development proposal. This information is required to support an application for outline planning permission.

The flood risk issues, their implications for the development in question and the resulting land drainage and flood protection and mitigation measures that are required for the development are addressed in the following itemised and PPS 25 referenced flood risk assessment:

(1) A revised Planning Policy Statement 25 (PPS 25) "Development and Flood Risk" was published in March 2010 by the Department of Communities and Local Government (DCLG) to supersede its December 2006 publication, which itself replaced Planning Policy Guidance 25 (PPG 25) "Development and Flood Risk" published in July 2001 by the Department of the Environment, Food and Rural Affairs (DEFRA). PPS 25 gives guidance to planning authorities in England on how to respond on flood risk grounds to development proposals. It expects planning authorities to apply a sequential risk-based approach to development planning and control through a sequential test, which forms the core of PPS 25. The main points of the guidance are summarised as follows:

(a) Table D.1 in annex D of PPS 25 divides the land area of England into four flood risk zones in relation to flooding from the coast and watercourses. These are flood risk zone 1 (low probability), 2 (medium probability), 3a (high probability) and 3b (functional flood plain). The 1 in 1000 (0.1%) annual probability (1000 year return period) of either tidal or fluvial flooding defines the boundary between flood risk zones 1 and 2. The 1 in 200 (0.5%) annual probability (200 year return period) of tidal flooding or the 1 in 100 (1.0%) annual probability (100 year return period) of fluvial flooding defines the boundary between flood risk zones 2 and 3a. Flood risk zones 1, 2 and 3a are defined ignoring the presence of flood defences. Flood risk zone 3b represents the functional flood plain, which is identified by taking account of local circumstances rather than being defined solely on rigid probability parameters. However, land having a 1 in 20 (5.0%) annual probability (20 year return period) or greater of either tidal or fluvial flooding or is specifically designed to flood at a lower annual probability is a starting point for the identification process.

(b) Table D.2 in annex D of PPS 25 classifies development according to vulnerability to flooding. There are five classes, which are highly vulnerable, more vulnerable, less vulnerable, essential infrastructure and water-compatible development. Emergency

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services stations, basement dwellings and caravans, mobile homes and park homes intended for permanent use are classified as highly vulnerable. All residential premises, educational establishments, hotels, public houses, nightclubs and caravan and camping sites used for temporary holiday accommodation are classified as more vulnerable. Commercial, retail, leisure and general industrial development, buildings used for agriculture, horticulture and forestry and water and sewage treatment plants are all classified as less vulnerable. The essential infrastructure classification relates to strategic transport and utility infrastructure. Water-compatible development includes outdoor sports and recreation, together with essential facilities such as changing rooms.

(c) The aim of the sequential test is to steer new development to areas with the lowest probability of flooding from the coast and watercourses, namely flood risk zone 1. If there is no reasonably available site in zone 1, the development can be located, subject to its vulnerability to flooding, in zone 2 and then zone 3. Table D.3 in annex D of PPS 25 details the compatibility criteria between flood risk zone and vulnerability to flooding. It indicates that highly vulnerable, more vulnerable and less vulnerable development should not be permitted in zone 3b. Highly vulnerable development should also not be permitted in zone 3a. Essential infrastructure in zones 3a and 3b, more vulnerable development in zone 3a and highly vulnerable development in zone 2 should only be permitted if the exception test is passed.

(d) The exception test is only appropriate for use where the sequential test cannot deliver a reasonably available site, but development is necessary to avoid social or economic blight. It is passed by satisfying all of the following criteria:

(i) The development provides demonstrably wider sustainability benefits to the community that outweigh flood risk.

(ii) The development is on previously developed land or, if it is not, that there are no reasonable alternative sites on previously developed land.

(iii) The development will be safe from flooding, without increasing, and where possible decreasing, flood risk elsewhere.

(e) Paragraph 16 and annex D paragraph D5 of PPS 25 give the duty of applying the sequential test to the decision-maker, namely the planning authority. Similarly, paragraph 20 and annex D paragraph D10 of PPS 25 also give the duty of applying the exception test to the decision-maker.

(f) Minor development and changes of use should not be subject to the sequential or exception tests. Minor development is defined as:

(i) Non-residential (eg industrial, commercial, retail, leisure etc) extensions with a footprint of less than 250 m^2.

(ii) Alterations that do not increase the building footprint.

(iii) Residential extensions, including shed, garage, games room etc within the curtilage of a dwelling, but excluding the creation of an additional separate dwelling within the curtilage, which includes the sub-division of a dwelling into apartments or flats.

(g) Flooding can occur from sources other than watercourses and the coast, as identified in annex C of PPS 25. These other forms of flooding arise from:

(i) The rate of rainfall exceeding the rate of infiltration into the ground, resulting in "sheet run-off" of the residual. This can occur from either heavy rainfall on ground saturated through prolonged wet weather in the winter or an intense summer thunderstorm.

(ii) The water level in the ground rising above the surface level. This is most likely to occur in low-lying areas underlain by permeable rock formations during wet winter months.

(iii) Sewers or drains being overwhelmed by heavy rainfall, becoming blocked or having inadequate capacity.

(iv) The overtopping, or even breach, of canals and impoundments, where water is retained above natural ground level.

New development within a flood risk zone should be directed first to sites at the lowest probability of flooding from all sources. Within each site, higher vulnerability uses should be located on parts of the site at the lowest vulnerability of flooding from all sources, with the more flood-compatible uses, such as parking and open space, on parts of the site at the highest probability of flooding.

(h) Annex F of PPS 25 highlights the need to mitigate for the effect of increased surface water run-off caused by development, so as not to increase, and if possible decrease, the flood risk elsewhere. This can be achieved by the provision of attenuation storage, infiltration into the underlying subsoil where ground conditions and water table permit or a combination of both. These are normally provided on-site but are, occasionally, located off-site.

(i) It should be demonstrated that the residual risks remaining after applying the sequential approach and implementing flood protection and mitigation measures can be safely managed. This requirement is addressed in annex G of PPS 25, which draws particular attention to development behind flood defences and the residual risk due to the defences being overtopped or breached. The management of residual flood risk may incorporate one or more of the following:

(i) Flood-resilient construction is designed to reduce the consequences of flooding and facilitate the recovery from the effects of flooding sooner than conventional buildings. Water resistant materials for floors, walls and fixtures and the positioning of electrical controls, cables and appliances at higher than normal levels are examples of flood-resilient construction.

(ii) Flood-resistant construction is designed to prevent or limit floodwater entering a building. Raised floor levels and removable doorway barriers are examples of flood-resistant construction.

(iii) A flood risk management and evacuation procedure that is linked to Environment Agency (EA) flood warning alerts. Such a procedure is only viable if there is sufficient response time after a flood warning alert. Particular attention should be given to the communication of evacuation plans, including how such plans are triggered.

(j) A planning application for development should be accompanied by a flood risk assessment that demonstrates how the flood risk from all sources will be managed and the effect of the development on flood risk elsewhere. Minor development and changes of use are not excluded from this requirement. The only exception is a development site of area less than one hectare in flood risk zone 1. Annex E of PPS 25 gives the minimum criteria for a flood risk assessment.

(2) An updated "Practice Guide" to PPS 25 was published in December 2009 by DCLG to supersede its June 2008 publication, which itself replaced "A Practice Guide Companion to PPS 25" published in February 2007 by DCLG. The main points of this latest PPS 25 practice guide are summarised as follows:

(a) Paragraph 5.51 recommends a minimum standard for the protection of new property against fluvial flooding of 1 in 100 (1.0%) annual probability (100 year return period), with an appropriate allowance for climate change over the design life of the property. The corresponding minimum standard for the protection of new property against tidal flooding is, therefore, 1 in 200 (0.5%) annual probability (200 year return period), with an appropriate allowance for climate change over the design life of the property (reference (1)(a) above). Table B.2 in annex B of PPS 25 recommends a 20% increase to the fluvial flood peak discharge for a design life ending after 2025. Table B.1 in annex B of PPS 25 recommends annual relative sea level rises for the coast of England. Coastal flood defences are also subject to overtopping through wave action. This too is subject to increase through climate change as recommended in table B.2 of annex B of PPS 25.

(b) Referring to paragraphs 6.13 and 6.14, car parking areas may be subject to flooding provided there is a flood warning and evacuation procedure that allows sufficient response time for drivers to remove their vehicles and it is accompanied by appropriately located and worded signs. Where the depth of flooding exceeds 0.3 metres for the level of flood protection defined in (2)(a) above, then the car parking area should be designed to prevent vehicles floating out of it. Car parking areas for residential premises and long term car parking are unlikely to be acceptable where the depth of flooding exceeds 0.3 metres for the level of flood protection defined in (2)(a) above, because of the risk of vehicle owners being away from the area when flooding occurs and, therefore, unable to move their vehicles.

(c) Paragraphs 4.60 and 4.61 require new developments in flood risk areas to have, wherever possible, an access / escape route for occupants that is protected against flooding to at least the minimum standard stated in (2)(a) above. Where this is not possible, the acceptable flood depth for safe access / escape will vary depending on flood velocity and the likely debris in the floodwater. Appropriately located and worded signs should indicate the access / escape route if it is not immediately obvious (reference paragraph 4.65). Emergency services' vehicles should normally also be able to access the development during flood peak levels specified in (2)(a) above (reference paragraph 4.60).

(d) Raising ground levels or constructing flood defences to protect development proposed on undefended areas of fluvial flood plain will, in order to avoid increasing the flood risk elsewhere, require compensatory flood storage and, if applicable, conveyance to the level of flood protection defined in (2)(a) above. This is not the case on undefended areas of tidal flood plain that do not have a conveyance function because of the negligible impact on peak tidal levels (reference paragraph 3.74). Development proposed on defended areas should ensure that the effect on the residual flood risk elsewhere caused by the loss of flood storage and, if applicable, the disruption of flow paths due to the development is insignificant (reference paragraphs 3.70 and 3.71).

(e) All sewers that are subsequently adopted by a sewerage undertaker are designed and built in accordance with the sixth edition of "Sewers for Adoption" published in March 2006 by WRC plc for Water UK. This requires no surface flooding from the sewerage system for the 1 in 30 (3.33%) annual probability (30 year return period) storm of critical duration. Surface flooding from the sewerage system should not flood new property for the 1 in 100 (1.0%) annual probability (100 year return period) storm of critical duration, with an allowance for an increase in peak rainfall intensity due to climate change over the design life of the property (reference paragraphs 5.50 and 5.51). Table B.2 in annex B of PPS 25 recommends increases in peak rainfall intensity due to climate change.

(f) It is necessary to mitigate for the effect of the increased surface water run-off caused by development, so as not to increase, and if possible decrease, the flood risk elsewhere. The peak rate of surface water run-off post development should be no greater, and if possible less, than that pre development for storms of critical duration up to and including the 1 in 100 (1.0%) annual probability (100 year return period), with an allowance for an increase in peak rainfall intensity due to climate change over the design life of the development (reference paragraphs 5.53 and 5.54).

(g) The allowances for climate change given in tables B.1 and B.2 of annex B of PPS 25 are applied over the design life of the development. The design life for residential development should normally not be less than 100 years (reference paragraph 3.102). Development other than residential should have a design life based on local experience (reference paragraph 3.103).

(3) The EA has a duty under the Water Resources Act 1991 and the Land Drainage Act 1991, as amended by the Land Drainage Act 1994, to exercise general supervision over all matters relating to land drainage and flood defence in England and Wales. Accordingly, it is a statutory consultee in the planning process with regard to land drainage and flood defence. PPS 25 endorses and reinforces this consultee role in England. In practice, the approval of the EA in respect of matters relating to land drainage and flood protection and mitigation is, invariably, a prerequisite for planning permission.

(4) The EA normally requires development to be protected against flooding to at least the minimum standards recommended in the PPS 25 practice guide (reference (2)(a), (2)(b), (2)(c) and (2)(e) above). However, usually the EA additionally requires floor levels of all buildings on the development to be protected against flooding to at least the recommended minimum standard in the PPS 25 practice guide (reference (2)(a) above) plus 0.6 metres of freeboard.

(5) The village hall at Ewyas Harold is alongside the B4347 Pontrilas Road on its north-east side and some 0.4 kilometres from its junction with the A465(T). The grounds of the village hall are rectangular in shape and cover an area of approximately 0.4 hectares. They are bounded by the B4347 Pontrilas Road to the south-west and agricultural grassland on all other sides. The proposed ATC building and its associated parking area will occupy approximately 20% of the grounds of the village hall alongside the north-east boundary. This area is grassed, whilst the open area of the remaining 80% of the grounds has a stone aggregate surfacing. The

grounds of the village hall have a very slight fall from south-west to north-east, with levels of some 71.5 m AOD alongside the B4347 Pontrilas Road and 71.3 m AOD at the site of the proposed ATC building and its associated parking area. This site has a national grid reference at its approximate centre of SO 39202786.

(6) The relevant extract from the EA's flood risk zoning map on which the site is located shows that the whole of the site is within flood risk zone 2 (shaded light blue) (reference (1)(a) above). The risk is from fluvial flooding emanating from the Dulas Brook, which flows from approximately north-west to south-east some 50 metres to the north-east of the site. The Dulas Brook outfalls to the River Dore a little over 0.4 kilometres downstream of the site. Whilst flood risk zones are defined ignoring the presence of flood defences, the site in question is not within an area that benefits from flood defences.

(7) Development is classified according to vulnerability to flooding. The development proposal can probably best be described as a leisure development and is, therefore, classified as less vulnerable (reference (1)(b) above). Less vulnerable development in flood risk zone 2 is permitted subject to the development passing the sequential test (reference (1)(c) above). The planning authority has the responsibility of applying the sequential test (reference (1)(e) above).

(8) W S Atkins Consultants Limited has undertaken a flood study of the River Dore and Dulas Brook through Pontrilas and Ewyas Harold for the EA, which was completed in 2001. The EA has kindly made available the results of this study. Cross section chainage 406 on the Dulas Brook passes through virtually the centre of the site. The study estimates flood peak levels for this cross section of 70.04, 70.31, 70.62, 70.86, 70.99. 71.10 and 71.31 m AOD for, respectively, the 5, 10, 25, 50, 75, 100 and 200 year return period flood peak discharges in the Dulas Brook. It also estimates a flood peak level for the cross section of 71.56 m AOD for the 100 year return period flood peak discharge plus 20%.

(9) The parking area to the ATC building will have finished levels corresponding to existing ground levels and will, therefore, not be less than 71.30 m AOD throughout, which corresponds to the 200 year return period flood peak level (reference (8) above). The maximum depth of flooding on the car park for the design flood peak level will be 71.56 – 71.30 = 0.26 metres (reference (2)(a) and (8) above). Because this event will result in flooding of the car park, a flood warning and evacuation procedure that allows sufficient response time for drivers to remove their vehicles will be instigated, together with appropriately located and worded signs (reference (2)(b) above and (12) below).

(10) The ATC building will have a finished floor level of not less than 71.90 m AOD. It will, therefore, be protected against flooding from the Dulas Brook to the requisite standard required by PPS 25 (reference (2)(a) and (8) above). However, the 0.60 metres of freeboard usually required by the EA (reference (4) above) will not be provided, as it would require an even more excessive step-up to the floor level of the building. The freeboard provided will be 71.90 – 71.56 = 0.34 metres.

(11) The access / escape route for occupants will not be flooded from the 200 year return period flood peak discharge in the Dulas Brook. However, it will not be protected against flooding from the 100 year return period flood peak discharge plus 20%. The maximum flood depth on the access / escape route for this event will be 0.26 metres immediately alongside the ATC building. This flood depth will diminish to nothing on the B4347 Pontrilas Road at the entrance to the grounds of the village hall, a distance of about 65 metres from the ATC building. The corresponding floodwater velocity and debris crossing the access / escape route

is considered unlikely to prevent occupants from being able to evacuate the building. The above notwithstanding, the proposed flood warning and evacuation procedure (reference (9) above and (12) below) should result in the ATC building being unoccupied during such an event.

(12) The EA operates a common three-stage flood warning alert throughout England and Wales. The warning alerts are, for increasing flood risk, "Flood Watch", "Flood Warning" and "Severe Flood Warning". The River Dore and Dulas Brook form part of the River Monnow catchment, for which the EA issues flood warnings based on interrogation of its flow gauging station on the River Monnow at Grosmont. Following completion of the development, the West Midlands Reserve Forces and Cadets Association will register with the EA to receive its flood warning alerts for the catchment of the River Monnow.

(13) The height of the finished floor level of the proposed ATC building (reference (10) above) above its existing and proposed surrounding ground levels (reference (5) and (9) above) ensures compliance with the minimum standard of protection to buildings against flooding from sewers and drains (reference (2)(e) above). It also eliminates the possibility of the building being flooded from any other sources than those already addressed (reference (1)(g) above). All electrical controls and fittings in the ATC building will be at least 0.5 metres above the finished floor level (i.e. above 18.4 m AOD) for additional flood resilience. This together with the flood evacuation procedure provides the safe management of the residual flood risk (reference (1)(i) above).

(14) There will be no loss of flood plain storage through the provision of the proposed car park to the ATC building (reference (9) above). The building itself, which will have a footprint of 211 m^2, will result in no loss of flood plain storage at the 100 and 200 year return period flood peak levels. However, it will result in the loss of 211 x (71.56 – 71.30) = 55 m^3 of flood plain storage at the flood peak level arising from the 100 year return period flood peak discharge plus 20% (reference (8) and (9) above). It will not be possible to provide compensatory flood plain storage to mitigate for this small loss.

(15) The Soil Survey of England and Wales describes the subsoil underlying the site as " Deep stoneless permeable reddish fine silty soils. Similar coarse silty soils locally deep." Such subsoil will be conducive to the infiltration of surface water. Therefore, the car park to the ATC building will have a permeable pavement design. Surface water run-off from the roof of the building will drain to an infiltration "blanket" beneath the car park. Consequently, the proposed development will result in no increase in surface water run-off. The design of permeable pavement and the infiltration "blanket" will be in accordance with Construction Industry Research and Information Association (CIRIA) publications C697 of 2007 titled "The sustainable urban drainage systems (SUDS) manual" and R156 of 1996 titled "Infiltration drainage : manual of good practice".

The incorporation of the above land drainage and flood protection and mitigation measures will result in the safe management of flood risk for the proposed leisure development.

This letter, together with a copy of the topographical survey plan of the site and its immediate surrounds, should accompany any subsequent planning application for this leisure development proposal.

Yours sincerely

C M Dartnell