

Lidl GmbH UK

**Flood Risk Assessment with  
Outline Drainage Strategy**

For

**Proposed New Lidl Store  
Off New Hey Road  
Huddersfield**

Beam Consulting  
14 Bond Street  
Wakefield  
West Yorkshire  
WF1 2QP

Ref: 09-122-DOC-001

Date: 19 December 2018

## REVISION RECORD

| Revision | Description                     | Date     | Prepared | Checked | Approved |
|----------|---------------------------------|----------|----------|---------|----------|
| -        | First Issue                     | 19.12.18 | TM       | KA      | KGP      |
| A        | Revised for updated site layout | 25.03.19 | TM       | KA      | KGP      |
| B        | Revised for updated site layout | 04.04.19 | TM       | KA      | KGP      |
| C        | Revised drainage layout         | 16.04.19 | TM       | KA      | KGP      |

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## **EXECUTIVE SUMMARY**

This Flood Risk Assessment (FRA) has been prepared for Lidl GmbH UK for the proposed new Lidl Store off New Hey Road, Huddersfield. The Assessment has been undertaken in accordance with the requirements of the National Planning Policy Framework (NPPF) March 2012 and its Technical Guidance.

### **Flood risk**

The site is located within Flood Zone 1 – an area where flooding from rivers and the sea is very unlikely with less than a 0.1 per cent (1 in 1000) chance of flooding occurring each year. The site is in an area of low risk of flooding from reservoirs. However, the site is in an area of high risk of flooding from surface water. The proposed development will ensure the surface water is directed away from the building, across the car park. The proposed development is classified as less vulnerable it is considered to be at a suitable location for the development.

### **Surface water drainage**

Due to the site topography, location in close proximity to residential property, the use of site infiltration and other similar SUDS systems are not suitable for this development. On this site it is considered that soakaways are inappropriate. The northern part (8870m<sup>2</sup>) of the existing site is currently a field used which housed a stable and has no site surface water drainage. The south part (1330m<sup>2</sup>) of the site is a former public house and associated hardstanding, which has an existing surface water drainage system that discharges into a combined sewer near the southern boundary of the site. The proposed surface water drainage for the site will comprise a piped surface water drainage system connected into the combined sewer manhole near the southern boundary of the site.

The site area is 10,200m<sup>2</sup> and will comprise a total impermeable area of 6740m<sup>2</sup>. Based on a greenfield runoff rate of 5.0 litre/sec/hectare the proposed runoff rate for the site is 5.1 litre/sec. Based on 1 in 100 year rainfall and 30% allowance for climate change a 425m<sup>3</sup> attenuation (storage) will be provided. (See Appendix D for calculations). Drainage Strategy drawing 09-122-500A in Appendix E indicates the proposed layout.

There is a high risk of overland surface water flows from adjacent properties, flowing across the site from the western boundary with the Salendine Nook Baptist Church to the southern boundary with New Hey Road. The proposed redevelopment will not interfere with the route of any overland flows, other than ensuring they do not enter the Lidl store. Overland Flows Plan drawing 09-122-501A in Appendix E indicates the proposed route of overland flows across the site. The final solution for the drainage will depend on further investigation and development of detailed design.

### **Foul water drainage**

There is an existing foul drainage system on this site, which will be removed and replaced. The proposed foul drainage system will be connected to the existing combined sewer manhole near the southern boundary of the site. Drainage Strategy drawing 09-122-500A in Appendix E indicates the proposed layout. The final solution for the drainage will depend on further investigation and development of detailed design.

## **1.0 INTRODUCTION**

This Flood Risk Assessment (FRA) has been prepared for Lidl GmbH UK for the proposed new Lidl store off New Hey Road, Huddersfield.

The assessment has been undertaken in accordance with the requirements of the National Planning Policy Framework (NPPF) March 2012 and its Technical Guidance.

The Report is based on the following information:

- i. Site location
- ii. Current Clients' proposal
- iii. EA online Flood Maps which show indicative hydraulically modelled flooding from rivers or sea without defences - the natural flood plain area that could be affected in the event of flooding from rivers and the sea - based on Light Detection And Ranging (LIDAR) satellite digital terrain maps (DTMs).
- iv. Department for Environment, Flood and Rural Affairs, Sustainable Drainage Systems, Non-statutory technical standards for sustainable drainage systems.
- v. Existing public sewer information.

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## **2.0 BACKGROUND INFORMATION**

The site is located off New Hey Road, Huddersfield.

The National Grid reference for the site is 410677,417761. The site location plan is enclosed within Appendix A.

### **2.1 EXISTING DEVELOPMENT**

The northern part (8870m<sup>2</sup>, 0.887ha) of the existing site is currently a field used which housed a stable and has no site surface water drainage. The south part (1330m<sup>2</sup>) of the site is a former public house and associated hardstanding, which has an existing surface water drainage system that discharges into a combined sewer near the southern boundary of the site. The total site is 10,200m<sup>2</sup> (1.02ha) in area. There is evidence to suggest that there is an existing culvert entering site on the western boundary, which is believed to run east and then turning south, following the boundary, and then exiting site to New Hey Road.

### **2.2 PROPOSED DEVELOPMENT**

It is proposed to develop the site for a new Lidl store with associated car park, drainage and landscaping.

The proposed site layout drawing is enclosed within Appendix B.

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### **3.0 FLOOD RISK**

#### **3.1 RISK OF FLOODING OF DEVELOPMENT SITE**

The flood risk and site drainage assessment is based on the following sources of information:

i. EA online Flood Maps:

The site is located within Flood Zone 1 - low probability of flooding that comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). As the site is within low flood risk area based on EA flood maps then no further consultation with Environment Agency has been undertaken. The site is in an area of low risk of flooding from reservoirs. However, the site is in an area of high risk of flooding from surface water. The Environment Agency flood maps are enclosed within Appendix C.

Based on the above, surface water flooding within the site and surrounding areas is very unlikely, hence the proposed development is acceptable on the basis that surface water flows are properly allowed for and controlled. No flood protection measures are required. Proposed site levels will be adjusted and will not present any flooding risk to the surrounding or new properties.

The proposed development shall embody SUDS (Sustainable Urban Drainage Systems) principles. The site surface water is to be collected via a new surface water drainage system with attenuation prior to exiting the site and connecting to the existing drainage system.

### 3.2 SOURCES OF FLOODING AND FLOOD RISK

| Sources of flooding                                                                                                                                                                                                | Flood risk                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Streams and rivers</b><br>Flooding that can take place from flows that are not contained within the channel due to high levels of rainfall in the catchment.                                                    | Compensation Reservoir lies within 720m of the site at a level approximately 45m below the site. Based on Environment Agency flood maps the site is not in a high risk flood zone.                                                                                                                                                       |
| <b>Coastal or estuarine</b><br>Flooding that can occur from the sea due to a particularly high tide or surge, or combination of both.                                                                              | The site is located inland and therefore is not at risk of flooding from the sea.                                                                                                                                                                                                                                                        |
| <b>Groundwater</b><br>Where the water table rises to such a height where flooding occurs. Most common in low-lying areas underlain by permeable ground (aquifers), usually due to extended periods of wet weather. | The site is not at risk of flooding from groundwater.                                                                                                                                                                                                                                                                                    |
| <b>Sewers and highway drains</b><br>Combined, foul or surface water sewers and highway drains that are temporarily over-loaded due to excessive rainfall or due to blockage.                                       | The highways next to the site and adjacent developments have their own drainage systems in place. In the case of them being temporarily over-loaded due to excessive rainfall or due to blockage the water is collected within highways, car parks or landscaped areas, and overland flows direct water across the site to New Hey Road. |
| <b>Surface water</b><br>The net rainfall falling on a surface (on or off the site) which acts as runoff which has not infiltrated into the ground or entered into a drainage system.                               | The highways next to the site and adjacent developments have their own drainage systems in place. In the case of them being temporarily over-loaded due to excessive rainfall or due to blockage the water is collected within highways, car parks or landscaped areas, and overland flows direct water across the site to New Hey Road. |

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**Infrastructure failure**

Canals, reservoirs, industrial processes, burst water mains, blocked sewers or failed pumping stations.

The highways next to the site and adjacent developments have their own drainage systems in place. In the case of them being temporarily over-loaded due to excessive rainfall or due to blockage the water is collected within highways, car parks or landscaped areas, and overland flows direct water across the site to New Hey Road.

### 3.3 SEQUENTIAL AND EXCEPTION TEST

Based on NPPF and its Technical Guidance the sequential and exception tests are not applicable as the site is within Flood Zone 1 and hence outside the floodplain.

Whilst the Sequential Test is not applied the principles are followed in general in the flood risk assessment below:

| Possible Hazard                                                                                                                                       | Comments/ Remediation                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A. Effect of Development on General Flood Risk</b><br>Flooding caused by local sources - natural watercourses on or near to the site?              | The proposed development shall have its own drainage system in place. In excessive rainfall or due to blockage the water shall be collected within highway, car parking spaces or grassed areas. |
| <b>B. Effect of Development on General Flood Risk</b><br>Flooding caused to local sources - run-off from adjacent properties/ adjoining land          | As above.                                                                                                                                                                                        |
| <b>C. Contribution to Flood Flows from Development Drainage</b><br>Flooding caused to adjacent properties from surface run-off from hard-paved areas. | As above.                                                                                                                                                                                        |
| <b>D. Contribution to Flood Flows from Development</b><br>Flooding caused to 3rd party properties                                                     | As above.                                                                                                                                                                                        |

Whilst the Exception Test is not applied the principles are followed in general in the flood risk assessment below:

| Possible Issue                                                               | Comments/ Remediation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E. Benefit of Site Development to the Wider Community over Flood Risk</b> | The proposed development shall have its own drainage system in place. In the case of this system being temporarily over-loaded due to excessive rainfall or due to blockage the water is collected within highways, car parks or landscaped areas, and overland flows will direct water across the site to New Hey Road, as per adjacent residential developments.                                                                                                                                                                                                                                |
| <b>F. Does an alternative site exist for the development?</b>                | The site is existing grassland and at a suitable location for the proposed development with sufficient space to accommodate it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>G. Can the site be made safe?</b>                                         | <p>The proposed development shall consider and embody SUDS (Sustainable Urban Drainage Systems) principles if suitable. Any site surface water runoff shall be restricted and collected within onsite attenuation storage prior to discharging into existing sewer.</p> <p>In the event of the designed drainage system being temporarily over-loaded due to excessive rainfall or due to blockage the water is collected within highways, car parks or landscaped areas, and any overland flows will direct water across the site to New Hey Road, as per adjacent residential developments.</p> |

## 4.0 DRAINAGE ASSESSMENT AND STRATEGY

### 4.1 SURFACE WATER DRAINAGE

The northern part (8870m<sup>2</sup>, 0.887ha) of the existing site is currently a field used which housed a stable and has no site surface water drainage. The south part (1330m<sup>2</sup>) of the site is a former public house and associated hardstanding, which has an existing surface water drainage system that discharges into a combined sewer near the southern boundary of the site. The total site is 10,200m<sup>2</sup> (1.02ha) in area.

It is proposed to develop the site for a new Lidl store with associated car park, drainage and landscaping (see Appendix B).

The proposed redevelopment areas are as follows:

|                               |                             |
|-------------------------------|-----------------------------|
| Roofs                         | 2,312                       |
| Roads                         | 4,428                       |
| Grass and permeable surfacing | 3,457                       |
| <b>TOTAL</b>                  | <b>10,200 m<sup>2</sup></b> |

In compliance with SUDS (Sustainable Urban Drainage Systems) various surface water discharge methods and reducing the amount discharged to the water course/sewer have been considered as per the table below.

|                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Infiltration                                 | <p>The use of soakaways is generally an ideal SUDS solution for developments. Permeability testing in accordance with BRE Digest 365 should be carried out and this information then used to determine the viability of the use of soakaways to deal with rainwater runoff. Soakaways can be used to deal with run-off both from buildings and paved areas. It should also be noted that soakaways can cause flooding to nearby basements and properties. Hence, the groundwater flow paths should be determined by a geotechnical investigation. Soakaways should be located in landscaped areas of the site. In accordance with Building Regulations soakaways are not to be located within 5m of any structure.</p> <p>Soakaways must be designed to cope with a 1 in 30 year storm with an allowance for climate change and a factor of safety greater or equal to 2. It is possible that the road or other areas could, with the management of kerbs and levels, be designed to contribute to the additional storage capacity requirements for a 1 in 100 year storm. However if this is not possible then the soakaways would have to be designed for the 1 in 100 year event.</p> |
| Permeable paving/discharge to soft landscape | <p>The use of permeable surfacing for parking areas combined with discharge from paths onto adjacent soft areas are ideal for reducing run-off via drainage systems. Permeable paving can be used as an infiltration mechanism to discharge direct to the ground if the sub-strata is sufficiently permeable or alternatively can be used as on-site storage where used in conjunction with a flow restriction to attenuate flows into existing drainage systems.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Swales                                        | Swales are similar to wetlands except they are designed to empty when not required to balance flows; similar comments apply as above.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Ponds or wetlands                             | Ponds or wetlands can be used in conjunction with restricted discharge outlets to control the maximum rate of discharge from a site. However, the health and safety risks associated with ponds and wetlands may make them inappropriate without incorporating significant control measures into the scheme design.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| French drains                                 | French drains can be located in landscaped areas of the site. See the notes on soakaways. It is also possible to use French drain construction lined with an impermeable barrier as a storage facility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Restricted flows combined with onsite storage | <p>If the above solutions are inappropriate then the final drainage system may incorporate a flow restriction and on-site storage. This could be in the form of oversized pipes or tanks to attenuate the additional flows and then discharge into the existing surface water sewer system or into the water course subject to consent and approvals.</p> <p>The underground storage system must be designed to accommodate the calculated flows for a 1 in 30 year return period together with an allowance for climate change. The road, with the management of kerbs and levels, can be designed to contribute to the storage capacity for a 1 in 100 year storm. Alternatively the underground storage system should be designed to accommodate the 1 in 100 year event. 30% shall be allowed for climate change.</p> <p>Options for on-site storage include:</p> <ul style="list-style-type: none"> <li>a) Buried tanks</li> <li>b) Lined French drains</li> <li>c) Oversized pipes and manholes</li> <li>d) Paving with under paving storage</li> </ul> <p>The choice of solution depends upon relative levels of surfacing, inlet and discharge points and forms part of the detailed drainage design.</p> |

Due to the site topography, location in close proximity to residential the use of site infiltration and other similar SUDS systems are not suitable for this development.

The northern part (8870m<sup>2</sup>, 0.887ha) of the existing site is currently a field used which housed a stable and has no site surface water drainage. The south part (1330m<sup>2</sup>) of the site is a former public house and associated hardstanding, which has an existing surface water drainage system that discharges into a combined sewer near the southern boundary of the site. The total site is 10,200m<sup>2</sup> (1.02ha) in area.

The surface water drainage for the site will comprise an adopted piped surface water drainage system connected into the existing combined sewer manhole near the southern site boundary.

The site area is 10,200m<sup>2</sup> and will comprise a total impermeable area of 6740m<sup>2</sup>. Based on a greenfield runoff rate of 5.0 litre/sec/hectare the proposed runoff rate for the site is 5.1 litre/sec. Based on 1 in

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100 year rainfall and 30% allowance for climate change a 425m<sup>3</sup> attenuation (storage) will be provided. (See Appendix D for calculations).

Drainage Strategy drawing 09-122-500A in Appendix E indicates the proposed layout.

There is a high risk of overland surface water flows from adjacent properties, flowing across the site from the western boundary with the Salendine Nook Baptist Church to the southern boundary with New Hey Road. The proposed redevelopment will not interfere with the route of any overland flows. Overland Flows Plan drawing 09-122-501A in Appendix E indicates the proposed route of overland flows across the site.

The final solution for the drainage will depend on further investigation and development of detailed design

## **4.2 FOUL WATER DRAINAGE**

There is an existing foul drainage system on this site, which will be removed and replaced. The proposed foul drainage system will be connected to the existing combined sewer manhole near the southern boundary of the site. Drainage Strategy drawing 09-122-500A in Appendix E indicates the proposed layout options.

The final solution for the drainage will depend on further investigation and development of detailed design.

## 5.0 RECOMMENDATIONS

Based on the flood risk assessment our recommendations are as follows:

### Flood risk

The site is located within Flood Zone 1 – an area where flooding from rivers and the sea is very unlikely with less than a 0.1 per cent (1 in 1000) chance of flooding occurring each year. The site is in an area of low risk of flooding from reservoirs. However, the site is in an area of high risk of flooding from surface water. The proposed development will ensure the surface water is directed away from the building, across the car park. The proposed development is classified as less vulnerable it is considered to be at a suitable location for the development.

### Surface water drainage

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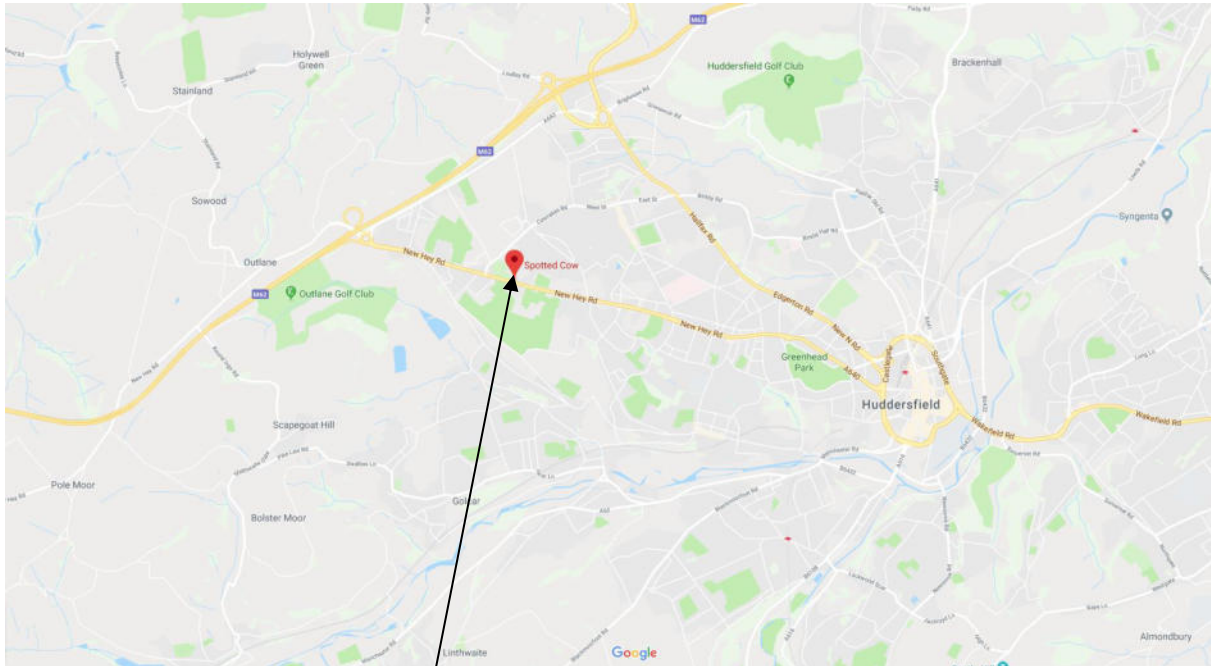
The site area is 10,200m<sup>2</sup> and will comprise a total impermeable area of 6740m<sup>2</sup>. Based on a greenfield runoff rate of 5.0 litre/sec/hectare the proposed runoff rate for the site is 5.1 litre/sec. Based on 1 in 100 year rainfall and 30% allowance for climate change a 425m<sup>3</sup> attenuation (storage) will be provided. (See Appendix D for calculations). Drainage Strategy drawing 09-122-500A in Appendix E indicates the proposed layout.

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### Foul water drainage

There is an existing foul drainage system on this site, which will be removed and replaced. The proposed foul drainage system will be connected to the existing combined sewer manhole near the southern boundary of the site. Drainage Strategy drawing 09-122-500A in Appendix E indicates the proposed layout. The final solution for the drainage will depend on further investigation and development of detailed design.

## **APPENDIX A - SITE LOCATION**



Site Location

## **APPENDIX B - PROPOSED SITE DRAWINGS**

- KEY**
- (1) NEW 6m HIGH LIDL FLAGPOLE
  - (2) NEW ENTRANCE IN ACCORDANCE WITH HIGHWAYS CONSULTANT DESIGN/ DETAILS
  - (3) NEW SHEFFIELD CYCLE STAND
  - (4) RED LINE BOUNDARY LOCATION
  - (5) 1 X BIN
  - (6) PROPOSED HIGHWAYS WORKS IN ACCORDANCE WITH HIGHWAYS CONSULTANT DRAWING
  - (7) RETAINING WALLS - SEE BOUNDARY TREATMENT PLAN FOR MORE INFORMATION
  - (8) EXISTING BUILDINGS TO BE DEMOLISHED
  - (9) EXISTING GHOST ISLAND TO BE REMOVED AND REPOSITIONED
  - (10) 1 FEEDER UNIT AND 2 SPACES (RAPID CHARGERS)

- SOFT LANDSCAPING KEY**
- PROPOSED NEW TREE
  - EXISTING TREE
  - EXISTING TREE TO BE REMOVED

THIS DRAWING IS COPYRIGHT, AND REMAINS THE PROPERTY OF HTC ARCHITECTS. IT MUST NOT BE REPRODUCED, USED, DISCLOSED OR TRANSMITTED TO THIRD PARTIES IN ANY FORM, IN WHOLE OR IN PART, WITHOUT PRIOR WRITTEN PERMISSION.

DO NOT SCALE!  
ALL DIMENSIONS SHOULD BE CHECKED ON SITE BEFORE WORK COMMENCES

TITLE PLAN: WYK122973, WYK13687, WYK707987, WYK886803 and YWE22745

SUBJECT TO ADDITIONAL LIGHTING

ARBORICULTURAL SURVEY: 12484 SR Arboricultural Report of the former Spotted Cow, New Hey Road, Huddersfield

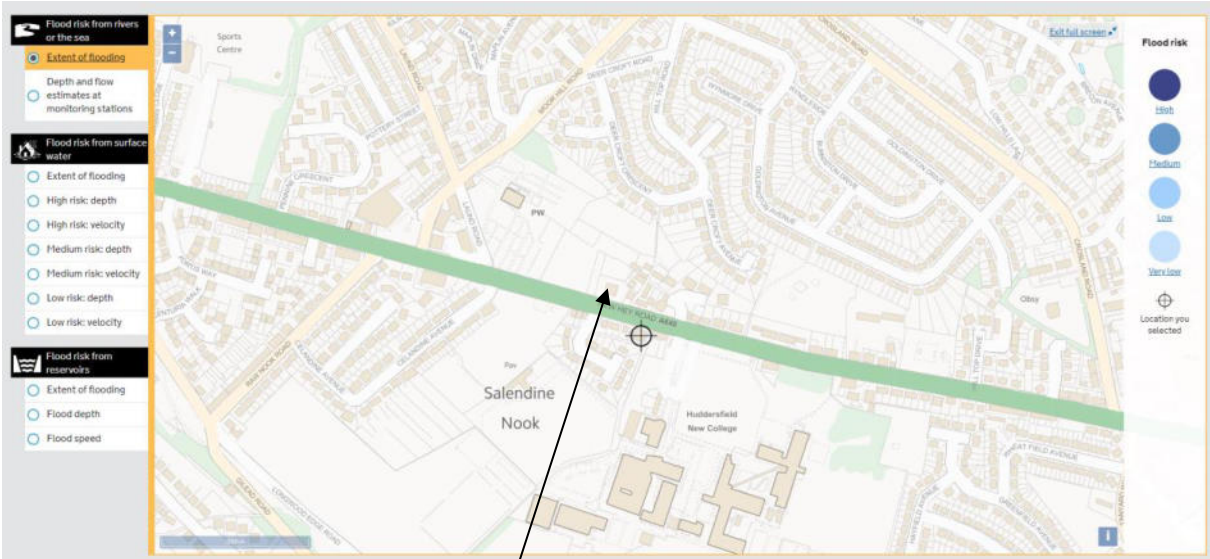
TRACKING: EISA 1814 07 Proposed Site Plan OPTION 5 paths update

MODIFIED DEVELOPERS SPECIFICATION DRAWING

**SURVEY INFORMATION:**  
D224-001 June 2018 Landform Surveys  
001/002 November 2014 Landform Surveys



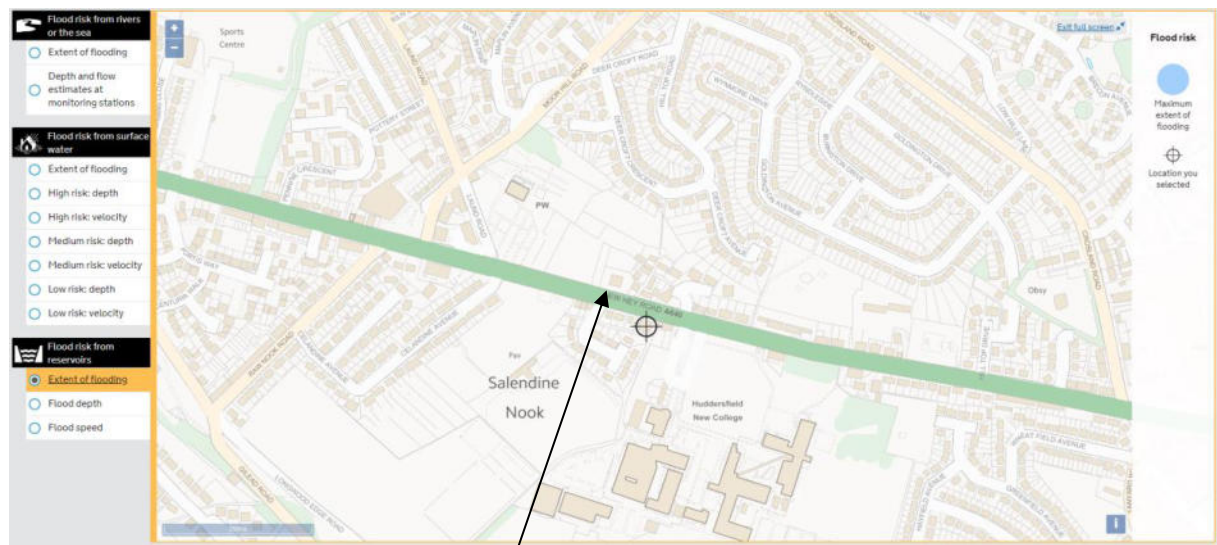
## **APPENDIX C - ENVIRONMENT AGENCY FLOOD MAPS**



Site Location



Site Location



Site Location

## **APPENDIX D - DRAINAGE CALCULATIONS**

Project Title: Lidl New Hey Road Huddersfield

09-122

Prepared By: TM

Date: 03/2019

Checked By: KGP

Date: 03/2019

## SURFACE WATER ATTENUATION FOR 100 YEAR RAINFALL RETURN PERIOD

## DESIGN DATA

|                                                                      |              |
|----------------------------------------------------------------------|--------------|
| Site location =                                                      | Huddersfield |
| M5-60 rainfall ratio (mm) =                                          | 19           |
| 60min rainfall ratio to 2 day rainfalls of 5 year return period, r = | 0.35         |
| Impemeable area (m <sup>2</sup> ) =                                  | 6740         |
| Total site area (m <sup>2</sup> ) =                                  | 10200        |
| Proposed discharge rate (l/s) =                                      | 5.1          |
| Allowance for Climate Change (%) =                                   | 30           |

## CALCULATIONS RESULTS

|                                             |     |
|---------------------------------------------|-----|
| Required storage volume (m <sup>3</sup> ) = | 423 |
| Rainfall intensity (mm/hr) =                | 123 |

## DETAILED CALCULATIONS

| Duration, D                      | 15     | 30     | 60     | 120    | 240    | 360    | 600    | 1440   | 2880   |
|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Z1                               | 0.64   | 0.79   | 1.00   | 1.20   | 1.44   | 1.63   | 1.85   | 2.35   | 2.81   |
| M5-D                             | 12.2   | 15.0   | 19.0   | 22.8   | 27.4   | 31.0   | 35.2   | 44.7   | 53.4   |
| Z2                               | 1.945  | 1.990  | 2.022  | 2.019  | 1.991  | 1.962  | 1.929  | 1.853  | 1.787  |
| M100-D                           | 23.65  | 29.87  | 38.42  | 46.03  | 54.48  | 60.77  | 67.80  | 82.73  | 95.41  |
| i (mm/hr)                        | 94.58  | 59.74  | 38.42  | 23.01  | 13.62  | 10.13  | 6.78   | 3.45   | 1.99   |
| i + Climate Change %             | 122.96 | 77.66  | 49.94  | 29.92  | 17.71  | 13.17  | 8.81   | 4.48   | 2.58   |
| Area (m <sup>2</sup> )           | 6740   | 6740   | 6740   | 6740   | 6740   | 6740   | 6740   | 6740   | 6740   |
| Qp (l/s)                         | 230.39 | 145.52 | 93.58  | 56.06  | 33.17  | 24.67  | 16.51  | 8.40   | 4.84   |
| Qe (l/s)                         | 5.10   | 5.10   | 5.10   | 5.10   | 5.10   | 5.10   | 5.10   | 5.10   | 5.10   |
| Balancing Q                      | 225.29 | 140.42 | 88.48  | 50.96  | 28.07  | 19.57  | 11.41  | 3.30   | -0.26  |
| Storage volume (m <sup>3</sup> ) | 202.76 | 252.76 | 318.53 | 366.91 | 404.27 | 422.74 | 410.92 | 284.80 | -44.67 |

## DESIGN NOTES

1. Surface water storage design is in accordance with the Wallingford Procedure - Design and Analysis of Urban Drainage. Volume 1 Principles, Methods and Practice. Volume 4 - Modified Rational Method.

## **APPENDIX E - PROPOSED DEVELOPMENT DRAWINGS**

Key

- Existing Surface Water Drainage
- Existing Foul Water Drainage
- Existing Combined Water Drainage
- Proposed Surface Water Drainage
- Proposed Foul Water Drainage
- Proposed Pump Drainage
- Proposed Surface Water Gully
- Proposed Rainwater Pipe
- Drainage Channel/Drain

Note:  
Outline Drainage Strategy. Subject to approval and detailed design

Note:  
Existing drainage information based on 1814 P400T Proposed Site Plan by HTC Architects dated 04.04.19 and D224-001 Utilities survey by Landform Surveys.

|                                |     |            |     |     |
|--------------------------------|-----|------------|-----|-----|
| Adjusted Gully locations       | C   | 16/04/2019 | TM  | KGP |
| Updated scheme                 | B   | 03/04/2019 | TM  | KGP |
| Updated to suit revised scheme | A   | 25/03/2019 | TM  | KGP |
| DESCRIPTION                    | REV | DATE       | CHK | APR |

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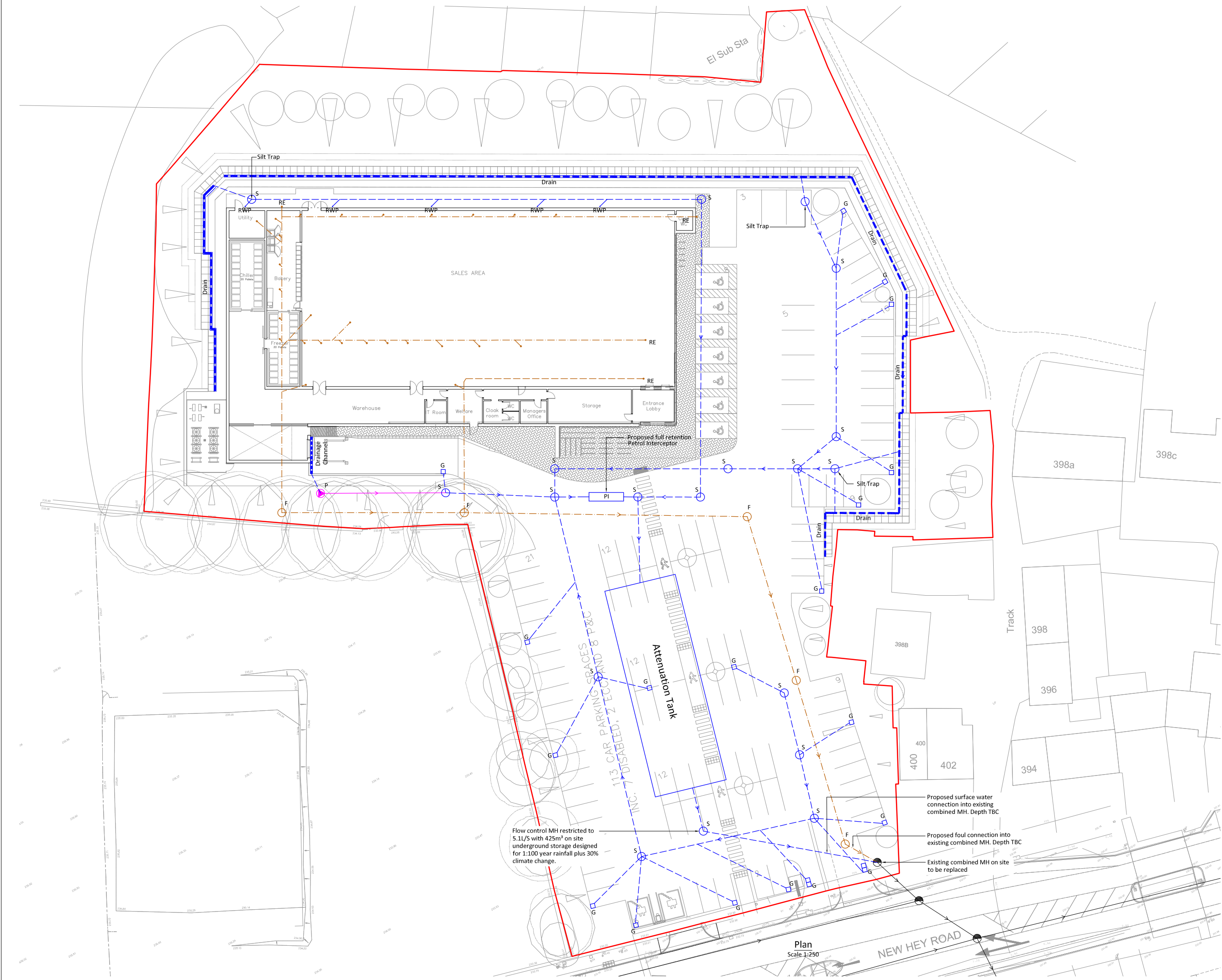
PROJECT  
**New Hey Road  
Huddersfield**

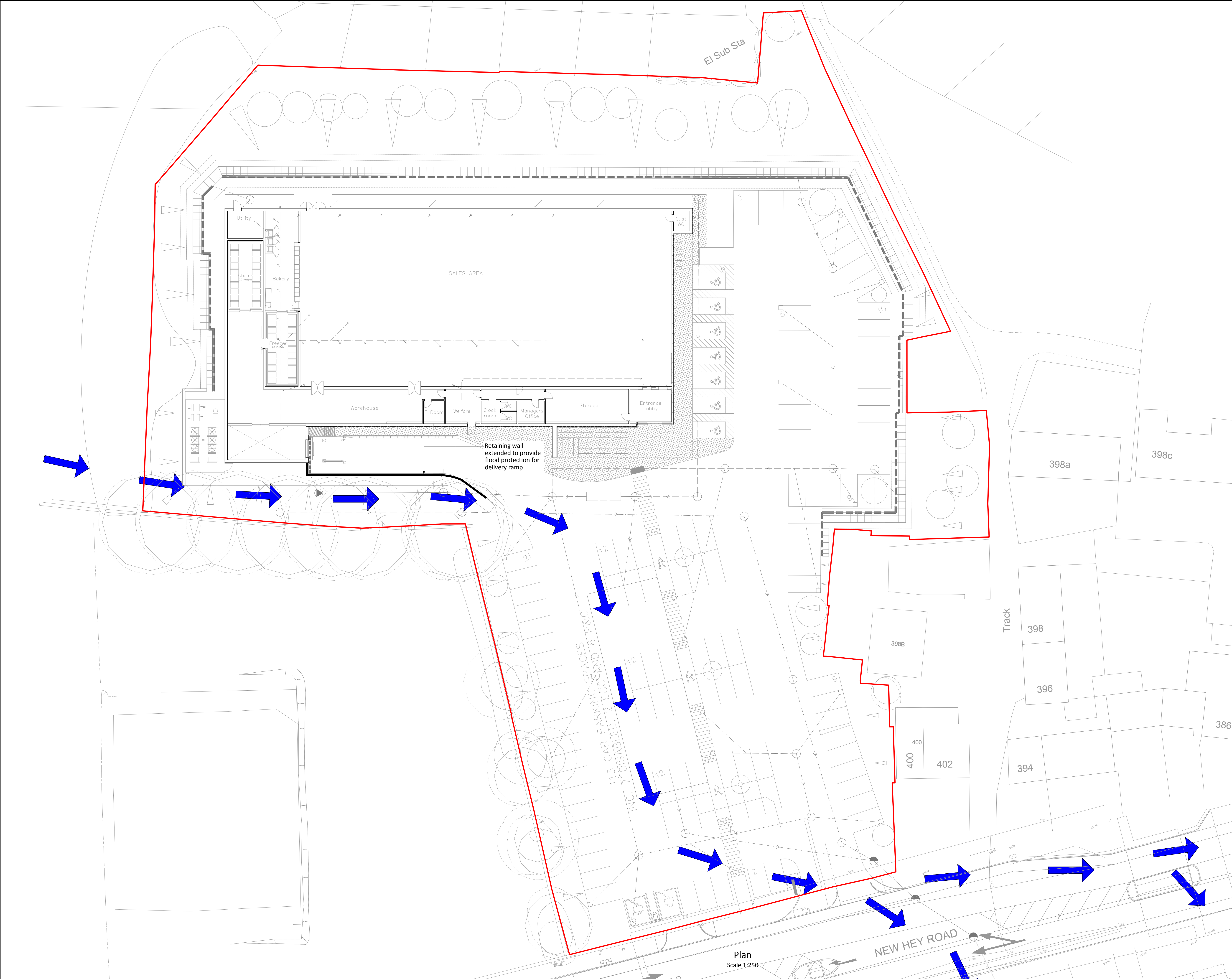
DRAWING TITLE  
**Outline Design  
Drainage Strategy**

CLIENT  
**Lidl UK GmbH**

STATUS  
**Information**

|                |            |          |               |
|----------------|------------|----------|---------------|
| DRAWN          | JG         | DATE     | 19/12/2018    |
| CHECKED        | KA         | SCALE    | AS SHOWN @ A1 |
| APPROVED       | KGP        |          |               |
| DRAWING NUMBER | 09-122-500 | REVISION | C             |





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Key

Proposed Surface Water Drainage

Direction of flow from surface water flooding

|                                |     |            |     |     |
|--------------------------------|-----|------------|-----|-----|
| Site plan updated              | B   | 04/04/2019 | TM  | KGP |
| Updated to suit revised scheme | A   | 25/03/2019 | TM  | KGP |
| DESCRIPTION                    | REV | DATE       | CHK | APR |

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PROJECT

New Hey Road  
Huddersfield

DRAWING TITLE

Overland Flood Flow Route

CLIENT

Lidl UK GmbH

STATUS

Information

|                |            |          |               |
|----------------|------------|----------|---------------|
| DRAWN          | JD         | DATE     | 19/12/18      |
| CHECKED        | KA         | SCALE    | AS SHOWN @ A1 |
| APPROVED       | KGP        |          |               |
| DRAWING NUMBER | 09-122-501 | REVISION | B             |