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Technical Note

Project:	Albion Gateway Development, Burton upon Trent, Staffordshire	**To:**	St Modwen Developments Limited
Subject:	Flood Risk Assessment, Sequential and Exception Test Review	**From:**	Atkins Limited
Date:	February 2017	**cc:**	

1. Introduction

1.1. General

This technical note relates to, and supports, the current detailed planning submission relevant to Phase 3 at Albion Gateway, Burton upon Trent. Atkins Limited (Atkins) has been commissioned by St Modwen Developments Limited (St Modwen) to undertake a review of, and respond to, specific comments raised pre-application registration, with particular regard to sequential and exception testing for the development.

2. Flood Risk Assessment

2.1. General

The original outline planning permission for the development site as a whole (East Staffordshire Borough Council Application Reference P/2011/01130/JN/PO) includes the following condition (Condition 25):

> 25. *The development hereby approved shall only be carried out in accordance with the recommendations set out in Section 8.3 of the approved Flood Risk Assessment (prepared by Halcrow and dated 1st August 2011).*
>
> *Reason: As recommended by the Environment Agency to minimise the risk of flooding in accordance with the National Planning Policy Framework (in particular Section 10).*

Extensive works have been carried out for the site to ensure the development progresses in accordance with the approved FRA[1], including but not limited to: a Technical Note[2] addressing the conditions for finished floor levels; as above, a Technical Note[3] addressing the discharge rates for Phase 1 and 2; and additional supporting strategy documents and drawings. The strategy for Phase 3 will be to design in accordance with the approved FRA whilst continuing to incorporate the principles agreed through the additional work done to date.

2.2. Sequential and Exception Testing

In discussion with the Authority, Atkins has been made aware that a query was raised with regards sequential and exception testing. In particular the query was raised with regards the requirements of the NPPF for the Flood Risk Assessment needing to be accompanied by a Sequential Test and an Exception Test agreed by the Local Planning Authority prior to the submission.

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[1] Flood Risk Assessment, Document: PI/EPRB/21 Version 1.0, Pirelli Factory, Burton upon Trent. Report produced by Halcrow 01/08/11

[2] Technical Note – Proposal to amend Planning Condition 25, Albion Gateway. Report produced by Atkins 11/05/15.

[3] Technical Note - Pirelli Site Redevelopment: Albion Gateway Mixed-use Development, Drainage Discharge Rates: Phases 1 and 2. Report produced by Atkins 03/03/15.

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It is acknowledged that the sequential test is required to enable the Environment Agency to make a considered judgement of the proposal, taking into account sequentially preferable sites in terms of Flood Risk. The exception test is required to prove that the site is sustainable and the location is suitable for the type of development.

A sequential test had been carried out at the Local Authority Level when the original FRA was undertaken. It was demonstrated at that time that there were no less vulnerable sites available within the conurbation area of Burton upon Trent to accommodate this size and type of development proposed. A site specific sequential test was also undertaken at that time to inform the masterplan in directing the 'more vulnerable' development towards areas of lower flood risk and with a lower degree of flood hazard, delivering further reductions in flood risk through avoidance.

There has been no change in condition since the original FRA and sequential/exception tests were carried out and approved in 2011 with regards alternative sites. As a consequence further testing and reporting is not considered necessary.

For ease of reference relevant extracts of the Halcrow FRA that address the previous approach and review with regards sequential and exception testing are appended to this technical note.

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Extracts from the approved Halcrow FRA

Flood Risk Assessment

Pirelli Factory, Burton upon Trent

St Modwen Developments Ltd

1st August 2011

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6.2.8 Stretton Brook

The Stretton Brook has not been represented within the 2D River Trent Model and therefore a Flood Hazard Analysis of this watercourse has not been undertaken. There are no records of the Stretton Brook flooding within the Pirelli Site or along Beech Avenue. This watercourse drains a relatively small catchment area of 0.8km. As such it is considered that there is minimal flood risk to the site from the Stretton Brook as the siphon upstream, which conveys the Stretton Brook under the canal before entering the site, acts as a restriction to the flow rate passing through the site.

Part of the Pirelli Site does discharge surface water runoff to the Stretton Brook, potentially augmenting flows in the Brook. However these discharge rates will also be at a controlled rate due to pipe full capacities and if there has been no evidence of historic flooding at the site then this demonstrates that contributing flows are not sufficient enough to cause the Stretton Brook to flood. There is a residual risk of flooding however to the Pirelli Site, where the Stretton Brook goes into culvert approximately 320m downstream under Beech Lane. The culvert could potentially become blocked with debris, tree branches, rubbish etc and cause the Brook to back up along Beech Lane and flood the site. To mitigate this residual risk however the entrance to the culvert, which is located within the proposed residential development, will be maintained and kept clear.

6.3 The Sequential Approach

The Sequential Approach is a simple decision-making tool designed to ensure that areas at little or no risk of flooding are developed in preference to areas at higher risk. PPS25 (paragraphs 14-15) sets out the Sequential Approach.

The aim of the Sequential Approach should be to direct all new development to Flood Zone 1 and away from locations affected by other sources of flooding. Opportunities to locate new developments in reasonably available areas of little or no flood risk should be explored, prior to any decision to locate them in areas of higher risk.

6.4 The Sequential Test

The Sequential Test is a key component of the hierarchical approach to avoiding and managing flood risk. It is a decision making tool designed to ensure that sites at little or no risk of flooding are developed in preference to areas at higher risk. The Sequential Test can be applied at a number of levels – from Local Authority Planning decisions to site specific flood risk assessments:

- Local Authority Level – the Sequential Test will assist in the defining of development zones, seeking to locate all new development to Flood Zone 1. If a development zone was selected that was in a higher flood risk zone, there would be a requirement to demonstrate that there are no less vulnerable sites available to accommodate the development, and that the development provides wider sustainability benefits which outweigh the risk from flooding (the Exception Test).
- Site Specific – A Sequential approach should also be applied on a site specific basis, providing a tool to ensure the correct placement of development. Consideration of flood risk at the earliest opportunity in the master-planning process will enable the location, layout and design of the development to deliver maximum reductions in flood risk.

6.5 Proposed Pirelli Site Sequential Test & Exception Test

PPS25 requires that development sites within Flood Zones 2 and 3 must demonstrate that there are no sequentially preferable sites. Therefore as part of the sequential test three alternative sites have been identified and are considered in Table 2.1. These are comparable in size to the proposed residential development and have been identified from the SFRA Level 2 Report and the Strategic Housing Land Availability Assessment (SHLAA) May 2010.

Table 2.1: PPS25 Sequential Test – Assessing Alternative Development Sites

Site Location & ID	Current Status	Size (ha)	Flood Zones	Comments
Barton Green, Barton under Needwood (H1 - SFRA Level 2)	Previously undeveloped greenfield – village perimeter	5.2	None	Discounted as it is a greenfield site – St Modwen specialise in brownfield development.
Harehedge Lane, Burton upon Trent (H46 – SFRA Level 2)	Previously undeveloped greenfield – town perimeter	6.2	None	Discounted as it is a greenfield site – St Modwen specialise in brownfield development.
Henhurst Ridge, Burton upon Trent (79 – SHLAA)	Previously undeveloped greenfield – rural location 2km west of Burton	5.7	None	Discounted as it was not located within the conurbation of Burton

The proposed Pirelli Site has come forward for development and having reviewed the site against other sites in Flood Zone 1, as identified by the Local Authority, it has been determined by the applicant that there are no alternative sites appropriate for a development of this scale and type.

7 Managing Residual Flood Risk

As advised by the PPS 25 Practice Guide, risk management by design should only be considered after the sequential approach has been applied to development proposals. It has been demonstrated through the sequential test that there are no suitable alternative development sites of similar size and land use in lower flood risk areas to locate the mixed use development. It should be remembered however that the Pirelli Site is defended from flood events up to a 1 in 200 year event and that should the defences should ever fail, the site would still not flood. Therefore the flood risk to the site emanates from the Horninglow Channel, the Stretton Brook and if a flood event was of sufficient magnitude to overtop the flood defences.

The following section therefore sets out the design solutions to be considered to exceptionally allow the development to proceed in flood risk areas resulting from overtopping of the defences and flooding from the ordinary watercourses. As such the flood outlines predicted by the SFRA Level 2 have been used to inform the site layout.

The proposed design solutions meet the policy objectives set out in PPS25 (paragraph 5) and those recommended by the EA (as part of the consultation process) which ensure the development and the public will remain safe without increasing flood risk elsewhere and where possible reduce flood risk overall.

7.1 Site Layout

Where the sequential test shows that there are no suitable available alternative sites in lower flood risk areas, the sequential test should be applied within the development site to locate the most vulnerable elements of a development in the lowest risk areas. Therefore a sequential test has been carried out in detail at site level to inform the masterplan. As part of this process more vulnerable development has been steered towards areas of the site with a lower probability of flooding i.e. Flood Zone 2. As such there is no 'more vulnerable' development located within Flood Zone 3 (which also accounts for climate change. The development has been determined to pass the sequential test and therefore "development is appropriate". The detailed sequential test can be reviewed in Appendix D.

Areas of the Beech Avenue development affected by the 1% AEP (1 in 100 year) plus climate change event will be left as open space, thereby ensuring that surface water and flood flow routes are not obstructed.

The location of the more vulnerable development proposed as part of the Derby Road site i.e. the hotel, restaurants and drinking establishments will also be sequentially appraised, and directed towards higher ground and areas of lower flood risk, Flood Zone 2.

7.2 Modification of Ground Levels & Finished Floor Levels

Risk to the development may be reduced by raising land above the level of flood risk. The EA have requested that finished floor levels are set 600mm above the breach reservoir floor level of 45.51mAOD. This would involve the finished floor levels to the commercial and residential development being set at a recommended minimum of 46.11mAOD.

The raising of land within the retained Pirelli Factory area will not be viable as this will remain as existing. Raising of land could potentially be carried out within the commercial and residential developments as the EA have advised that floodplain compensation would

The SFRA Level 2 study also determined the onset and speed of inundation of flood water reaching the Pirelli Site should the defences be overtopped. The analysis showed that the site was not at risk of rapid inundation with the minimum time of flood water to reach the site being approximately 31 hours providing sufficient time for evacuation.

This flooding analysis has also taken in to account the flood flows emanating from the Horninglow Channel as this was incorporated in to the 2D model and therefore the flood risk posed by the Horninglow Channel to the Pirelli Site has been fully accounted for. The Stretton Brook however has not been modelled as it is considered not to pose a flood risk to the site. The Stretton Brook drains a nominal sized catchment upstream of the site and flows into the site are restricted by a siphon. The only flood risk to the site from the Stretton Brook therefore is if the culvert along Beech Avenue which the Brook flows into as it leaves the site becomes blocked. This risk can be managed however through maintenance.

8.2 Sequential Test

A sequential test has been carried out at the Local Authority Level which has allocated the Pirelli Site for development. It has been demonstrated that there are no less vulnerable sites available within the conurbation area of Burton upon Trent to accommodate this size and type of development. A site specific sequential test has also been undertaken to inform the masterplan in directing the 'more vulnerable' development towards areas of lower flood risk and lower degree of flood hazard, thereby delivering maximum reductions in flood risk through avoidance.

8.3 Recommendations

To provide additional safety to the development and to ensure any residual flood risk is mitigated for, it is recommended that the following measures are incorporated into the design, build and operation of the Pirelli development:

1) Finished floor levels are set at 46.11mAOD to the new development.

2) That a safe route of access and egress is provided for all three areas of the development;

3) That residents, hotel owners, pub landlords, company office managers and the Pirelli Site manager are aware of the flood risks to the site, the flood warning service available and the emergency evacuation plan and advise on what to do on the receipt of a severe flood warning;

4) Flood resilient design and construction techniques be adopted during the detailed building design as set out in guidance provided in "Improving the Flood Performance of New Buildings: Flood Resilient Construction" (DCLG, 2007);

5) Surface water runoff from the site is disposed of in a sustainable manner through the use of SuDS as recommended by PPS 25. A betterment of 30 % is also applied to the rate at which surface water runoff is discharged from the site to fully account for the affects of climate change.

The implementation of these recommendations should ensure that any residual flood risk to the development is mitigated for and the development remains safe.