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Site Location: Aldi Stores, Winsover Road, Spalding

Proposed Development: Extension to the existing store and extension to the car park

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1. Summary

- 1.1 Ambiental Technical Solutions Limited has been appointed by STOAS Architects to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the extension of the existing site at Aldi Stores, Winsover Road, Spalding, PE11 2XY. The site is located approximately 480m to the northwest of the River Welland, an EA main River.
- 1.2 The current application is to extend the existing supermarket from a GEA of 1,204m² to 1,472m² and to extend the existing car park area by demolishing 3 properties acquired by the developer. With reference to the NPPF and the Environment Agency (EA) standing advice on development and flood risk, as well as the low detail, national-scale flood mapping created on behalf of the EA, the proposed store extension is located within Flood Zones 3 (High Risk >1% chance of annual tidal/fluvial flooding) and is considered to be a “Less Vulnerable” development under the NPPF. The car park extension is also located in Flood Zone 3 (High Risk >1%) according to the EA Flood Map for Planning. It can be argued that the car park is a “water compatible” use.
- 1.3 The proposed development will result in Aldi acquiring and demolishing 3 existing properties located adjacent to the store (43, 45 and 49). The combined GEA of the existing store and 3 units is 1,442m², and as such the proposed extension to the existing store will result in a net GEA increase on site of only 30m². The proposed development of the site could therefore be classified as a minor development.
- 1.4 Comparison of the EA modelled in-channel 1 in 100 year with allowance for climate change flood level (4.67mAOD) against the existing topographic levels on site, demonstrates a maximum flood depth of between 0.06m – 1.48m should the site be affected by the full in-channel flood level. Analysis of 2m LiDAR has shown, however, that at this location the top of bank level is approximately 5.58mAOD and, as such, flood waters are likely to remain within channel during this flood event.
- 1.5 No records have been provided by the South Holland District Council SFRA (2010) or the EA to indicate that the site or surround area has previously flooded.
- 1.6 As such and given that:
 - the proposed development is for two extensions to the existing site (store and car park);
 - the Sequential Test: Flood Risk Vulnerability and Flood Zone ‘Compatibility’ Table as specified by the NPPF demonstrates that the development is appropriate and should be permitted;
 - the proposed extension is to facilitate additional car parking and increase the size of the store;
 - the proposed development shall result in a total increase in GEA of only 30m², and can be classified as a minor development;
 - analysis has shown that flood waters up to the 1:1000 year with 20% climate change allowance would likely remain in channel in this area; and,
 - it is recommended that the site owner(s) signs up to the EA Flood Warning Service to provide a betterment to the site, if they have not done so already,

following the guidelines contained within the NPPF, the proposed development type is considered to be suitable assuming appropriate mitigation (including adequate warning and evacuation procedures) can be maintained for its lifetime.

Development Description	Existing	Proposed
Development Type:	Aldi Supermarket	Extension to existing store and car park area
(Number of Bedrooms):	None	No Change
EA Vulnerability Classification:	Less Vulnerable and Water Compatible	No Change
Ground Level:	External ground level across site between 3.19mAOD – 4.61mAOD	No change
Level of Sleeping Accommodation:	N/A ¹	N/A ¹
Impermeable Surface Area:	N/A ²	No change
Surface Water Drainage:	N/A ²	To existing site drainage
Site Size:	Approx. 4,635m ²	No change
Risk to Development	Summary	Comment
EA Flood Zone:	Flood Zone 3	No change
Flood Source:	Fluvial	River Welland
1 in 100yr flood level:	4.43mAOD	EA data – Welland Catchment Model (2007) Node 2190
1 in 100yr flood Level + Climate Change:	4.67mAOD	
Recorded Flood Events in Area:	No	
Recorded Flood Events at Site:	No	No recorded incidents provided by EA or SFRA
SFRA Available:	Yes	South Holland District Council SFRA, 2010
Management Measures	Summary	Comment
Ground floor level above extreme flood levels:	N/A ¹	Existing 'less vulnerable' supermarket extension
Safe Access/Egress Route:	N/A ¹	
Flood Resilient Design:	N/A ¹	
Site Drainage Plan:	N/A ²	
Flood Warning & Evacuation Plan:	Yes	Sign up to EA Flood Warning Service to provide betterment
OFFSITE IMPACTS	SUMMARY	COMMENT
Displacement of floodwater:	Negligible	30m ² GEA increase post development; classified as minor development
Increase in surface run-off generation:	None	Attenuate/discharge to existing site drainage
Impact on hydraulic performance of channels:	None	

Table 1: Summary of flood risks, impacts and proposed flood mitigation measures.

N/A¹ not required for this assessment; N/A² data not available.

2. Development Description and Site Area

Proposed Development and Location

- 2.1 The proposed development site is located at Aldi Stores, Winsover Road, Spalding, PE11 2XY (Figure 1).



Figure 1: Wider Location Map. The site area outlined in red (Source: OS).

- 2.2 The proposed development is for the extension of an Aldi Supermarket with regards to greater retail floor space and car park area in order to facilitate more car parking spaces (*see Appendix A for a detailed site plan*).
- 2.3 Space will be acquired for the extensions through the acquisition and demolition of 3 neighbouring properties; 43, 45 and 49. These structures are located within the current redline application boundary.
- 2.4 The extension of the store and car park shall be onto existing impermeable surfaces and, as such, does not increase the impermeable surface coverage on the site. The overall built footprint on the site pre development is 1,442m² (store and 3 units), post development there will be a slight increase in GEA on site to 1,472m². This is an increase of only 30m² and as such the development can be deemed to be a minor development.
- 2.5 Existing topographic levels for the site range between 3.19mAOD and 4.61mAOD (Source: STOAS Architects Ltd).

Vulnerability Classification

- 2.6 The site is located within Flood Zone 3 (*Figure 2*) and under the NPPF guidance, it can be argued that the car park is classified as 'Water Compatible' and the store is classified as 'Less Vulnerable'.

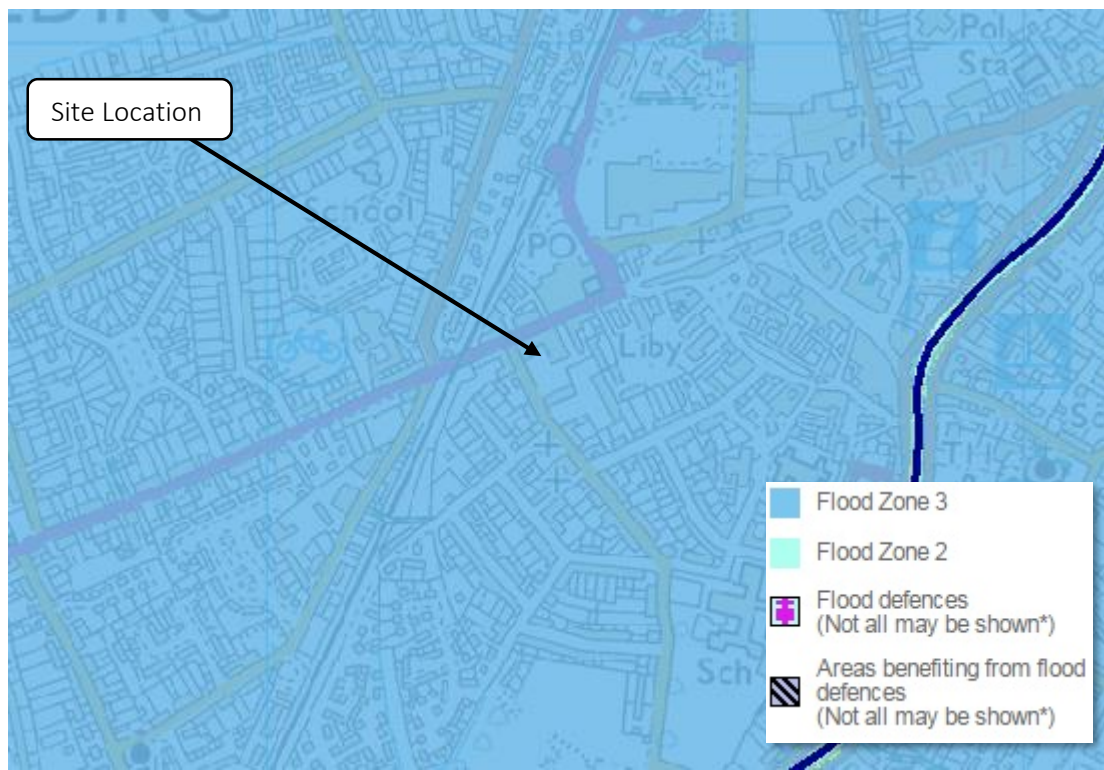


Figure 2: EA Flood Zone Map. (Source: EA online)

Geology

- 2.7 The site's bedrock geology has been identified by the British Geological Survey's public mapping model as the Oxford Clay Formation, formed of mudstone. The superficial geology is Tidal Flat Deposits formed of clay and silt (*Source: BGS*).

3. Sequential Test/Exception Test

- 3.1 Under the NPPF, all new planning applications must undergo a *Sequential Test*. This test must be implemented by local planning authorities with a view to locating particularly vulnerable new developments (e.g. residential, hospitals, mobile homes etc.) outside of the floodplain.
- 3.2 The test refers to the EA Flood Zones described in Table 5. For reference, the NPPF *Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility' Table* is reproduced below:

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
	Zone 3b <i>Functional Floodplain</i>	Exception Test Required	✓	✗	✗	✗

Table 2: The Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility' Table as specified by NPPF. Shaded cells denote the proposed re-development. Please note: ✓ means development is appropriate; ✗ means the development should not be permitted.

- 3.3 Using the principles of the Sequential Test outlined above, the proposed development is viewed as both 'Water Compatible' and 'Less Vulnerable'. The proposed site is located within Flood Zone 3 (Figure 2) and under the NPPF guidance, is deemed appropriate for the area and, as such, this development would not require the implementation of the Exception Test.
- 3.4 Due to the site's location within Flood Zone 3, the planning application submitted by STOAS Architects Limited is required to be accompanied by a FRA, which shows that the development can be achieved in a sustainable manner, with an overall reduction of flood risk to the site and surrounding area.

4. Site Flood Hazards

Sources of Flooding

- 4.1 As outlined in Figure 2, the proposed site is located within Flood Zone 3 (High risk of fluvial flooding), and the development is considered to be both a 'Water Compatible' car park and a 'Less Vulnerable' supermarket under the NPPF.
- 4.2 Communication with the Environment Agency (EA) has identified the following potential sources of flooding to the site:

Source	Description
Fluvial	River Welland
Surface	On Site
Groundwater	N/A
Sewer	N/A

Table 3: Summary of flood sources.

Mechanisms and History of Flooding

- 4.3 According to the low detail, national-scale flood mapping created on behalf of the EA, the probability of fluvial flooding at the site is greater than 1 in 100 annual probability of river flooding (>1%). Figure 2 outlines only the potential floodplain; and the mitigating effects of flood defences currently in place are not considered.
- 4.4 The EA have stated that whilst there are no formal defences protecting the site, the natural channel, which they maintain, provides protection against a flood event with a 1% chance of occurring in any given year.
- 4.5 A flood storage area is located some 1.5km upstream of the site's location, which may provide some level of protection in the event of fluvial flooding.

River (Fluvial)

- 4.6 The EA Flood Map for Planning (*Figure 2*) confirms that the site is located within Flood Zone 3, at high risk of flooding from fluvial sources.
- 4.7 The topographic levels across the site range between 3.19mAOD to 4.61mAOD (*Source: STOAS Architects Ltd*).

- 4.8 The nearest EA main river to the site is the River Welland, which is located approximately 480m southeast of the site.
- 4.9 No floodplain data has been provided by the EA, however, in channel nodes from the Welland Catchment Model (2007) have been provided. The EA have confirmed that this is the most up to date data available at this time, however, communication with the EA has identified that the Welland Strategic Flood Model of 2007 is currently being updated. The EA have confirmed that the updated model is due for release in summer 2016. No specific date has been provided.
- 4.10 The in-channel flood levels have shown a potential in-channel flood level of 4.43mAOD during the 1:100 year flood event, and 4.45mAOD during the 1:1000 year event. These flood levels would result in a flood depth on site between 0m – 1.24m during the 1:100 year event and between 0m – 1.49m during the 1:1000 year flood if water levels remained at the modelled maximum in-channel water levels.
- 4.11 The EA have stated that as these levels are in-channel levels, they may not represent the flood level on the floodplain, particularly where the channel is embanked or has raised defences. Given this, and the information provided in relation to the channel itself providing protection during a 1:100 year flood event, an approximate top of bank level was obtained using 2m LiDAR data.
- 4.12 A cross section using 2m LiDAR intersecting the in-channel node 2190 shows a topographic level of the top of bank closest to the site to be approximately 5.58mAOD (*Figure 3*). This would suggest that at this location, the 1:100 year and 1:1000 year flood levels would be insufficient to overtop the riverbank.

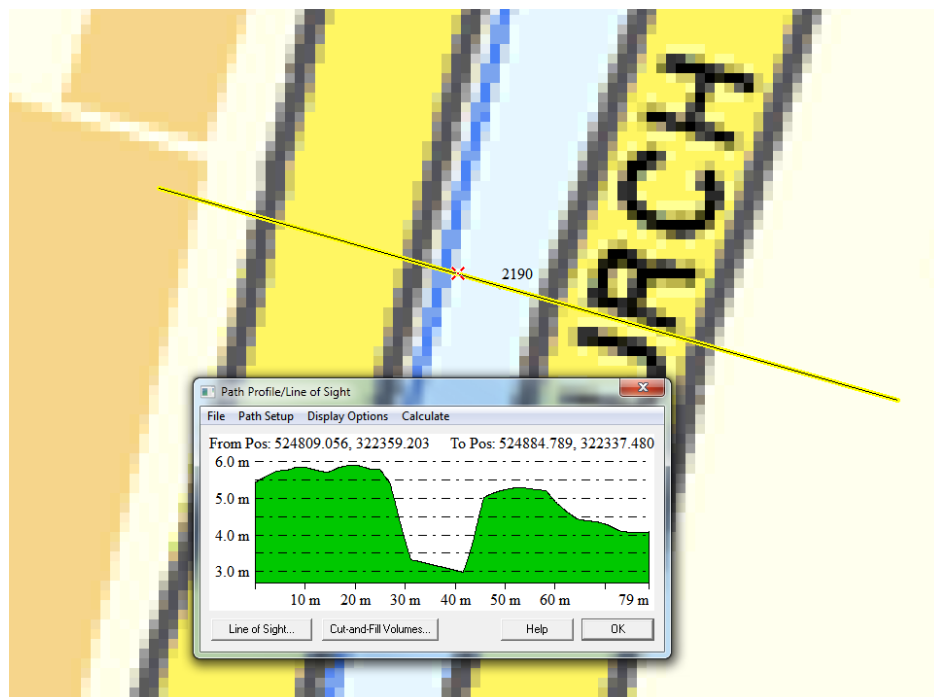


Figure 3: Topographic cross section showing bank profile (Source: OS and 2m LiDAR)

- 4.13 The EA have stated they have no records of the area having been affected by flooding in the past.
- 4.14 A review of the River Welland Catchment Flood Management Plan (2009) has confirmed that Spalding is situated in a low-lying fenlands in the lower reaches of the River Welland. The area

benefits from a flood storage area upstream of the site, and raised embankments through the town. The catchment flood management plan states that **there are no people and properties, agricultural land or critical infrastructure at risk in the 1% annual probability flood in this sub-area.**

- 4.15 The document further identifies the area of Spalding to be adopting of Policy 4.

Policy option 4: Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.

- 4.16 Historically, the flood defences have been constructed to reduce the probability of flooding. In the future, the protection given by these defences may decline as future flooding is forecast to become more intense. Flood risk is expected to increase. For Spalding, the preferred option is to take further action to sustain the current level of flood risk by raising the flood embankments through the town. Adopting and implementing this approach will reduce the risk of overtopping of the defences in the future.
- 4.17 The South Holland District Council Strategic Flood Risk Assessment, Jan 2010 update has produced actual peak depth maps for a number of flood events within the area. These maps have shown that during the 1:100 year (1%) and the 1:1000 year (0.1%) fluvial flood events, the site would be unaffected by any modelled flood waters.
- 4.18 Given that the top of bank appears to be of higher elevation than the modelled 1:100 year and 1:1000 year flood levels at this location, the EA have stated that whilst there are no formal defences, the natural channel is maintained and provides protection against a 1:100 year flood event. As there are no records of flooding having occurred within the area or on-site, and the SFRA shows the site to be unaffected by flood events in the area, the risk of flooding to the site from this source is deemed to be **relatively low**.

Surface Water (Pluvial)

- 4.19 The site has been identified by the EA Risk of Surface Water Map to be located predominantly in an area that is of “Very Low” risk of surface water flooding, with less than 0.1% chance of flooding from this source in any given year. A very small area of the site has been classified as being at “Medium” risk of surface water flooding, with between 1% - 3.3% chance of flooding in any given year (*Figure 4*).
- 4.20 The EA Surface Water Depth - High Chance of Occurring Map demonstrates that during this event the site would not experience depths greater than 300mm, with the majority of the site being unaffected by any measurable flood depths (*Figure 5*).
- 4.21 No records have been provided to suggest that the site has previously flooded from this source.

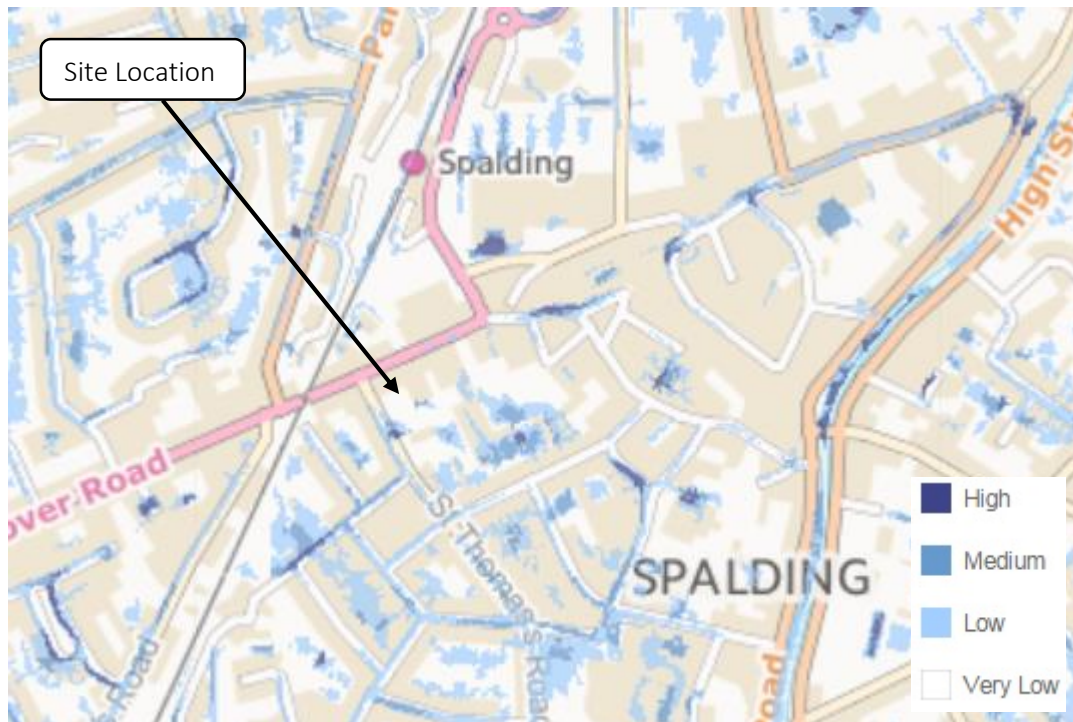


Figure 4: EA Surface Flood Risk Map. (Source: EA)

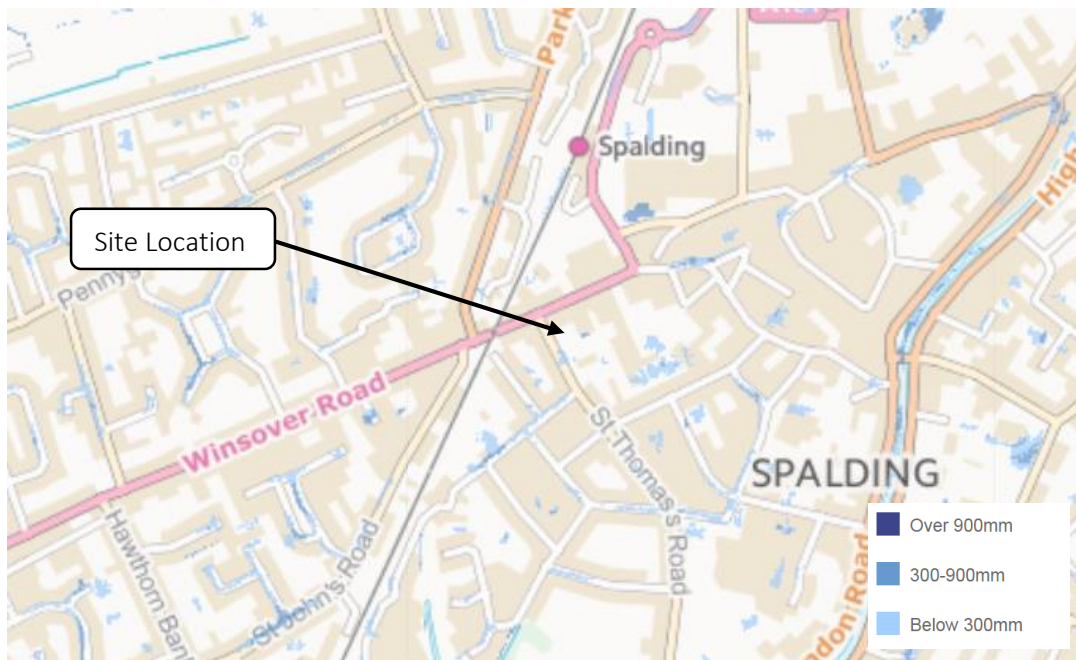


Figure 5: Surface Water Depth - High Chance of Occurring Map (Source: EA)

Groundwater

- 4.22 The EA has identified the site to be located outside of any groundwater source protection zones, and in an area with no groundwater vulnerability.
- 4.23 The BGS do not classify the superficial deposits as aquifers, nor the bedrock geology.
- 4.24 The EA and SFRA have provided no records of historical flooding at the site or in the local area. As such, taking into consideration the clay rich geology of the area, the risk to the site from this source of flooding is considered to be **relatively low**.

Sewer

- 4.25 No recorded incidents have been provided by the EA or SFRA regarding flooding from this mechanism. As such, the risk to the site from this source of flooding is considered to be **relatively low**.

Surface Water Drainage Strategy

- 4.26 The existing site is developed and is covered by impermeable surfaces, as such, any changes the development is likely to make have a negligible effect on surface water runoff on-site.
- 4.27 It is recommended that the developer seeks to incorporate a surface water drainage strategy to provide sustainable drainage to the site should it not already be available, to provide betterment over the existing site.

Records of Historical Flooding

- 4.28 The SFRA does not provide any information as to whether the site or surrounding area has been affected by flooding in the past. The EA has also not provided any information regarding flooding on-site or within the local area.

5. Probability of Flooding

5.1 According to the low detail, national-scale flood mapping created on behalf of the EA, the probability of fluvial flooding at the site is greater than 1 in 100 in any given year.

Zone	Description
1	Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
2	Medium Probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.
3a	High Probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
3b	The Functional Floodplain. This zone comprises land where water has to flow or be stored in times of flood. SFRA's should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the EA, including water conveyance routes).

Table 4: Definition of the NPPF Flood Zones. Shaded cells denote the proposed development. (Source: EA)

Climate Change on Site

5.2 Climate change is likely to increase the flow in rivers, raise sea levels and increase storm intensity. The range of allowances in Table 5 is based on percentiles. A percentile is a measure used in statistics to describe the proportion of possible scenarios that fall below an allowance level. The 50th percentile is the point at which half of the possible scenarios for peak flows fall below it and half fall above it.

The:

- central allowance is based on the 50th percentile
- higher central is based on the 70th percentile
- upper end is based on the 90th percentile

5.3 So, if the central allowance is 30%, scientific evidence suggests that it is just as likely that the increase in peak river flow will be more than 30% as less than 30%.

5.4 At the higher central allowance, 70% of the possible scenarios fall below this value. So, if the higher allowance is 40%, then current scientific evidence suggests that there is a 70% chance that peak flows will increase by less than this value, but there remains a 30% chance that peak flows will increase by more (Source: EA).

5.5 The risk of flooding to the site would therefore be expected to increase following the effects of climate change. The likely increases in peak rainfall intensity would also lead to an increased risk

of surface water flooding. The increase in river flows for the Anglian Basin have been provided below in Table 6.

Flood Zone	Essential Infrastructure	Highly Vulnerable	More vulnerable	Less Vulnerable	Water Compatible
2	Higher Central and Upper End	Higher Central and Upper End	Central and Higher Central	Central	None of the allowances
3a	Upper End	Development should not be permitted	Higher Central and Upper End	Central and Higher	Central
3b	Upper End	Development should not be permitted	Development should not be permitted	Development should not be permitted	Central

Table 5: Allowance and Flood Zone Table (Source EA)

River basin district	Allowance category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Anglian	Upper end	25%	35%	65%
	Higher central	15%	20%	35%
	Central	10%	15%	25%

Table 6: Peak river flow allowances by river basin district (Source: EA)

- 5.6 From the tables above, it can be determined that the less vulnerable aspect of the proposed development would need to take into account the central and higher central allowances for climate change. The water compatible aspect of the development would need to only take into account the central allowance for climate change.
- 5.7 Less vulnerable commercial premises have a lifespan of 60 years, given that this development is for the extension of an existing commercial premises with no change of land usage, it has been deemed that the use of the climate change allowances up to 2069 are appropriate.
- 5.8 As such, the maximum climate change allowance required to be used for this development is 20% (higher central for the 2050's).

- 5.9 The EA have provided in channel flood levels for the 1:100 year with 20% climate change allowance and the 1:1000 year with 20% climate change allowance. Given the analysis undertaken of the latest climate change allowances requirements, it can be determined that these are suitable for use within the flood risk assessment for this development to assess how climate change could affect the site.
- 5.10 The in-channel flood levels have shown a potential in-channel flood level of 4.67mAOD during the 1:100 year with climate change flood event, and 4.68mAOD during the 1:1000 year with climate change event. These flood levels would result in a flood depth on site between 0.06m – 1.48m during the 1:100 year with climate change event and between 0.07m – 1.49m during the 1:1000 year with climate change flood if water levels remained at the modelled maximum in channel water levels.
- 5.11 The EA have stated that as these levels are in-channel levels, they may not represent the flood level on the floodplain, particularly where the channel is embanked or has raised defences. Given this, and the information provided in relation to the channel itself providing protection during a 1:100 year flood event, an approximate top of bank level was obtained using 2m LiDAR data.
- 5.12 A cross section using 2m Lidar intersecting the in channel node 2190 shows a topographic level of the top of bank closest to the site to be approximately 5.58mAOD (*Figure 3*). This would suggest that at this location the 1:100 year with climate change and 1:1000 year with climate change flood levels would be insufficient to overtop the riverbank.
- 5.13 As such, the risk of flooding to the site from fluvial sources, whilst increased, is likely to be **relatively low to moderate**.
- 5.14 The risk of surface water flooding is, however, likely to increase within the lifetime of the development.

6. Residual Risks

- 6.1 Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions. Examples of residual flood risk include:
- the failure of flood management infrastructure, such as a breach of a raised flood defence, blockage of a surface water conveyance system, overtopping of an upstream storage area, or failure of a pumped drainage system;
 - failure of a reservoir, or;
 - a severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot cope with.
- 6.2 The site is located in an area that does not benefit from the presence of formal defences, however, the EA have stated that at this location the river channel itself offers a level of protection against the 1:100 year fluvial flood event.
- 6.3 As such, the risk of flooding due to defence/bank failure, breach or overtopping is considered moderate to high. No information regarding defence/bank failure has been provided at the time of writing. The River Welland Catchment Flood Management Plan (2009) for Spalding has stipulated that the preferred option is to take further action to sustain the current level of flood risk by raising the flood embankments through the town
- 6.4 In the unlikely event that a reservoir dam failed, a large volume of water would escape at once and flooding could happen with little or no warning. As detailed in Figure 7, the site is located on the edge of the maximum extent of flooding from a reservoir.
- 6.5 The EA show that this flood extent is associated with the Crowlands Cowbit Washes. The EA states that reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, we ensure that reservoirs are inspected regularly and essential safety work is carried out.

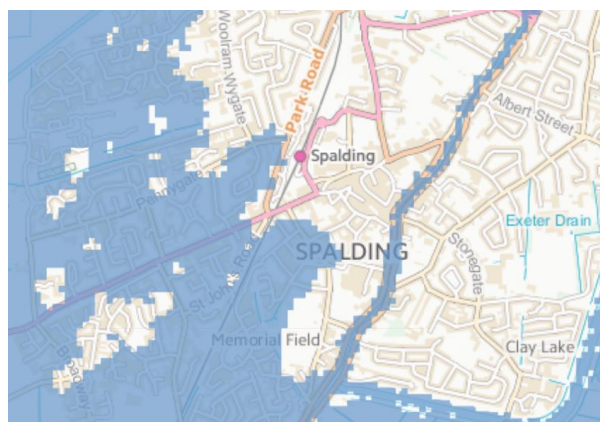


Figure 6: Risk of Flooding from Reservoirs Map (Source: EA)

- 6.6 The only other residual risk to the site is drainage failure; it is recommended that the store extension maintains existing floor levels.

7. Off-Site Impacts

Impact to Flood Risk Elsewhere

- 7.1 The proposed development shall incorporate the demolition of 3 properties on-site and the extension of the existing supermarket. The total existing built footprint (GEA) on-site is 1,442m² which shall be increased to 1,472m² post development. The total increase of GEA on site is only 30m² and as such the extension could therefore be classified as a minor development.
- 7.2 As such, and given the very limited chance of fluvial flooding given the top of bank levels within the area the proposed development is likely to have negligible impact to the site's potential flood storage.

Generation of Runoff

- 7.3 The existing site is developed and is covered by impermeable surfaces, as such, any changes the development is likely to make have a negligible effect on surface water runoff on-site.
- 7.4 It is recommended that the developer seeks to incorporate a surface water drainage strategy to provide sustainable drainage to the site should it not already be available, to provide betterment over the existing site.

8. Flood Risk Management Measures

- 8.1 The existing store and car park, and the proposed store and car park extensions, are located within Flood Zone 3 (High Risk of Fluvial Flooding).
- 8.2 The proposed development shall incorporate the demolition of 3 properties on-site and the extension of the existing supermarket. The total existing built footprint (GEA) on-site is 1,442m² which shall be increased to 1,472m² post development. The total increase of GEA on site is only 30m² and as such the extension could therefore be classified as a minor development.
- 8.3 It is advised that the store extension incorporate the following measures to mitigate potential flood risks on site:
- Air brick flood protection to be placed across all air bricks up to 1.5m above ground level to ensure flood protection for the maximum 1:1000 year with climate change flood depths on site.
 - Any replacement or new floors should be at the same level as the existing store floor levels and be of solid (i.e. concrete) construction to limit the effect floodwaters would have on the store in the event of flood waters entering the site.
 - Services to be installed at raised levels (where possible).
 - Use of MDF carpentry (i.e. skirting, architrave, built-in storage) to be avoided.
 - Bringing down electrical services from the ceiling on the ground floor.

- Electrical sockets to be raised 600mm above the FFL at ground floor level.

Flood Warning and Evacuation Plan

- 8.4 The site is located within Flood Zone 3, and the proposed development is for extension to the existing supermarket and associated car park. To provide betterment to the site, it is recommended that the site owner(s) should sign up to the EA Flood Warning Service Area if they have not done so already.
- 8.5 The EA operates a 24-hour telephone service on 0345 988 1188 that provides frequently updated flood warnings and associated floodplain information.
- 8.6 Further information can be found on www.environment-agency.gov.uk/floodline. Floodline Warnings Direct is a free service operated by the EA that provides flood warnings direct to occupants by telephone, mobile phone, fax or pager.
- On receipt of a **FLOOD ALERT**, the individual property owners and occupiers should:
 - Monitor the situation via local media;
 - Make themselves aware of forecast local weather conditions;
 - Alert both current visitors, and those scheduled to arrive, of the situation;
 - Prepare to evacuate if necessary.
 - On receipt of a **FLOOD WARNING**, the individual property owners and occupiers should:
 - Follow advice to “go in, stay in, and tune in”;
 - Move all vehicles to an area outside of the potential flood extent, if safe to do so;
 - Alert scheduled visitors that they should seek alternative accommodation;
 - Be prepared to follow instruction from the Emergency Services.
 - On receipt of a **SEVERE FLOOD WARNING**, the individual property owners and occupiers should:
 - Follow advice to “go in, stay in, and tune in”;
 - Remain attentive to local media forecasts and news bulletins;
 - Do not evacuate unless instructed to do so by the Emergency Services;
 - Only when instructed to evacuate by the Emergency Services, leave the property and follow the agreed evacuation plan.
- 8.7 It is advised that the store is closed in the event of a severe flood warning and the site evacuated.

- 8.8 It is also advised that the site owner(s) install barriers to the car park, if not already in place, which can be closed in the event of a severe flood warning to ensure the site remains clear and any remaining vehicles are confined to the site and do not become a floating debris hazard.
- 8.9 It is the responsibility of the site owner(s) to keep the evacuation route and areas of safe refuge known to all site users and visitors.

9. Conclusion

- 9.1 Ambiental Technical Solutions Limited has been appointed by STOAS Architects to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the extension of the existing site at Aldi Stores, Winsover Road, Spalding, PE11 2XY. The site is located approximately 480m to the northwest of the River Welland, an EA main River.
- 9.2 The current application is to extend the existing supermarket from a GEA of 1,204m² to 1,472m² and to extend the existing car park area by demolishing 3 properties acquired by the developer. With reference to the NPPF and the Environment Agency (EA) standing advice on development and flood risk, as well as the low detail, national-scale flood mapping created on behalf of the EA, the proposed store extension is located within Flood Zones 3 (High Risk >1% chance of annual tidal/fluviat flooding) and is considered to be a “Less Vulnerable” development under the NPPF. The car park extension is also located in Flood Zone 3 (High Risk >1%) according to the EA Flood Map for Planning. It can be argued that the car park is a “water compatible” use.
- 9.3 The proposed development will result in Aldi acquiring and demolishing 3 existing properties located adjacent to the store (43, 45 and 49). The combined GEA of the existing store and 3 units is 1,442m², and as such the proposed extension to the existing store will result in a net GEA increase on site of only 30m². The proposed development of the site could therefore be classified as a minor development.
- 9.4 Comparison of the EA modelled in-channel 1 in 100 year with allowance for climate change flood level (4.67mAOD) against the existing topographic levels on site, demonstrates a maximum flood depth of between 0.06m – 1.48m should the site be affected by the full in-channel flood level. Analysis of 2m LiDAR has shown, however, that at this location the top of bank level is approximately 5.58mAOD and, as such, flood waters are likely to remain within channel during this flood event.
- 9.5 No records have been provided by the South Holland District Council SFRA (2010) or the EA to indicate that the site or surround area has previously flooded.
- 9.6 As such and given that:
- the proposed development is for two extensions to the existing site (store and car park);
 - the Sequential Test: Flood Risk Vulnerability and Flood Zone ‘Compatibility’ Table as specified by the NPPF demonstrates that the development is appropriate and should be permitted;
 - the proposed extension is to facilitate additional car parking and increase the size of the store;
 - the proposed development shall result in a total increase in GEA of only 30m², and can be classified as a minor development;

- analysis has shown that flood waters up to the 1:1000 year with 20% climate change allowance would likely remain in channel in this area; and,
- it is recommended that the site owner(s) signs up to the EA Flood Warning Service to provide a betterment to the site, if they have not done so already,

following the guidelines contained within the NPPF, the proposed development type is considered to be suitable assuming appropriate mitigation (including adequate warning and evacuation procedures) can be maintained for its lifetime.



Dr. J. B. Butler

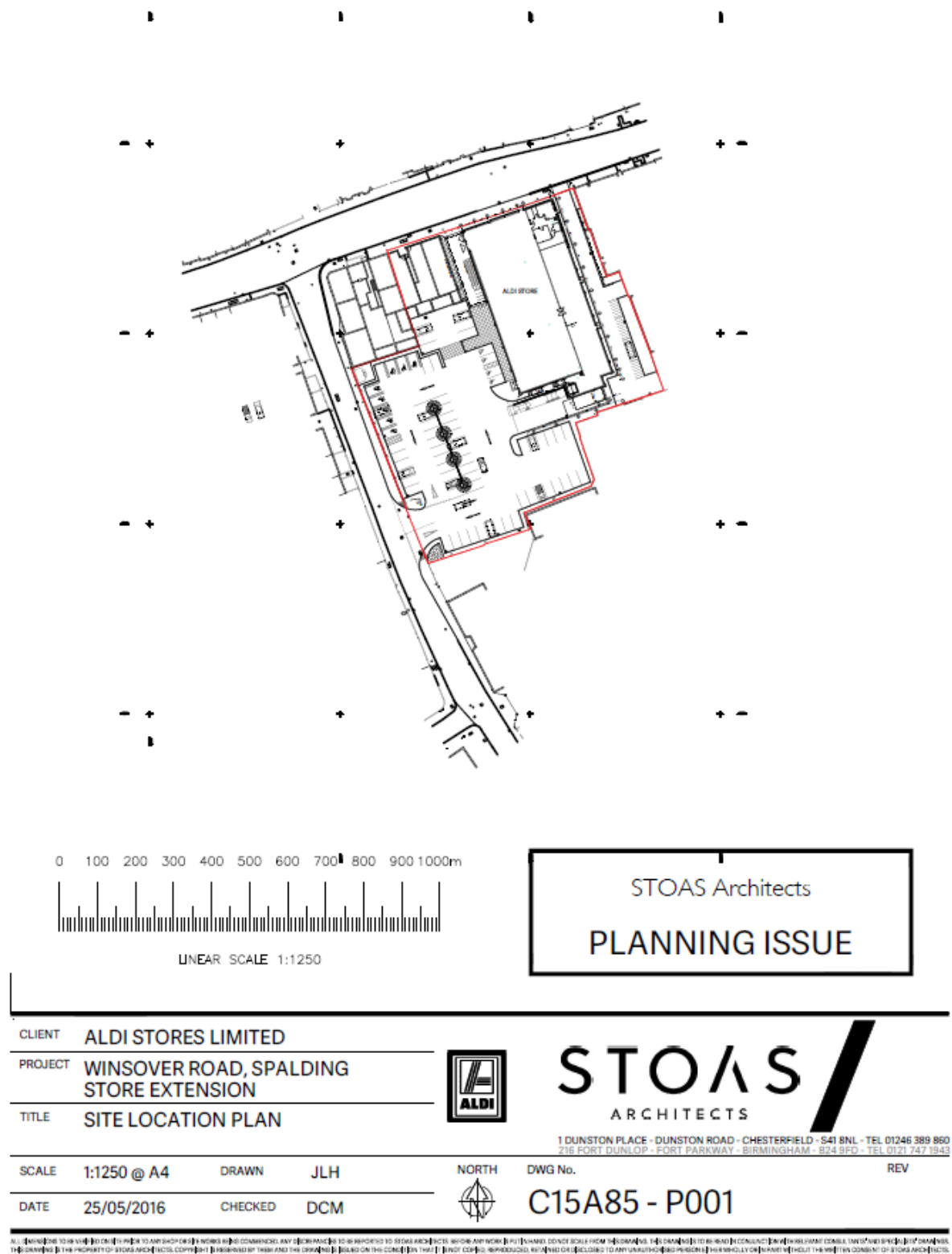
B.Sc., M.Phil., PhD.

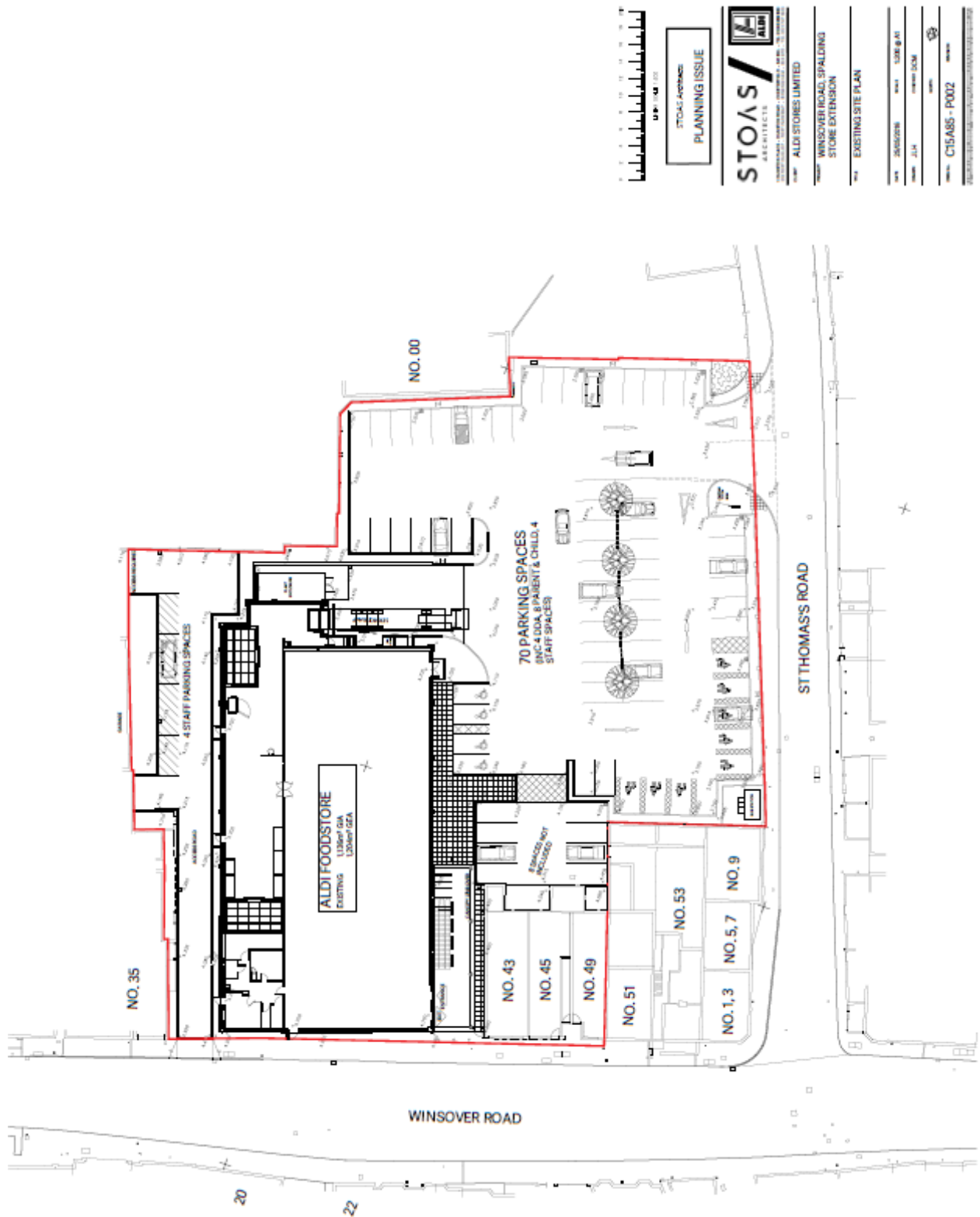
Ambiental Technical Solutions Ltd.

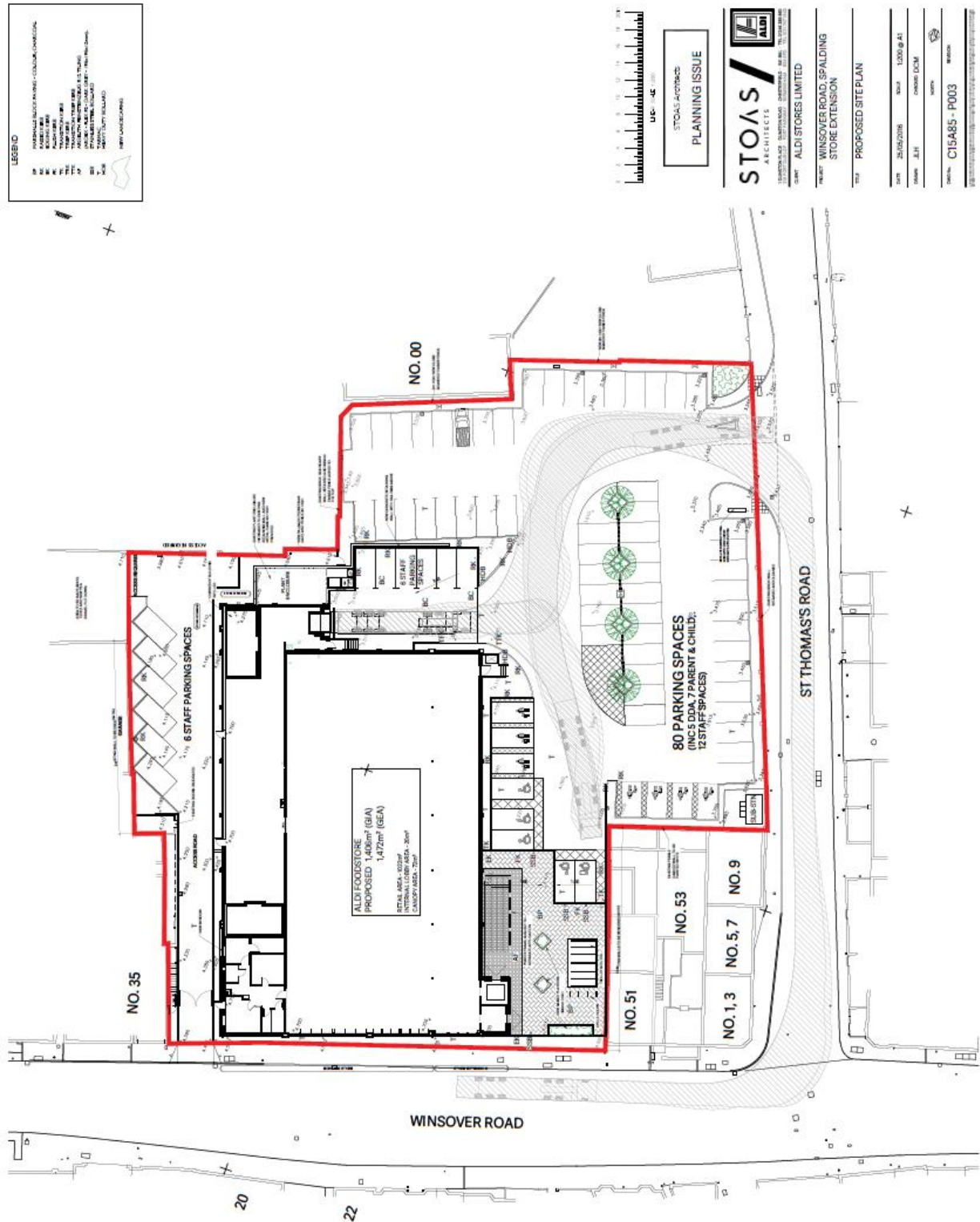
July 2016

Appendix A – Supporting Information

- Plan A – Site location plan
- Plan B – Existing site plan
- Plan C – Proposed site plan
- Figures D – I – EA Data
- Figure J – South Holland District Council SFRA, Actual flood depth 1% fluvial flood event
- Figure K - South Holland District Council SFRA, Actual flood extent 1% fluvial flood event









Dayle Goldsmith
Ambiental

Our ref: CCN/2016/16574

Date: 19 July 2016

Dear Dayle Goldsmith

Basic Flood Risk Assessment Data Request for Aldi, Winsover road, Spalding, PE11 3XY. [NGR: TF 24353 22604].

Thank you for your request of 21/06/2016 to use Environment Agency data, Product 3, in the development of the Flood Risk Assessment (FRA) for the above site. The information is attached.

If you have requested this information to help inform a development proposal, then you should note the detail in the attached advisory text on the use of Environment Agency Information for Flood Risk Assessments.

Flood Map

The attached map includes the current Flood Map for your area. The Flood Map indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial (river) flooding. It also shows the extent of the Extreme Flood Outline which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

The Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered that flooding may occur from other sources such as surface water sewers, road drainage, etc.

The Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered that flooding may occur from other sources such as surface water sewers, road drainage, etc.

Fluvial Flood Levels

The fluvial flood levels and flows for the model nodes shown on the attached map are set out in the attached datasheet. They are measured in metres above Ordnance Datum Newlyn (mODN).

These levels are taken from the Welland Catchment Model (2007) and are the most up-to-date currently available. We aim to review our models on a regular basis, so if you are using these levels more than twelve months from the date of this letter, please contact us again to check that they are still valid.

Nene House Pychley Lodge Road Kettering NN15 6JQ.
Customer services line: 08708 508 508
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

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Please note that these levels are "in-channel" levels and therefore may not represent the flood level on the floodplain, particularly where the channel is embanked or has raised defences.

Climate Change

Flood risk data requests including an allowance for climate change will be based on the 1% annual probability flood including an additional 20% increase on peak flows to account for climate change impacts, unless otherwise stated. You should refer to 'Flood risk assessments: climate change allowances' to check if this allowance is still appropriate for the type of development you are proposing and its location. You may need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.

Fluvial Defence Information

There are no formal flood defences protecting this site. The natural channel which is maintained by us, provides a nominal protection against a flood event with a 1% chance of occurring in any year (1 in 100). We inspect the channel regularly to ensure that any potential defects are identified early.

History of Flooding

With regards to the history of flooding I can advise that we do not have any records of flooding in this area. It is possible that other flooding may have occurred that we do not have records for, and other organisations, such as the Local Authority or Internal Drainage Boards, may have records.

Land Drainage

The information provided is limited to flood risk from the sea and rivers with catchment areas greater than 3km². The property is in an area of extensive land drainage which may pose an additional risk of flooding. Further information should be sought from the Welland & Deepings Internal Drainage Board.

Further details about the Environment Agency information supplied can be found on the GOV.UK website:

<https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather>

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments

<https://www.gov.uk/planning-applications-assessing-flood-risk>
<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

Supporting Information

This information is provided subject to the enclosed notice which you should read.

I hope that we have correctly interpreted your request. Please see the Standard Notice or licence for details of permitted use. The Standard Notice can be found at the link below.

<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

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We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

If you are not satisfied with our response to your request for information you can contact us within 2 calendar months to ask for our decision to be reviewed.

If you have any queries or would like to discuss the content of this letter further please contact Partnership & Strategic Overview team (Welland & Nene) at the Environment Agency.

Yours sincerely



Stacey Moore
FOR Alistair Windler
Partnership and Strategic Overview Team Leader
Lincolnshire & Northamptonshire Area

e-mail psown@environment-agency.gov.uk

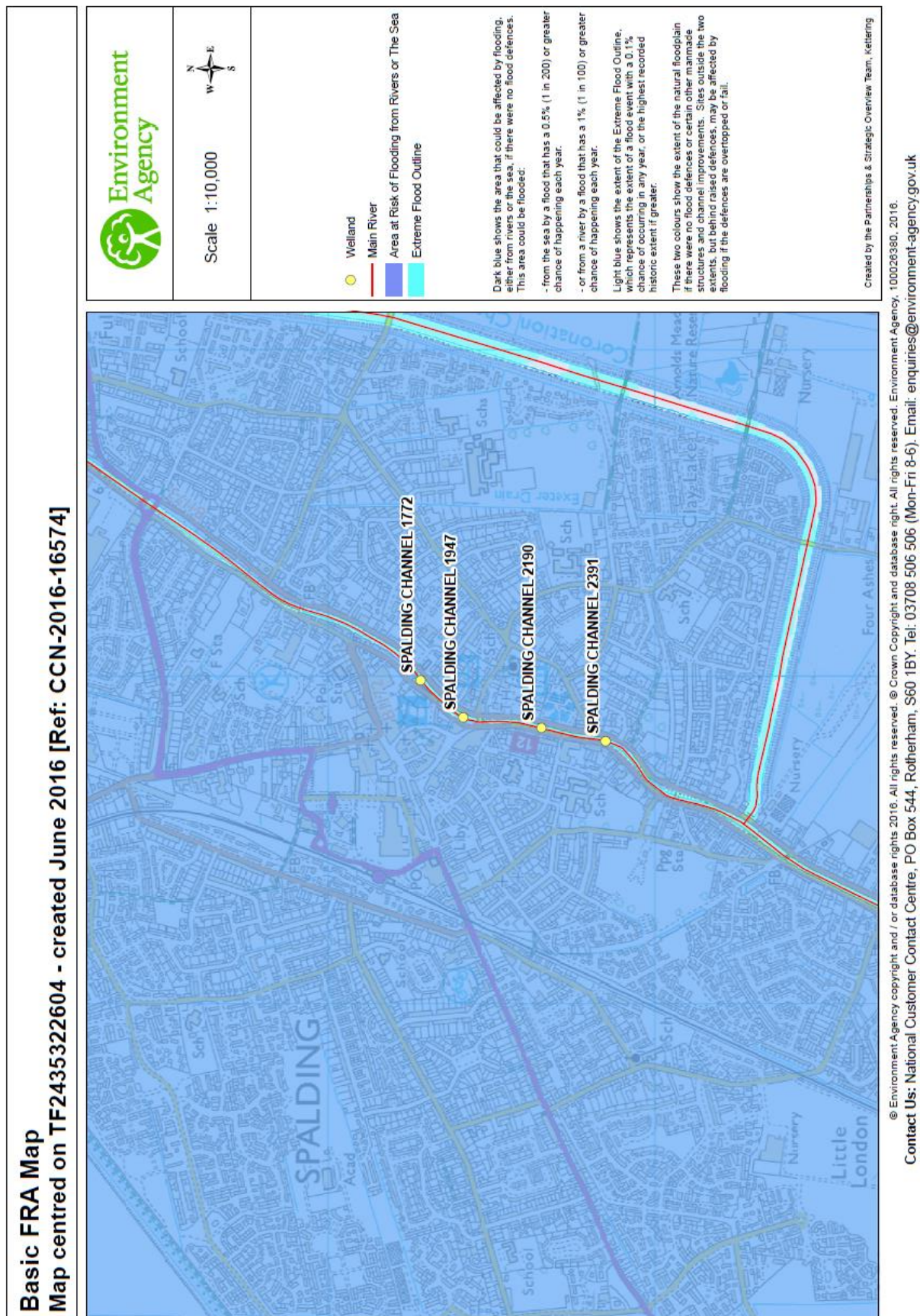


Awarded to Lincolnshire & Northamptonshire Area

Enc.
FRA Advisory Text
Basic FRA Map
Level and flows data tables

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Datasheet [Ref: CCN-2016-16574]

Fluvial Flood Levels (mODN)

The fluvial flood levels for the model nodes shown on the attached map are set out in the table below. They are measured in metres above Ordnance Datum Newlyn (mODN).

			Annual Exceedance Probability - Maximum Water Levels (mODN)											
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	4% (1 in 25)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
SPALDING CHANNEL 1772	524990	322719	4.03	4.22	4.29	-	4.34	4.40	4.42	4.43	4.67	4.44	4.45	4.68
SPALDING CHANNEL 1947	524876	322589	4.03	4.22	4.29	-	4.33	4.40	4.42	4.43	4.67	4.44	4.45	4.68
SPALDING CHANNEL 2190	524844	322349	4.03	4.22	4.29	-	4.33	4.40	4.42	4.43	4.67	4.44	4.45	4.68
SPALDING CHANNEL 2391	524803	322153	4.02	4.22	4.29	-	4.33	4.40	4.42	4.43	4.67	4.44	4.45	4.68

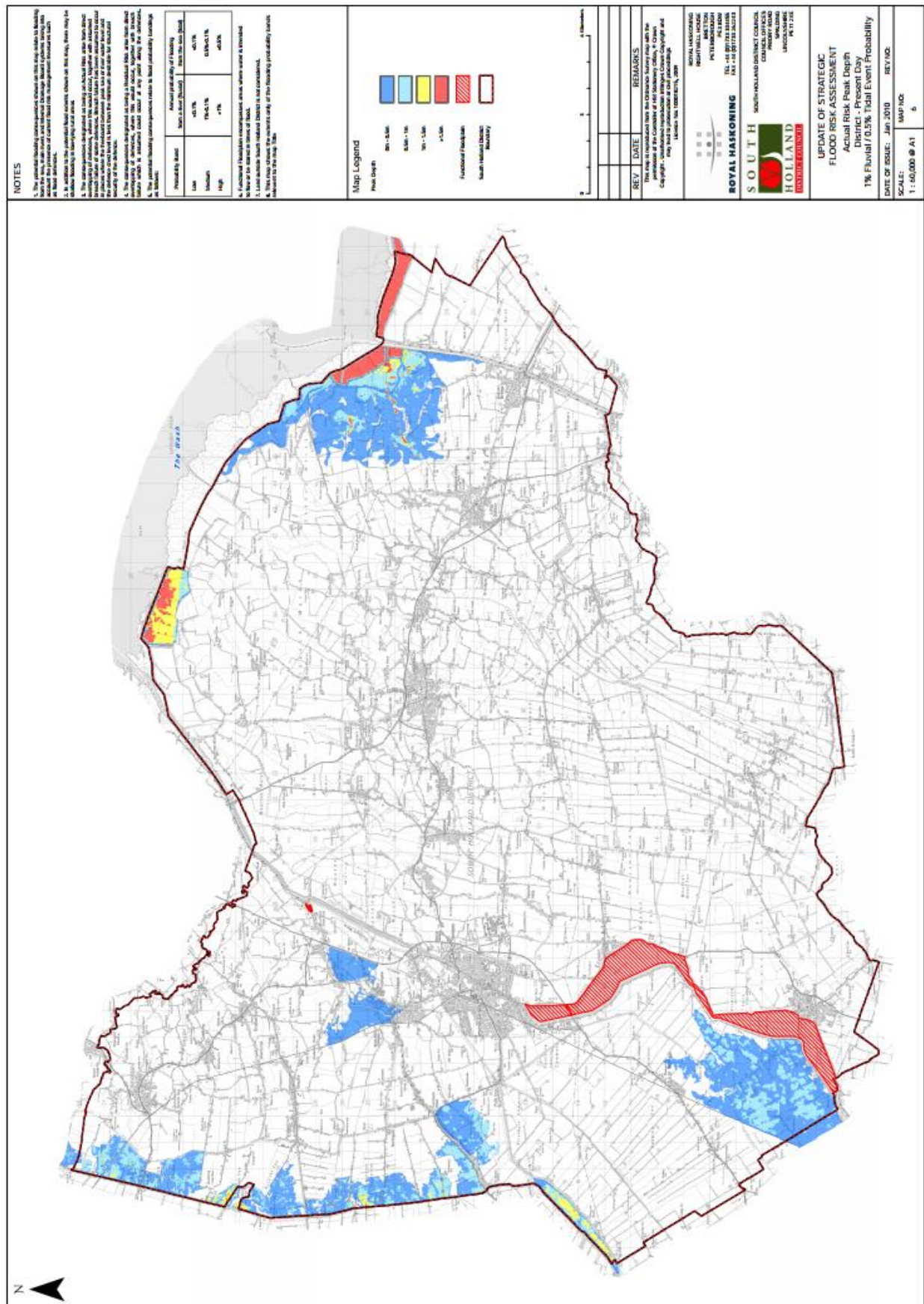
19 July 2016

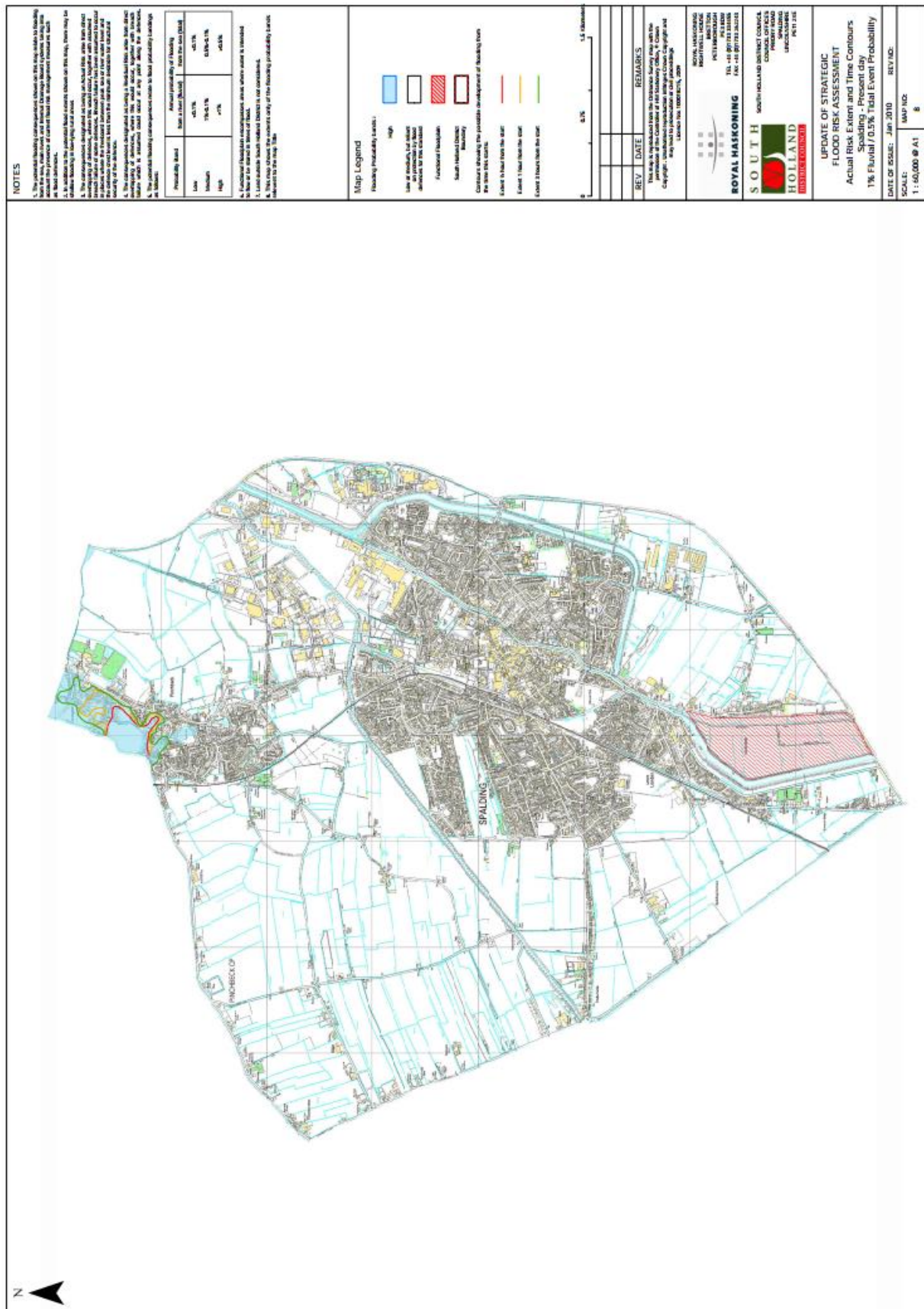
Fluvial Flood Flows (m³/s)

The fluvial flood flows for the model nodes shown on the attached map are set out in the table below. They are measured in metres cubed per second (m³/s).

			Annual Exceedance Probability - Maximum Flows (m³/s)											
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	4% (1 in 25)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
SPALDING CHANNEL 1772	524990	322719	3.90	3.03	2.64	-	2.88	3.26	3.54	3.76	5.50	4.11	4.13	5.80
SPALDING CHANNEL 1947	524876	322589	4.13	3.22	2.81	-	3.06	3.45	3.75	3.98	5.80	4.38	4.40	5.90
SPALDING CHANNEL 2190	524844	322349	4.51	3.55	3.10	-	3.38	3.80	4.11	4.36	6.36	4.87	4.90	6.46
SPALDING CHANNEL 2391	524803	322153	4.85	3.84	3.37	-	3.66	4.12	4.45	4.71	6.85	5.32	5.37	6.95

19 July 2016





Appendix B – Information relating to JFLOW

JFLOW and Flood Outlines (Source: EA)

Flood Zones have been produced using JFLOW, a nationally consistent model. JFLOW has been used to produce the 1% (1 in 100 year) and 0.1% (1 in 1000 year) flood outlines.

The flood outlines have been developed by applying flow and tide models to a 3D ground level map of England and Wales, known as a Digital Terrain Model (DTM). This is created by flying an aircraft over the whole of the country using radar to record and create a contoured model of the land. This DTM is used as the basis of a grid of cells which is used to estimate the extent of flooding in a flood of a given return period or probability.

The size of the flood event (1 in 100 or 1 in 1000 year) is determined by the inflows to the JFLOW model, which are calculated using statistical techniques from the Flood Estimation Handbook. The technique used is based upon catchment descriptors and data transfer, the details of these can be found in the Flood Estimation Handbook volume 3. The Flood Estimation Handbook provides a consistent technique for estimating inflows to the national model and its methods are widely accepted.

The methodology is a raster-based approach, driven by an underlying Digital Elevation Model (DEM).

- Each cell has a ground level and water depth
- Water can move to any of surrounding 8 cells where the water level is lower
- Water will pond in low spots until the water level is high enough to spill
- The velocity of movement depends on water surface slope and surface roughness

The above points describe the basic principles of the model. The two underlying principles are:

- Mass conservation within each cell
- Calculation of the fluxes between the cells

Each grid cell is treated as a small storage area. Mass conservation is applied to each grid cell. The flux between cells is calculated using a form of the generalised weir equation.

Efficient coding is achieved by keeping a list of all currently wet cells and a list of newly wet cells. This avoids having to search through each cell in the ground grid.

For whole catchment modelling, the hydrographs used as inflow boundary conditions represent the whole hydrograph at that inflow location and a simple conceptual method has been derived to account for the amount of flow within the channel banks. A simple solution was therefore sought which would approximately account for the proportion of flow contained within the channel without requiring further information about the channel.

The simple conceptual method used involves two assumptions:

1. That bankfull flow (Q_b) is equal to QMED as calculated by the Flood Estimation Handbook (FEH) methods. QMED has a return period of 2 years. This assumption derives from the

concept of dominant discharge in fluvial geomorphology (Wolman and Leopold, 1957; Wolman and Miller, 1960) where the cross-section shape is assumed to be formed by a discharge with a recurrence interval of 1-2years.

2. That the additional channel flow (Q_c) scales with both Q_b and depth above bankfull (d).

The basis of the current model is that each grid cell acts as a small flood cell and the links to each of the surrounding cells are automatically calculated. It is therefore capable of simulating the inundation extent at a level of detail equal to the underlying DEM. It is fundamentally volume conservative and so, in a given time period, will simulate the peak water levels across the floodplain depending on the volume of water that has entered the floodplain. This approach is a half-way house between the common 1D hydrodynamic models and a 2D hydrodynamic model.

Limitations

JFLOW was used to produce flood maps for the whole of England and Wales for all catchments greater than 3 sq-km in a consistent manner. The method is therefore very generalised and therefore cannot take account of information that may be very significant locally. This might include:

1. Effects of bridges and other structures including flood defences are not taken into account.
2. Errors in the DTM, caused by trees and buildings for example.
3. The effect of reservoirs and urban drainage and other man made influences on the flow regime can only be taken into account in a very general sense in JFLOW.
4. The channel is assumed to be able to take the 2 year flow. This may not be true especially in those modified by man.
5. Hydraulic roughness is assumed to be the same everywhere in JFLOW, but of course it is not.

For these and many other reasons, the flood outlines produced by JFLOW can only be taken as a rough guide, showing where more detailed flood risk assessments are essential. Flood risk assessments should also be undertaken near small watercourses whose catchments are too small to have been included in the JFLOW modelling.