Flood Risk Assessment

Lidl, Blue Boar Lane
Sprowston, Norwich

Lidl UK GmbH

June 2016

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Document Revision Control

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EXECUTIVE SUMMARY

The proposed development requires a Flood Risk Assessment to be undertaken in accordance with PPS 25 of the National Planning Policy Framework. This is detailed in Section 2. The scheme passes all of the required sequential and exception tests required by PPS 25.

The proposed development is a low vulnerability development in Flood Zone 1 and is at low risk of flooding from rivers, seas, surface water and groundwater sources. This is detailed in Section 3.

The proposed development is located on greenfield land and is located just outside of a groundwater protection zone however, the areas downstream are in this zone and measures are included within the Drainage Strategy to mitigate the impact of the proposed development.

The proposed development has an existing surface water sewer crossing the site which is proposed to be diverted within the land boundary.

The Drainage Strategy in Section 5 and in provides options for the drainage of the proposed development in accordance with the National and Local discharge hierarchy and restricting the development from causing an impact downstream of the site or in the adjacent area. SCP recommend that the site discharge to the Anglian Water surface water sewer, but that post planning, further to site testing, a system using infiltration may be possible, reducing the amount of attenuation required on site.
1.0 THE DEVELOPMENT AND NATIONAL PLANNING POLICY GUIDANCE

Introduction

1.1 This flood risk assessment has been prepared in accordance with National Planning Policy Framework, 2012 and Planning Policy Statement 25 Practice Guide. (The National Planning Policy Framework, 2012). Under this guidance, a Flood Risk Assessment is required as the development has more than 1,000m² of floor space (PPS25, December 2009, Paragraph 2.46). The application of this policy is detailed in Section 2. This site is shown in Figure 1 below.

Figure 1 - Proposed Development Plan.
Site Location

1.2 The location of the development site is adjacent to Blue Boar Lane, Sprowston and is centred on Ordnance Survey reference TG 255 122. The post code of the site is NR7 8UD and it is located at 52.661626 Latitude, 1.334626 Longitude. The location of this site is shown in Figure 2. The proposed development is to be built on greenfield land in Sprowston, to the North East of Norwich. The proposed site plan is shown in Figure 1 and Figure 2 and is provided in Appendix A.

![Proposed Development, Blue Boar Lane, Sprowston](image)

Figure 2 - Location Plan

1.3 The existing area of undeveloped land within the proposed development site boundary is 0.77 hectares. The existing site has no positive drainage system except for an existing Anglian Water surface water sewer crossing the site as shown in Figure 6.

1.4 To the north west of the proposed development there is a drain shown in Figure 1 and Figure 2, which is the responsibility of the Lead Local Flood Authority and the Riverside Broads Internal Drainage Board which is culverted under Blue Boar Lane.

1.5 Downstream of the site the area is predominantly agricultural with few residential properties. The drain passes through an adjacent golf course, which can be seen in Figure 2. It then drains to the North of the site, away from Norwich and drains into Dobbs Beck to the North East which lies in the River Bure catchment.
1.6 Upstream of the site, the drain is mostly culverted as it drains the suburban areas around Sprowston.

**Site Layout and Levels**

1.7 The proposed development in Figure 1 consists of approximately 2000m² of floor space 120 space car park to the south of the store which is approximately 4800m². This equated to an impermeable area of 6769m² (0.68 Hectares), with a permeable area of 916m² (0.09 hectares) for landscaping.

1.8 The site is currently situated 29m above sea level and falls towards the drain to the west. The proposed finished floor level is to be confirmed, but is expected to be above the level of the existing field and adjacent road.

1.9 The proposed development includes a car parking and access area which accounts for circa 4,000m² of the impermeable area. Of this area, approximately 2,600m² of this is proposed to be permeable paving which will be restricted to the non-HGV and service areas.

**Flood Maps**

1.10 The Environment Agency Flood Map for Planning shows this location to be within Zone 1 in Figure 4 (low risk). These flood maps are provided in Section 3.0 (Flood map for planning, 2016).
2.0 LOCAL AND NATIONAL PLANNING POLICY GUIDANCE

National Planning Policy Framework


NPPF – Sequential Test

2.2 A sequential test is applied to the allocation of land suitable for development. The test is required for any development proposed in Flood Zone 2 and 3. Occasionally applied to Zone 1 when there are flood risks not identified by the Environmental Agency’s flood maps for planning.

2.3 The guidance is detailed on the UK government portal here: https://www.gov.uk/guidance/flood-risk-assessment-the-sequential-test-for-applicants.

2.4 Table D.2 in Annex D of PPS 25 states that retail developments are “less vulnerable” to flooding.

2.5 Table D.3 in Annex D of PPS25 states that less vulnerable sites are compatible with being located in Flood Zones 1, 2, and 3a.

2.6 As the proposed development is compatible with Flood Zone 1 and is a suitable development for this area as per Table D.3, this site therefore passes the sequential test.

NPPF – Exception Test

2.7 Following the application of a sequential test, if it is not deemed possible to relocate the development to a location with lower flood risk, an Exception Test can be applied where appropriate.

2.8 In reference of the Flood risk and Coastal Change Guidance for NPPG, (Flood Risk and Coastal Change Guidance for NPPG 2012, 2016); in Tables 2 and 3 it states that as this site is Zone 1 for flood risk, it is not necessary to perform an Exception Test.
Norfolk County Council Strategic Flood Risk Assessment

2.9 The lead flood authority for the area is Norfolk County Council. A Partnership of Norfolk District Councils have prepared a Strategic Flood Risk Assessment (SFRA) which was first issued in 2008.

2.10 This SFRA covers the administrative planning areas of North Norfolk District Council, Broadland District Council, Norwich City Council, South Norfolk Council and the Broads Authority.

2.11 The SFRA is based on the guidelines in the NPPF and maintains the same definitions for the development site as detailed above.

2.12 This document does not state that the proposed development or neighbouring developments are at risk of flooding.

Norfolk County Council Local Flood Risk Management Strategy

2.13 This document was drafted by Norfolk County Council and its partners following the Flood and Water Management Act 2010. This document identifies that the proposed development is within the catchment area of the River Bure and Dobbs Beck and provides planning guidelines regarding the management of flooding risk in the County Council area.

2.14 Of note is Policy UC11 which requires the adaptation of SUDS in new developments, prioritising infiltration drainage over outfalls into water courses and sewers which is in accordance with the Flood and Water Management Act 2010. This guidance has been used to define the development of the Drainage Strategy in Section 5.

2.15 This document can be found here: https://norfolk.citizenspace.com/consultation/draft-local-flood-risk-management-strategy/supporting_documents/01_Norfolk_LFRMS_v12.3_Draft.pdf

2.16 This document does not state that the proposed development or neighbouring developments are at risk of flooding.

Norfolk County Council Local Lead Flood Authority Consultation

2.17 SCP requested pre-application consultation with Norfolk County Council and in a letter received 27th July 2016, Reference FWP/16/5/3056,Norfolk County Council confirmed that pre-application advice isn’t available and to follow the statutory and non-statutory guidelines above.
2.18 The Broadland Rivers Partnership is a steering group involving all of the strategic authorities and partners responsible for the management and maintenance of the waterways in the Norfolk Broads. This partnership have published a Catchment Management Plan which identifies key measures and policies to be enacted by the flood management authorities within the partnership to reduce flood risk. This document similarly prioritises the use of SUDS as a key measure for new developments which the proposed development will need to comply with.


**Climate Change**

2.21 In the National Planning Policy Framework, PPS25 Annex C, it states we must take into consideration possible climate change projections for future years. As Lidl stores are not being designed to last more than 30 years, the Total potential change anticipated should be for 2050’s which years predicted include 2040 to 2065. The Environment Agency’s report Adapting to Climate Change “Advice for Flood and Coastal Erosion Risk Management Authorities” states in Table 4 - ‘Change to extreme rainfall intensity compared to a 1961-90 baseline’ recommends up to **20% increase of peak rainfall** be considered in designs up until 2065.
3.0 FLOOD RISK ASSESSMENT

Flooding from Rivers and Seas

3.1 The nearest river to the proposed development is the River Yare which is 3 miles away from the site. With reference to the Environment Agency’s flood map in the figures below, we can see there is no flood risk from this river or any rivers and seas.

![Map of flood risk areas](image)

*Figure 3 - Environment Agency - Flooding from Rivers and Sea*

Surface Water

3.2 Environmental Agency Flood Maps for planning in Figure 4 shows no flood risk to the proposed development from surface water.

3.3 The small drain which runs to the north of the site which is shown as being a high risk of flood within its extents. This water course to the north does not impact the proposed development as the proposed development is at a higher level than the water course and is outside of the 1 in 100 flood risk area shown in Figure 4.

3.4 From Google Earth the roundabout to the south is 29m above sea level and the ditch is 27m. Although no official levels have been provided at the present time, although it should be considered that the site is only at risk of ponding and the proposed levels of the store and the car park will be equal to or higher than the existing; therefore there is a low risk of flooding from the public highway or the drain.
Figure 4 - Environment Agency - Risk of Flooding from Surface Water

Figure 5 - Environment Agency - Flood Map for Planning
Groundwater Flooding

3.5 Groundwater flooding occurs in areas where there is a high water table and where abnormal springs are formed following saturation of the underlying ground.

3.6 As the proposed development site is higher than the adjacent drain, and there is no history of flooding at this location with no visible evidence of springs or other sub-surface drainage features, the risk of groundwater flooding is low.

Flood Risk Assessment - Summary

3.7 As the site is Flood Zone 1, the existing site is unlikely to flood from rivers, seas, groundwater or surface water sources.

3.8 Any residual flood risks will be managed by the developer of the site.
4.0 FLOODING MITIGATION

4.1 The proposed development is at a low risk of flooding with the main residual risk being from the flooding of the surface water drainage system proposed for the site.

4.2 In accordance with the SFRA and local planning policy, the site will need a SUDS system to reduce the runoff of the site to greenfield runoff rates, reducing the impact of flooding downstream.

Existing Development Run-Off

4.3 The proposed developable area is 100% permeable as it is undeveloped greenfield land.

4.4 The existing development drains into the drain to the north west with an greenfield permeable area of 0.77 hectares.

4.5 The greenfield runoff has been calculated using the FEH method using the HR Wallingford Sustainable Drainage Tool - http://www.uksuds.com/greenfieldrunoff_js.htm, and using a BFIHOST value of 0.861 which indicates that the site is permeable. This value has been used in adjacent planning applications and is sourced from the Catchment Descriptor data from the FEH Suite.

4.6 The existing site runoff is 1.38 l/s during a 1 in 100 year event. This calculation is provided in Appendix C.

Proposed Development Run-off

4.7 The proposed development is 88% impermeable with an area of 0.68 hectares which is impermeable and will be positively drained with an additional 0.09 hectares which is permeable landscaping.

4.8 If the site was to discharge without any form of SUDS the runoff would be 94.93 l/s. This calculation is provided in Appendix C and is based on the areas above.

4.9 Standard 4 of the Flood and Water Management Act 2010 states that the peak flow from the development must not exceed the peak greenfield runoff rate for the same event.

4.10 The greenfield runoff for this site is as per the Existing Run-off detailed earlier in this report. However, a minimum discharge rate of 5 l/s has been assumed to allow the outfall from the proposed development to be controlled via a flow control apparatus.

4.11 These options for the site are developed further in the Drainage Strategy in Section 5.0.
5.0 DRAINAGE STRATEGY

5.1 A drainage strategy is a document and plans which demonstrate how a proposed development are to drain surface and foul water.

Runoff Drainage Hierarchy

5.2 The method of drainage of surface water from is bound by the Flood and Water Management Act 2010.

5.3 Schedule 3 Paragraph 5 of the Flood and Water Management Act 2010 states that the following hierarchy is to be applied to surface water runoff in the following order or priority:

- Discharge into the ground (infiltration);
- Discharge to a surface water body (lake, river, drain);
- Discharge to a surface water sewer, highway drain or another drainage system; or
- Discharge into a combined sewer.

Permeable Pavement

5.4 In all Drainage Strategies, the site will be utilising a permeable pavement in accordance with BS EN 7533-13 to collect and store water from the internal drainage system. The method of outfall from the permeable pavement is assumed, based on no underlying infiltration data being available, on a Type C system which is a sealed attenuated system.

5.5 Based on an area of 2,600 m² for the permeable pavement system, and a Category E loading, the proposed buildup of the system is as follows:

- 80/50mm Block and Laying Course
- 200mm Hydraulically Bound Coarse Graded Aggregate (min 30% void ratio, 3% cement by mass – 20,000mm/hr permeability)
- 150mm Coarse Graded Aggregate (min 30% void ratio)
- Impermeable Membrane
- 150mm Class 6F2 Capping Layer

5.6 This system would naturally provide up to 270 m³ of attenuation in the coarse graded aggregate layers across the proposed development.
**Diversion of Anglian Water Sewer**

5.7 To accommodate the development, the existing surface water sewer across the site will need to be diverted to avoid the impact from the proposed store footprint. This diversion will be required in all options and will need to be accommodated within the development land with a 5m easement between the centreline of the pipe and the building foundations.

5.8 The proposed development will require the construction of a new surface water drainage system which will discharge into the watercourse to the north west, on the understanding that an easement will be agreed across the land between the development and the water course. This will need to be agreed with the Lead Local Flood Authority for this section of the drainage ditch.

5.9 At the entrance to the car park there is an adopted 1200mm surface water sewer which crosses the site. Manhole 6351 which enters through the access and leads to another Manhole 6350. MH6350 lies directly beneath the middle of the floor plan of the store. To accommodate the development of the site this adopted surface water sewer will need to be diverted.

5.10 The existing sewerage network in the area of the development is shown in Figure 6.

5.11 The Anglian Water maps are provided in Appendix B and Figure 6.
Discharge Options

5.12 In accordance with the hierarchy of discharge, the development site has the following options:

- Option 1 – Discharge Surface Water via Infiltration
- Option 2 – Discharge Surface Water via the Drain
- Option 3 – Discharge Surface Water via the Anglian Water Surface Water Sewer
Option 1 – Discharge Surface Water via Infiltration

5.13 Option 1 is a drainage system which utilises infiltration drainage combined with attenuation to outfall surface water in the site. This option is available if the underlying soils are found to have sufficient permeability to enable the site to use infiltration drainage. Based on the BGS data in Appendix E and the Soil Types, there is a high likelihood that the underlying geology of the site is permeable.

5.14 Due to no investigations having been undertaken at this stage of the development, information regarding the capacity of the underlying geology to accommodate water percolation is not available. For the basis of this Flood Risk Assessment, this option has been discounted due to a lack of information. Details of this option are in Appendix E and SCP recommends that further investigation post-planning is undertaken to identify whether the site is suitable for an infiltration drainage scheme.

5.15 If the site is suitable for drainage, then an alternative design from SK01 in Appendix E may be available to further reduce the attenuation required due to the permeable pavement being able to accommodate infiltration through its construction.

Option 2 - Discharge Surface Water via the Drain

5.16 This option is understood to not be available to the development due to the land between the development and the drain being not a part of this planning application and assumed to be under the control of a third party as shown in Figure 7 below. On this basis and to avoid third party issues, this drainage strategy has assumed that this option is not available to the development, and is prioritising the discharge of the surface water into the Anglian Water surface water sewer over the existing watercourse.
Figure 7 - Location Plan showing potential 3rd Party Land

Proposed Drainage Strategy - Option 3 – Discharge Surface Water via the Anglian Water Surface Water Sewer

5.17 Option 3 is a drainage system which utilises attenuation and outfalls all captured surface water into the Anglian Water sewer.

5.18 Based on this option, which is shown in SK02 in Appendix D, the attenuation required is 463m$^3$ with an outfall of 5 l/s based on greenfield run-off into the public sewer as per calculations shown in Appendix D.

5.19 The permeable pavement provides 270m$^3$ of storage which means that a minimum of 190m$^3$ of storage needs to be provided on the outfall of the system to accommodate the building and car park surface water discharge.

5.20 To protect this water source, the proposed development will need to treat all surface water to ensure that pollutants washed from the site are controlled using a three part treatment system
which would include the permeable pavement, gullies and linear drains, catchpits and an interceptor.

5.21 Due to the need to separate the site, a second interceptor may be required from the store drainage and the loading area.

5.22 Due to the uncertainty of Option 1, and the 3rd party land conflict of Option 2, Option 3 is therefore the proposed method of drainage for this development.

Foul Water Discharge

5.23 The foul water for the development will be discharged via the existing foul water sewer located in Blue Boar lane which runs adjacent to the development.

5.24 Based on the Discharge Unit calculation from BS EN 752 Part 4: 1998, the proposed foul discharge for this scheme is **0.87 l/s** under normal conditions, with a peak flow of **5.2 l/s**. This calculation is detailed in Figure 8 below.

5.25 To accommodate this flow, a new 150mm diameter connection onto the existing foul water drain on Blue Boar Lane will need to be applied for with Anglian Water.
### BS EN 752 Part 4: 1990

**Annex C - Calculation of Wastewater Flows by Discharge Units**

- **Client**: Lidl
- **Site**: Sprowston
- **Date**: 5-Jul-16
- **Job No**
- **Sub No**

#### Prepared by: SR

- **Frequency Factors** ($k_{DU}$)
  - Hospital, School, Restaurant, Hotel (frequent use)
  - $k_{DU} = 0.7$

#### Discharge Units ($DU$)

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**Sum $DU = 55.2$**

- **$Q = 5.20$ l/s @ 6DWF**
- **$0.87$ l/s**

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*Figure 8 - Foul Water Discharge Units*