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FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

McDonald's, Lane End, Kirkby (ST2120)



Prepared for: McDonald's Restaurants Ltd
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Document History

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1.0 Introduction

Purpose

- 1.1 This Flood Risk Assessment has been prepared by Glanville Consultants Ltd on behalf of McDonald's Restaurants Limited to support a planning application for the development of a site in Kirkby in Ashfield and is currently unused. The proposed layouts for the new restaurant shown in this report are outline ones, but accurately reflect the proposal from a drainage impact assessment point of view. The outline drawings exclude signage.

Site Location & Description

- 1.2 The site is located on Lane End, Kirkby in Ashfield, as shown in Figure 1. The site is surrounded by Lane End to the north, an unnamed road and residential property to the east, an industrial yard to the south and a car park for commercial property to the west.

Data Sources

- 1.3 Data used for this report is as follows:
- Topographical survey, Google Earth observations & historical mapping.
 - On-line Flood Maps -. Gov
 - Phase 2 Geotechnical Investigation
 - Emerging Local Plan - Kirby in Ashfield
 - Preliminary flood Risk assessment – Nottinghamshire CC (LLFA)
 - Local Flood Risk Management Strategy - Nottinghamshire CC (LLFA)
- 1.4 All the level information quoted in this report refers to the Ordnance Datum, defined as the mean sea level recorded at Newlyn in Cornwall.

Approach to SuDS

- 1.5 McDonald's are an advocate of sustainable development and will employ sustainable development practices wherever possible. The selection of SuDS for McDonald's sites is based on practical experience of building and maintaining thousands of similar restaurants across the United Kingdom, where many different forms of SuDS have been employed, some with greater success than others. The selection of SuDS therefore takes account of both National & Local SuDS policies, advice from LLFA's or LPA drainage engineers where this is offered, feedback from McDonald's maintenance staff, the experience of the development team and the specific conditions at the site.
- 1.6 McDonalds and their consultants are also constantly researching new and innovative forms of SuDS or refinements to existing SuDS designs in order to:
- Create solutions that better provide for all of the 'Four Pillars of SuDS'.
 - Provide better longevity and maintenance performance for SuDS.
 - Reduce carbon emissions.

2.0 Flood Risk & SuDS Planning Policy

National Flood Risk Policy

- 2.1 National planning policy requires a Flood Risk Assessment for development within Zones 3 and 2, including minor development and for any development located in a critical drainage area. The proposed development is within Zone 3 and therefore a Flood Risk Assessment is required.
- 2.2 The proposed Restaurant use is classified as 'Less Vulnerable' and in accordance with Table 2 - Flood Risk Vulnerability and flood zone 'incompatibility', the proposed development is compatible with flood Zones 1, 2 or 3a.
- 2.3 The 2015 Ministerial Statement on SuDS confirmed:
- We expect local planning policies & decisions on 'Major Development' applications, to ensure SuDS are put in place, unless demonstrated to be inappropriate.
 - To protect the public whilst avoiding excessive burdens on business, this policy will apply to all developments of 10 or more homes and to major commercial development.
- 2.4 This development has less than 1000m² of floor space and is on a site of less than one Hectare in size. Therefore it is not classified as 'Major Development' and planning policies requiring SuDS do not apply.

Local SuDS Policy

- 2.5 Nottinghamshire County Council are the Lead Local Flood Authority and statutory consultee, they will review drainage strategies for major applications. As this is a non-major application, LLFA consultation is not required in respect of SuDS. However the LLFA also have some duties in respect of Ordinary Watercourses and may need to be consulted in respect of flood risk relating to the Ordinary Watercourse adjacent to the site.
- 2.6 Kirby in Ashfield's Emerging Local Plan includes a number of policies relating to SuDS, which generally follow national policy and guidance.

3.0 Existing Conditions and Sources of Flooding

Topography

- 3.1 The site has levels ranging from 148.9m in the west to 146.1m in the south east corner. Levels in the north east are 147.5m. The centre of the site is relatively level at around 146.6m. Asphalt paving remains in the northwest corner and former buildings have now been demolished leaving concrete slabs and made ground over much of site. There are long banks down into the site around the northern boundary, with lane End around 1-2.5m higher than the site. There is a small soil heap near the site entrance in the southeast corner of the site.
- 3.2 There are mature trees inside much of the site boundary.

Historical Use

- 3.3 The earliest available mapping (1879) shows the site to be undeveloped with a railway line along the alignment of the adjacent unnamed road. Later mapping shows the River Erewash alongside the railway. In 1960 a library was constructed on the eastern part of the site. In 1985 there is another larger works building on the western side of the site and the River Erewash is no longer shown, presumably culverted. By 2010 both buildings had been demolished with floor slabs and external paved areas left in-situ.

Geology & Ground Conditions

- 3.4 The British Geological Survey indicates no superficial deposits and Cadeby Formation Bedrock. Table 1 summarises the results of the geotechnical investigation of the site.

Table 1: Summary of Intrusive Geo-Environmental Investigation

Geotechnical Intrusive Investigation Summary- (m = metres below ground level)		
Strata top	Strata base	Description of Strata
0.0	0.25	RC slab / Asphalt
0.0	0.19	TOPSOIL – clayey, gravelly SAND with abundant rootlets. Gravel of angular to sub angular fine to coarse sandstone, bricks and mudstone.
0.2	0.96	SUB BASE – firm sandy very gravelly CLAY / medium dense SAND with occasional cobbles. Gravel of angular fine to coarse mudstone, sandstone and bricks.
1.05	2.64	CADEBY FORMATION – Firm to stiff & very stiff sandy, very gravelly CLAY.
2.53	3.23+	CADEBY FORMATION – Weathered bedrock. Extremely weak to weak SANDSTONE.
Geotechnical Summary:		
Highest water level	TP02 1.5m at surface of natural clay. Subsequent monitoring found levels between 1.6m and 2.9mbgl.	
Drainage	All BRE soakaway tests failed to record a rate due to lack of infiltration. The geotechnical report concludes that infiltration drainage is not considered feasible.	

- 3.5 Extracts of the Geotechnical Report can be found in Appendix A.

Groundwater Quality

- 3.6 Geological records indicate the bedrock aquifer designation is 'Principal'. The site is not within a groundwater source protection Zone.

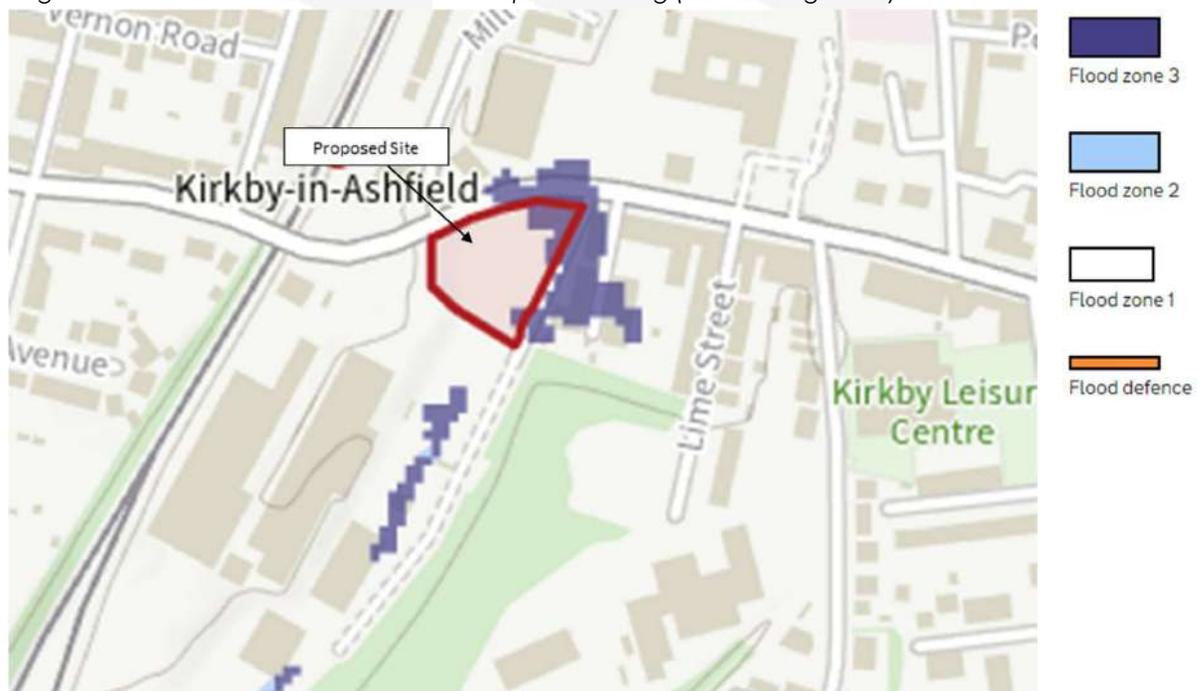
Tidal & Fluvial Flooding

- 3.7 Flood Zone definitions are set out in the National Planning Policy Guidance:

- Flood Zone 1 - land assessed as having a less than 1 in 1,000 annual probabilities of river or sea flooding (<0.1%)
- Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year
- Flood Zone 3 - 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

Note: Flood zones refer to the probability of river and sea flooding, ignoring defences.

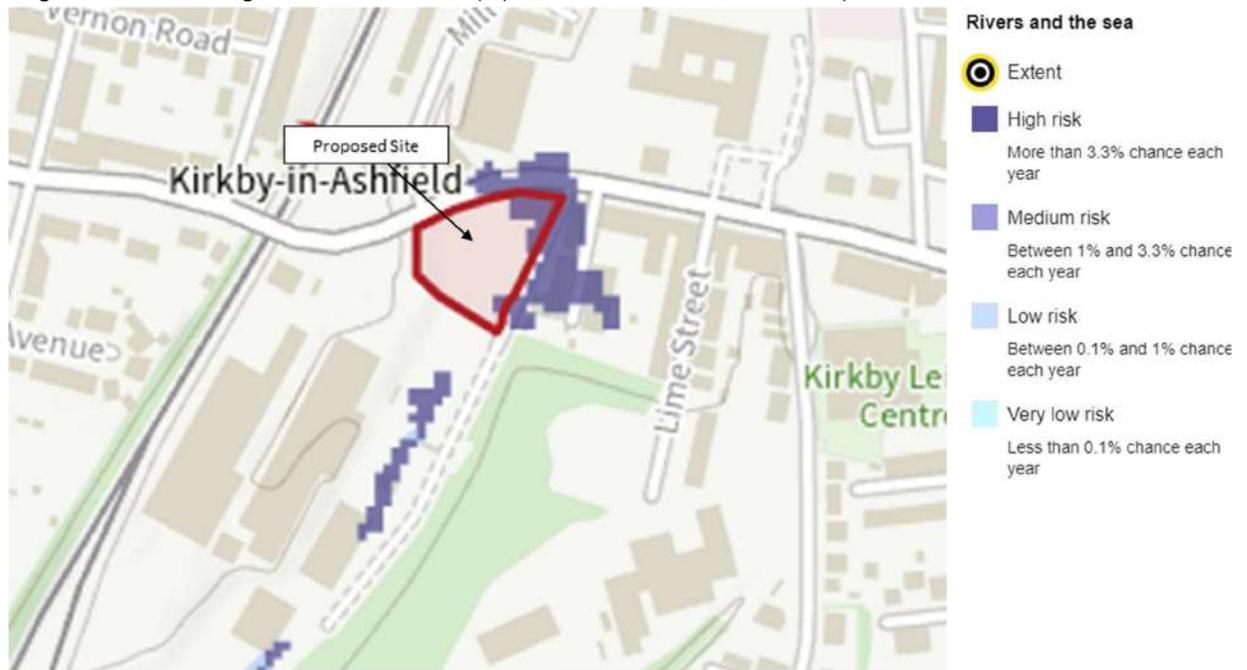
Image 1: Gov.UK Fluvial & Tidal Flood Risk Map for Planning (defences ignored)



- 3.8 The Flood Map for Planning, as shown in Image 1, indicate the site to be located within Zone 3, high risk.

- 3.9 The Long Term Flood Risk Map indicates the flood risk when defences are taken into account. Comparing the flood risk in Images 1 and 2, it can be seen that defences make no difference to the flood extent in this location. This mapping also differentiates between flood Zones 3b (<3.3% chance of flooding) and Zone 3a (between 1% & 3.3%). Image 2 shows the site to be in a medium risk area, i.e. Zone 3a.

Image 2: Gov.UK Long Term Flood Risk Map (defences taken into account)



- 3.10 The Flood Map for Planning typically shows flood zones associated with Main Rivers which fall under the governance of the Environment Agency. The Environment Agency (EA) have confirmed that the culverted watercourse which passes the eastern part of the site is not classified as a Main River, and is classified as an Ordinary Watercourse, which falls under the governance of the Lead Local Flood Authority (LLFA).
- 3.11 The Environment Agency have confirmed they have no records of flooding in the location of the site, neither do they have a flood model for this Ordinary Watercourse. When requested for information pertaining to the zonal classification in this area, where there is no Main River, the EA referred to the surface water flood risk.
- 3.12 The LLFA have confirmed that the adjacent Ordinary Watercourse is not a council maintained asset but a watercourse under riparian ownership.

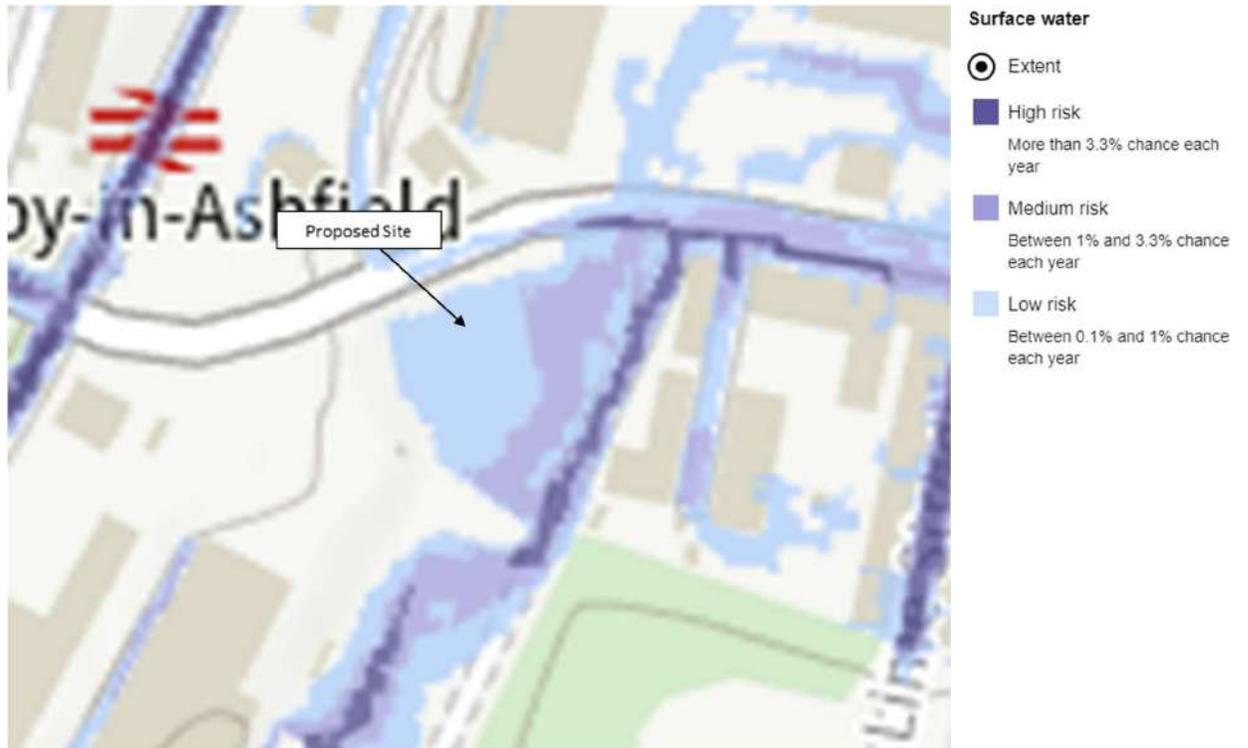
Groundwater Flooding

- 3.13 The Geo-Environmental Study indicates the site has potential for groundwater flooding to property below ground level.

Overland (Pluvial) Flooding

- 3.14 The Flood Warning Information Service website, as shown in Image 3, indicates most of the site to be within an area of low risk of surface water flooding, with an area of medium risk adjacent to the culverted watercourse. The culverted watercourse, located under the track adjacent to the site is shown as an area of high risk.

Image 3: Gov.UK Surface Water Flood Risk Map



Flooding from Reservoirs, Canals and other Artificial Sources

3.15 The Flood Warning Information Service website indicates the site to be outside the area at risk of reservoir flooding, as shown in Image 4.

Image 4: Gov.UK Reservoir Flood Breach Extent Map



Existing Sewer Flooding

3.16 The public sewer records, refer to Image 5, shows the existing ø525mm to ø825mm culvert flowing south under the unnamed road to the east of the site. Nearby surface water sewers drain into this culvert. It is likely the former site drainage connected to this culverted watercourse, as shown in Image 6, which shows remaining parts of the former site drainage.

3.17 The public sewer records also show combined water sewers to the northwest and east of the site, converging on the ø525mm combined sewer which flows south along the unnamed road to the east of the site. Further combined sewers are located to the south of the site flowing south. Refer to images 6 and 7 for the on-site sub scan.

Image 5: Public Sewer Records Extract

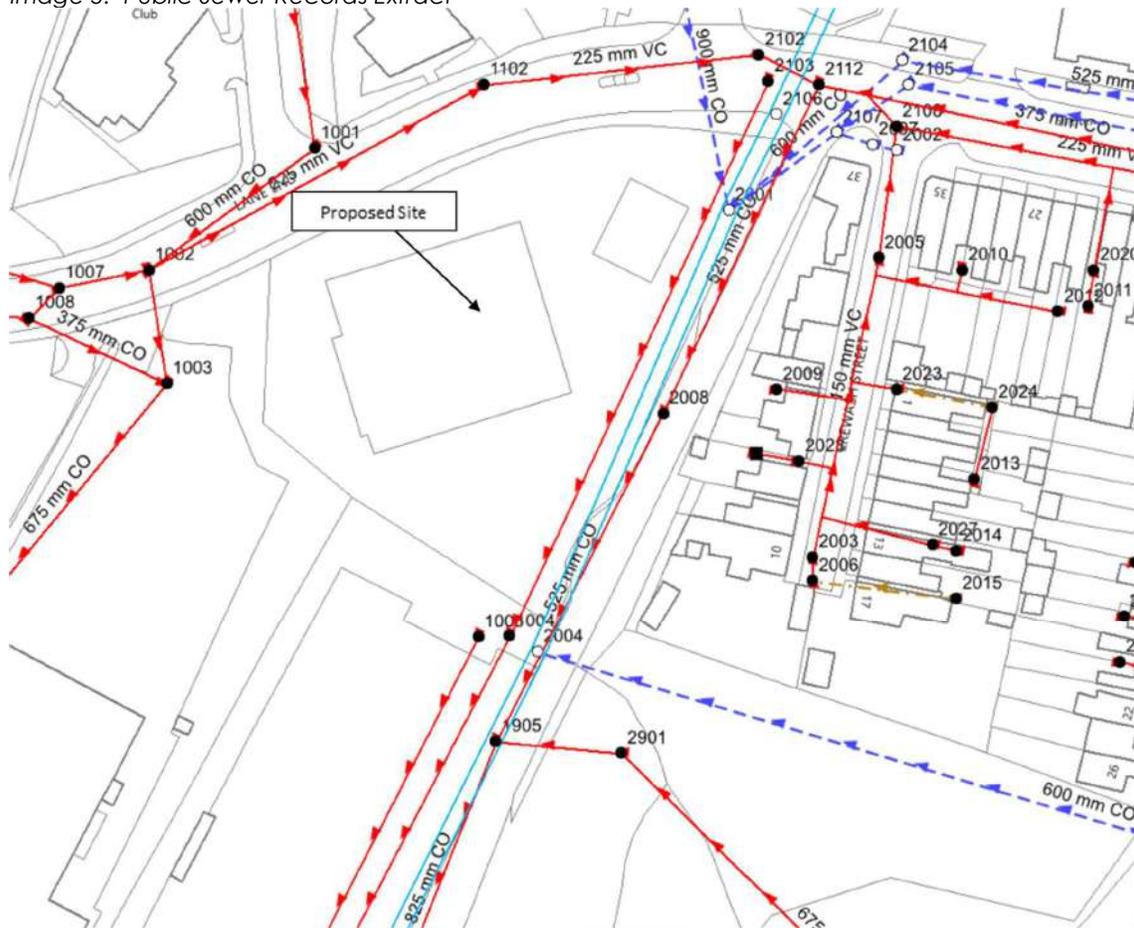
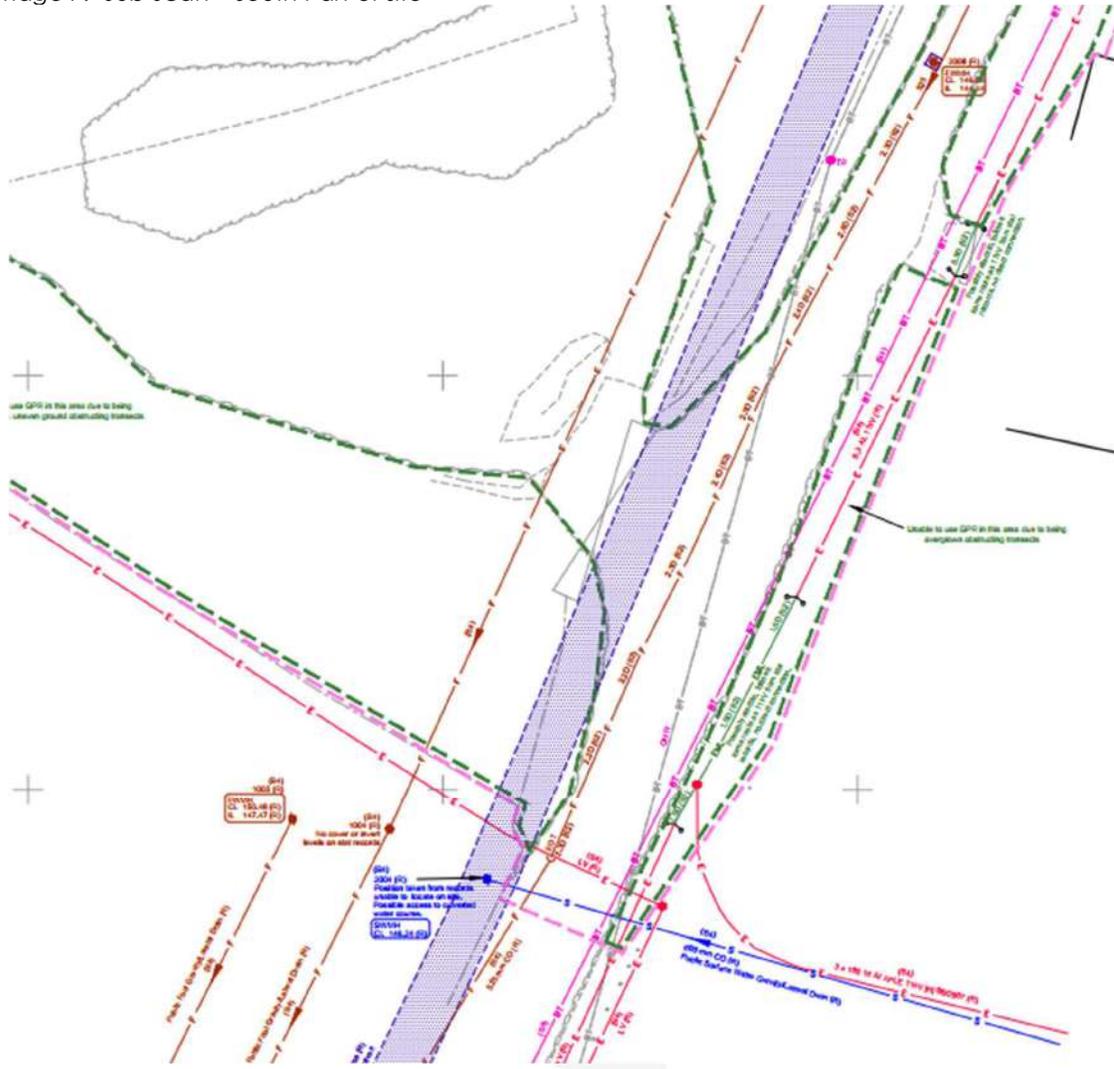


Image 7: Sub Scan – South Part of site



4.0 Development Flood Risk

Development Proposals

- 4.1 The proposed development consists of a McDonald's Restaurant with associated drive-through lane and car park. The development layout can be seen in Figure 3.

Flood Risk Management

- 4.2 The development design includes flood risk reducing features which are listed in Table 2. The following sub sections of this chapter describe in more detail each of the potential sources of flooding and how the development design features will reduce these risks.

Table 2: Flood Risk Reducing Design Features

Possible Design Features	In this Design	Description of Feature	Flood Risk Reduction
Surface levels & FFL	Yes	The building FFL is raised 600mm above existing site levels. Surfaces drained into the SuDS. Exceedance flow routes are checked to ensure they do not create a flood risk.	Pluvial flooding
SuDS Drainage	Yes	1:100 + climate change allowance included within drainage system.	Pluvial /drainage flooding
Flood Resilience Measures	No	Not required, buildings not expected to flood.	N/A
Flood Compensation	Yes	Site raised, but flood routes and volumes maintained within the site, refer to compensation analysis.	Pluvial / drainage / Ordinary Watercourse
Flow Control Devices	Yes	Infiltration is not possible due to ground conditions and therefore flow control is required for a restricted watercourse discharge.	Ordinary Watercourse flooding
Safe Pedestrian Escape Route	No	The adjacent unnamed road and the eastern edge of the site is a flood route during extreme events. The majority of the site remains dry.	Pluvial flooding
Safe Escape Route Vehicular	No	The adjacent unnamed road and the eastern edge of the site is a flood route during extreme events. The majority of the site remains dry.	Pluvial flooding
Dry parking area	Yes / No	The adjacent unnamed road and the eastern edge of the site is a flood route during extreme events. The majority of the site remains dry.	Pluvial flooding
Flood Plan & Warning	Yes	The site will have a Flood Emergency Plan.	Pluvial flooding

Tidal & Fluvial Flooding

- 4.3 The development is outside the floodplain for Main Rivers and Sea. The EA have confirmed the flood risk for the site relates to surface water flooding and the Ordinary Watercourse. The extent of flooding shown by the EA flood map (image 2) has been assessed and a level for level floodplain compensation analysis has been carried out. The analysis is shown in Figure 7.
- 4.4 The Finished Floor Level (FFL) of the proposed restaurant will be set 600mm above existing ground levels, to ensure an appropriate level of safety from any on-site surface water or ordinary watercourse flooding.

Overland Surface Water Flooding (Pluvial) On Site

- 4.5 The proposed overland flow paths and levels are shown in Figure 5 with the existing flow path shown in Figure 2. In addition, the improved on-site drainage and raised building FFL, the site level design will ensure that any pluvial flooding is routed to avoid a risk to the development and to match existing flow routes through the site.

Overland Surface Water Flooding from the Site onto Surrounding Land

- 4.6 The proposed on-site drainage system will be designed to accommodate a 1 in 100 plus climate change rainfall event, without creating a flood hazard. If an exceedance event occurs (greater magnitude than 1 in 100 plus climate change storm event) then the existing overland flood routes on and off the site will not be changed by the development, so the development does not adversely impact surrounding land as shown in Figures 2 and 5. In addition, Figure 5 demonstrates that an overland route for surface water is maintained from the NE corner to the SE corner, matching the existing overland flow route through the eastern edge of the site shown in Image 3.

Groundwater Flooding

- 4.7 The site level design will ensure that in the unlikely event that any groundwater does flood at surface level, the proposed overland flow routes do not create a risk to the development (refer to Figure 5).

Flooding from Reservoirs, Canals and other Artificial Sources

- 4.8 No artificial sources of flooding have been identified.

Sewer Flooding

- 4.9 The proposed development surface and foul water drainage layouts are shown in Figure 6. The new foul drainage infrastructure on the site will be designed in accordance with Building Regulations and therefore no significant flood risk is expected from the proposed on-site foul water drainage.
- 4.10 The new on-site surface water drainage has been designed to accommodate a 1 in 100 year plus climate change event without creating a flood hazard by using a flow control device. It is likely the former buildings and hard surfacing, constructed in the 1960's and 1980's did not include any SuDS or flow control and therefore the proposed development will reduce the risk of flooding of the receiving watercourse connected to it. Raising the building by 600mm above existing ground levels will create further resilience to any surcharging or flooding from nearby sewers.

Flood Impacts, Mitigation and Residual Effects

4.11 Table 3 below rates the different flood risks to the development, considering the development design proposals as described in this report. Design proposals are not considered to be mitigation, but any action required in addition to the current design proposals is considered mitigation and listed in the table. We have rated the risks as none, low, medium and high based on our assessment of the facts relating to each source of flooding and the potential hazards.

Table 3: Residual Flood Risk

Type of Flood Risk	Flood Risk Rating None Low Med High	Mitigation required	Mitigation Measure
Tidal / Fluvial Flooding	Low	No	None
Overland SW flooding from adjacent land / Ordinary Watercourse	Med	Yes	Ensure Flood Emergency Plan is maintained and staff trained accordingly.
Overland SW flooding onto adjacent land	Low	No	None
Groundwater flooding	Low	No	None
Flooding from reservoirs	Low	No	None
Flooding from sewers	Low	Yes	Normal maintenance of drainage systems

5.0 Proposed Sustainable Drainage

Site Specific Sustainable Drainage Assessment

5.1 The Ciria SuDS Manual describes the four main categories of benefits that can be achieved by SuDS as water quantity, water quality, amenity and biodiversity: also known as the four Pillars of SuDS. The SuDS Manual Box 1.2 describes the SuDS approach to managing surface water runoff as follows & depending on the characteristics of the site, these may be used in combination and to varying degrees:

- use surface water runoff as a resource
- manage rainwater close to where it falls (at source)
- manage runoff on the surface (above ground)
- allow rainwater to soak into the ground (infiltration)
- promote evapotranspiration
- slow and store runoff to mimic natural runoff rates and volumes
- reduce contamination of runoff through pollution prevention and by controlling the runoff at source
- treat runoff to reduce the risk of urban contaminants causing environmental pollution.

5.2 Table 4 below is a version of the Ciria SuDS Manual table 1.1 'Types of SuDS Components with a comment on the suitability of each component for this site.

Table 4: SuDS Component Suitability Assessment

Component Type	Description	Suitability for this Site
Rainwater Harvesting	Rainwater collected from roof and paved surfaces in a tank. The system may include treatment elements and should include specific storage provision if it is to be used to manage runoff to a design standard.	The restaurant is of modular construction to a standard design which is not set up for rainwater recycling. Water demand is also high so any recycling would need to be accompanied by a backup water supply and a very large recycling tank, negating the environmental benefits.
Green /Blue Roofs	A planted soil layer constructed on the roof of a building to create a living surface. Water is stored in the soil layer and absorbed by vegetation. Blue roofs store water at roof level, without the use.	The restaurant is a lightweight modular construction, produced in a factory and transported to site. This form of construction has many environmental benefits but is not currently capable of supporting green or blue roofs for McDonald's.
Infiltration System	Collects & stores runoff allowing it to infiltrate into the ground. Overlying vegetation & unsaturated soils offer protection to groundwater from pollution.	Infiltration unsuitable due to clay soils.
Proprietary Treatment System	These structures provide treatment of water through the removal of contaminants.	These systems are suitable for this site.
Filter Strips	Runoff from an impermeable area is allowed to flow across a grassed or otherwise densely planted area for sedimentation & filtration.	Filter strips unsuitable, due to site levels and space. Only sufficient treatment for roof water.

Filter Drains	Runoff is temporarily stored below the surface in a trench filled with stone, providing attenuation, conveyance & treatment (via filtration).	Filter drains suitable if lined through made ground and connected to positive drainage.
Swales	A vegetated channel is used to convey & treat runoff (via filtration). These can be "wet", where water will remain permanently at the base of the swale (lined), or "dry" where water is only present temporarily after rainfall events (unlined).	Swales are unsuitable due banks in soft landscaped areas.
Bioretention Systems (inc. rain gardens)	A shallow landscaped depression allows runoff to pond temporarily on the surface, before filtering through vegetation and underlying soils prior to collection or infiltration. In its simplest form it is often referred to as a rain garden. Engineered soils (gravel and sand layers) and enhanced vegetation may improve treatment performance.	Bioretention systems may be suitable but location and capacity restricted by external levels in most places.
Rills	Formal linear drainage features in which surface water can be stored or conveyed. They can be incorporated with water features such as ponds or waterfalls where appropriate.	Unsuitable due trip/wheel hazard & high pedestrian & vehicle traffic. Unsuitable for disabled access. Channels with heel guard grating are an acceptable alternative.
Trees	Trees within a range of infiltration SuDS components improve their performance, as root growth & decomposition increase soil infiltration capacity. Alternatively, as standalone features within soil filled tree pits, tree planters or structural soils, collecting and storing runoff and providing treatment (via filtration and phytoremediation).	Trees are suitable subject to space requirements. Several existing trees are being retained.
Pervious Pavements	Runoff soaks through structural paving. This can be paving blocks with gaps between solid blocks, or porous paving where water filters through the block itself. Water can be stored in the sub-base & potentially allowed to infiltrate into the ground.	Porous paving has been used extensively by McDonald's in the past, but the daily jet washing of pavements consistently led to early failure of the pavement. Porous paving is not deemed suitable for this reason.
Attenuation storage tanks	Below-ground spaces used to temporarily store runoff before infiltration, controlled release, or use. E.g. geocellular or concrete tanks, oversized pipes.	These systems are suitable for this site.
Detention Basins	Runoff drains to a landscaped depression with an outlet that restricts flows, so that the basin fills & provides attenuation. Generally, basins are dry, except during & immediately following the rainfall event. If vegetated, runoff will be treated as it is conveyed & filtered across the base of the basin.	Insufficient site area for a significant basin.
Ponds & Wetlands	Features with a permanent pool of water can provide attenuation & treatment of runoff, where outflows are controlled & water levels vary. They can support emergent & submerged vegetation along their shoreline & in shallow, marshy zones, which enhances treatment & biodiversity.	Insufficient site area for a significant pond or wetland.

Available Surface Water Discharge Options

- 5.3 Part H3 of the Building Regulations requires adequate provision for rainwater and surface water to be drained from a building and external areas, which shall be discharged to one of the following in order of priority: -
- An infiltration system;
 - A watercourse;
 - A sewer.
- 5.4 The Geo-Environmental report indicates made ground over clay over sandstone, with relatively shallow groundwater. Infiltration tests failed and the geotechnical report advises against infiltration for this reason, as shown in Appendix A.
- 5.5 There is an Ordinary Watercourse near the site which would be suitable for a discharge. It is likely that former development on the site was connected to this watercourse.
- 5.6 It is concluded that the most suitable option is therefore to discharge to the Ordinary Watercourse under the unnamed road adjacent to the site's eastern boundary.

Selected Sustainable Drainage Measures

- 5.7 The selection of SuDS techniques for this site has followed the SuDS management train concept explained in the SuDS Manual. The concept is to use drainage techniques in series to incrementally reduce pollution, flow rates and volumes. The hierarchy of techniques to be used are as follows:
- Prevention - prevent runoff & pollution e.g., rainwater re-cycling and road sweeping.
 - Source Control - control runoff at or near its source e.g., local infiltration methods.
 - Site Control - routing water to site controls e.g., pipes to a large detention basin.
 - Regional Control - routing water from several sites to regional controls e.g., pipes to a balancing pond or wetland.
- 5.8 The proposed surface water drainage layout is shown in Figure 6 and includes the following features: -
- Rainfall will be collected from roofs & the main car park by rainwater pipes, gullies and channels and conveyed to lined cellular tanks for attenuation of run-off.
 - The tank will attenuate flows with the help of a flow control device at the downstream manhole.
 - Once through the flow control device, flows will pass through a petrol interceptor and then discharge into the culverted ordinary watercourse.
- 5.9 These sustainable drainage measures have been selected for the site conditions and are suitable for the constant use and daily maintenance required for a McDonald's site. These systems are tried and tested on similar sites where permeability is poor, and the site area cannot accommodate larger open drainage features.

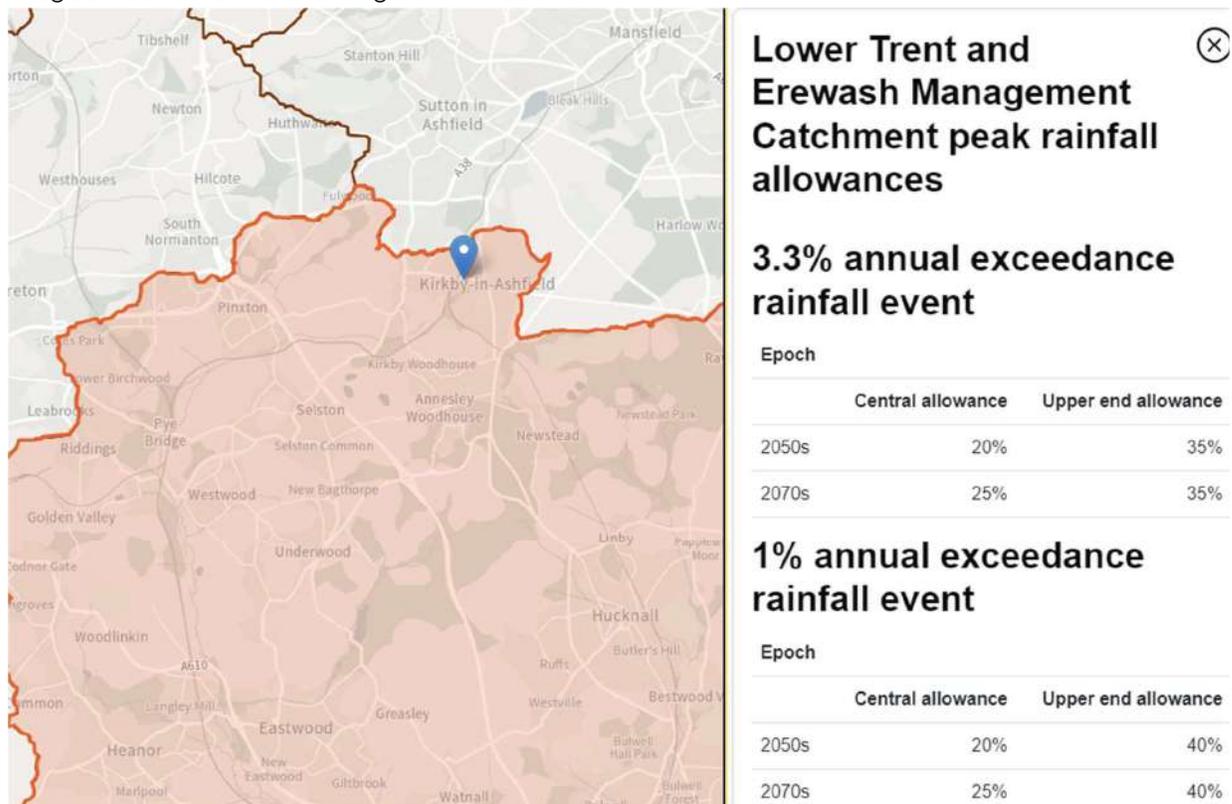
Climate Change

5.10 Climate Change allowances were updated on the 10th of May 2022. The new climate change allowances map places the site within the Lower Trent & Erewash Management Catchment, as shown in Image 8. The design life for the proposed development is 50 years, but planning practice guidance requires non residential development to have a minimum 75-year life for the purpose of climate change assessments which places it within 2070's epoch and the central allowance. For Flood Risk Assessments, the developments should be designed to cater for 1% annual exceedance events so:

- there is no increase in flood risk elsewhere and
- the development will be safe from surface water flooding.

5.11 Development drainage should therefore be designed for no flooding in the 1:100 year plus **25%** climate change event.

Image 8: Gov.UK Climate Change Allowances



Development with a lifetime of between 2061 and 2100

For development with a lifetime between 2061 and 2100 take the same approach but use the central allowance for the 2070s epoch (2061 to 2125).

Flow Rates & Attenuation

5.12 Existing and proposed impermeable areas have been calculated and are shown in Figure 4. These areas have been used to calculate the existing and proposed discharge from the site for a range of storm events, as shown in Table 5.

5.13 'Urban Creep' is not applicable to McDonald's as most of their sites have no space for further expansion of impermeable areas and those that do will have any alterations to paving accompanied by a new planning application with additional SuDS measures if required. Urban creep allowances are normally only required for residential development where small paving alterations and extensions area more likely to be completed outside of the planning process, without complementary sustainable drainage improvements. This approach accords with the advice in the Non-Statutory Technical Standards for SuDS by LASOO (Local Authority SuDS Officer Organisation).

Table 5: Existing & Proposed Flows & Attenuation

Storm Event (Annual Exceedance Probability)	Existing greenfield Run Off Rate (l/s)	Proposed Discharge Rate (l/s)	Attenuation Provided (m³)
1 in 1 (100% AEP)	1.7	1.9	220
Qbar	1.9		
1 in 30 (3.3% AEP)	3.4		
1 in 100 (1% AEP)	4.0		
1 in 100 (1% AEP) plus 30%	-		

Pollution Control

5.14 Ciria pollution treatment measures have been applied to ensure treatment of the surface water. The pollution control measures are designed to minimise the transmittal of any pollutants, collected by runoff flowing over hard paved areas, to the public sewers and to ground. Pre-treatment is provided with gulleys and catchpit manholes to remove silt and prolong the life of the pollution control treatment media. Pollution control measures for this site include:

- A proprietary SPEL coalesce ESR 325/C1 petrol interceptor prior to discharge to ground.

5.15 The suitability of the pollution control measures is quantified in accordance with CIRIA 753, Simple Index Approach. Comparing the pollution hazard indices in Table 6, for each catchment type, with the total pollution mitigation indices in Table 7, it can be seen that the suggested drainage system will be sufficient to mitigate the expected pollution from roofs and paved areas. Refer to the mitigation formula below and Appendix B for the product details.

*Total SuDS Mitigation Index must be ≥ Each Catchment's Pollution Hazards Index
(For each contaminant type)*

Total SuDS Mitigation Index = 1st Stage Mitigation Index + 0.5 (2nd Stage Mitigation Index)

Table 6: Pollution Hazard Indices

Catchment Type	Pollution Hazard Level	Pollution Hazard Indices		
		Suspended solids	Metals	Hydrocarbons
Restaurant Roof	Low	0.3	0.4	0.05
Restaurant parking	Medium	0.7	0.6	0.7

Table 7: Total Pollution Mitigation Indices

Type of Pollution Mitigation (SuDS)	Pollution Mitigation Indices for discharge to surface water		
	Suspended solids	Metals	Hydrocarbons
SPEL Petrol interceptor with coalescer ESR 325/C1	0.8	0.6	0.9
Total treatment indices	0.8	0.6	0.9

Maintenance

- 5.16 Refer to the separate Glanville report entitled 'Drainage Maintenance Plan'.

Foul Water Drainage Strategy

- 5.17 The development will connect FW flows, using a separate foul water gravity drainage system, to the existing public sewer under the unnamed road to the east, as shown in Figure 6.
- 5.18 The restaurant drainage includes an alarmed grease trap for all the kitchen waste pipework to ensure drains do not lose capacity due to grease build up and to prevent grease entering the public sewers.

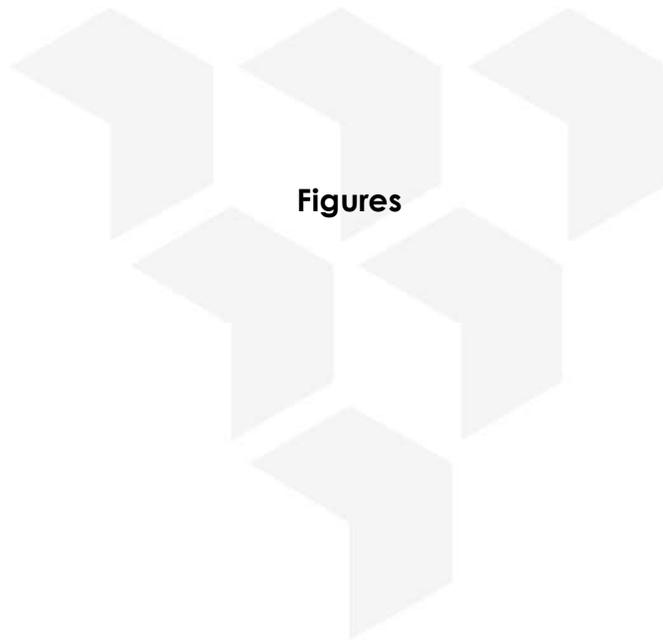
6.0 Further Investigations & Approvals

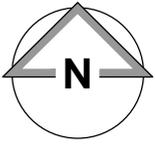
- 6.1 The information in this report is sufficient to demonstrate the suitability of the proposed development in respect of Flood Risk and Sustainable Drainage. It is expected that planning conditions may be imposed requiring drainage proposals to be in accordance with this Flood Risk Assessment, and that details of the on-site foul and surface water drainage designs will need to be provided prior to commencement of works.
- 6.2 The detailed drainage design must comply with the Building Regulations and approval will be required from a qualified Building Inspector.
- 6.3 Prior to construction a formal application will need to be submitted to obtain consent for physical connections (direct or indirect) and the discharge of flows to the adopted sewer.
- 6.4 Surface water must be carefully managed on site during construction to safeguard the works and neighbouring land from flooding and to ensure protection of natural water resources and ecology.



7.0 Conclusion

- 7.1 The development proposals have been designed after consideration of national and local planning policy and best practice guidance, in the context of the proposed use and site conditions.
- 7.2 Flood risks within the site have been assessed and are medium to low. The proposed design ensures that flood risks are appropriately mitigated with the site and that flood risks to others are not increased by the development.
- 7.3 The development's surface water drainage strategy follows sustainable drainage guidance. Infiltration is not possible due to poor infiltration characteristics of the existing soils. The site therefore discharges at a restricted rate to the ordinary watercourse under the unnamed road to the east. The sustainable surface water drainage system is designed to accommodate a 1:100-year event plus the appropriate climate change allowance for this site without flooding.
- 7.4 The proposed building FFL ensures that the proposed building benefits from an enhanced level of protection. The proposed external levels ensure that no volume is taken away from the flood zone, and that an existing overland flow path across the site is maintained.
- 7.5 A SuDS maintenance schedule has been provided to demonstrate adoption and maintenance proposals in a separate Glanville report entitled 'Drainage Maintenance Plan'.
- 7.6 The development's foul water drainage strategy utilises a separate gravity foul water drainage system to take effluent to the existing combined sewer under the adjacent unnamed watercourse. The design includes many access points for maintenance and an alarmed grease trap to ensure downstream sewers are protected from cooking waste / grease.
- 7.7 In summary, the development proposals comply with relevant standards for flood risk and sustainable drainage.

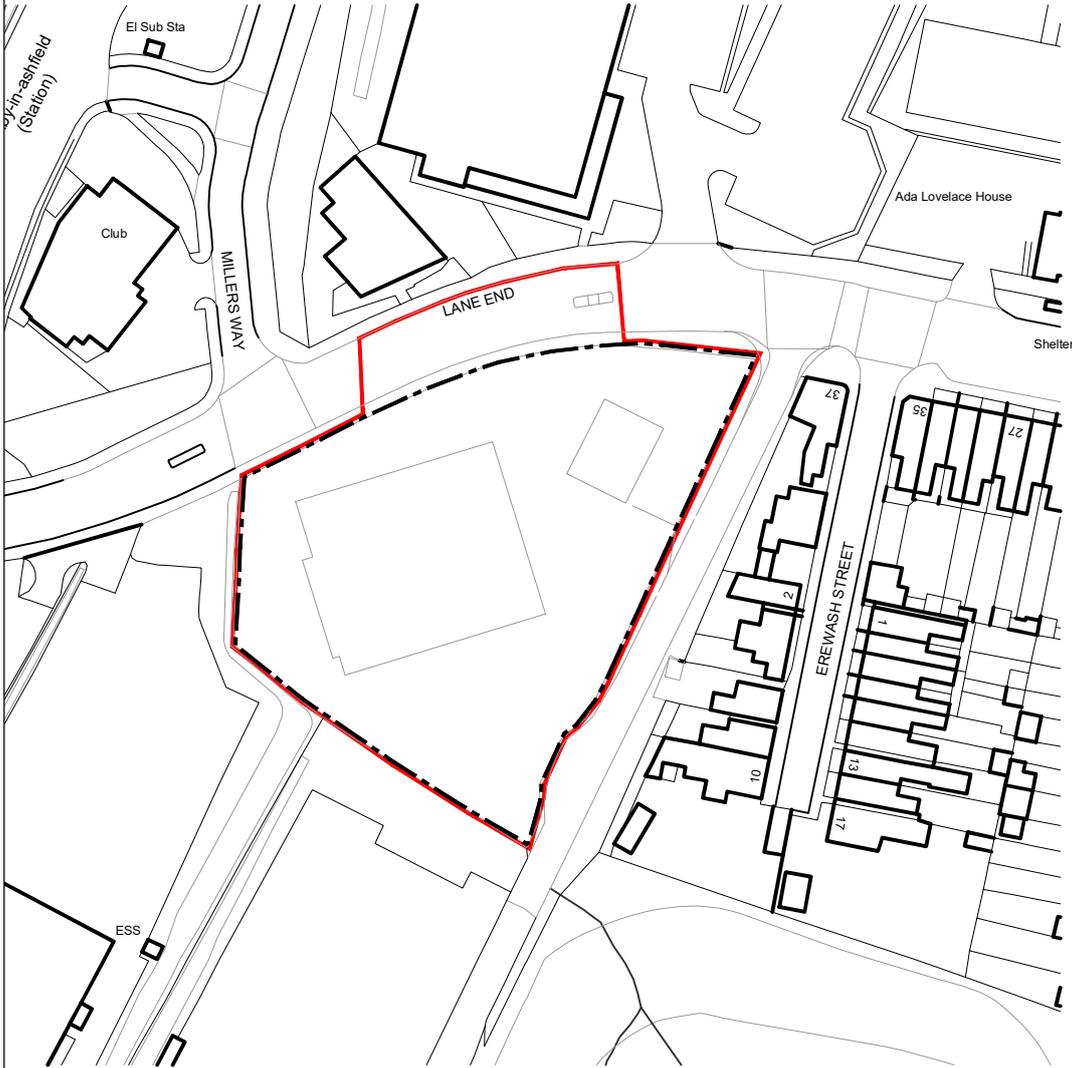




0 10 20 30 40 50m



Scale 1:1250



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- All proprietary materials and products are to be used strictly in accordance with the manufacturers recommendations.

CDM 2015

Client notified of duties: **At Design Workshops**

Principal Designer: **CSS**

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Drawing Based:

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McDonald's Demise Boundary Indicated:



Application Boundary Indicated:

Notes:
All drawings to be read in conjunction with all other drawings as noted on issue sheet.

FIGURE 1

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- 15/11/2024 BA TSS

Initial Issue

REV Date Drawn by: - Checked by: -

Status Purpose of Issue

S2 For Information

drawing stage **Planning**

client

McDonald's Restaurants Ltd

project store

Land End, Kirkby 2120

drawing title

Location Plan

date 15/11/2024 drawn BA

scale@A4 1:1250 checked TSS

PLANNING

Location Plan

Rev

Job No **13010_AEW_2120_1001**

Job No

aew architects
0161 214 4370
www.aewarchitects.com



AEW



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- KEY**
-  EXISTING SURVEY
 -  EXISTING OVERLAND FLOW PATH

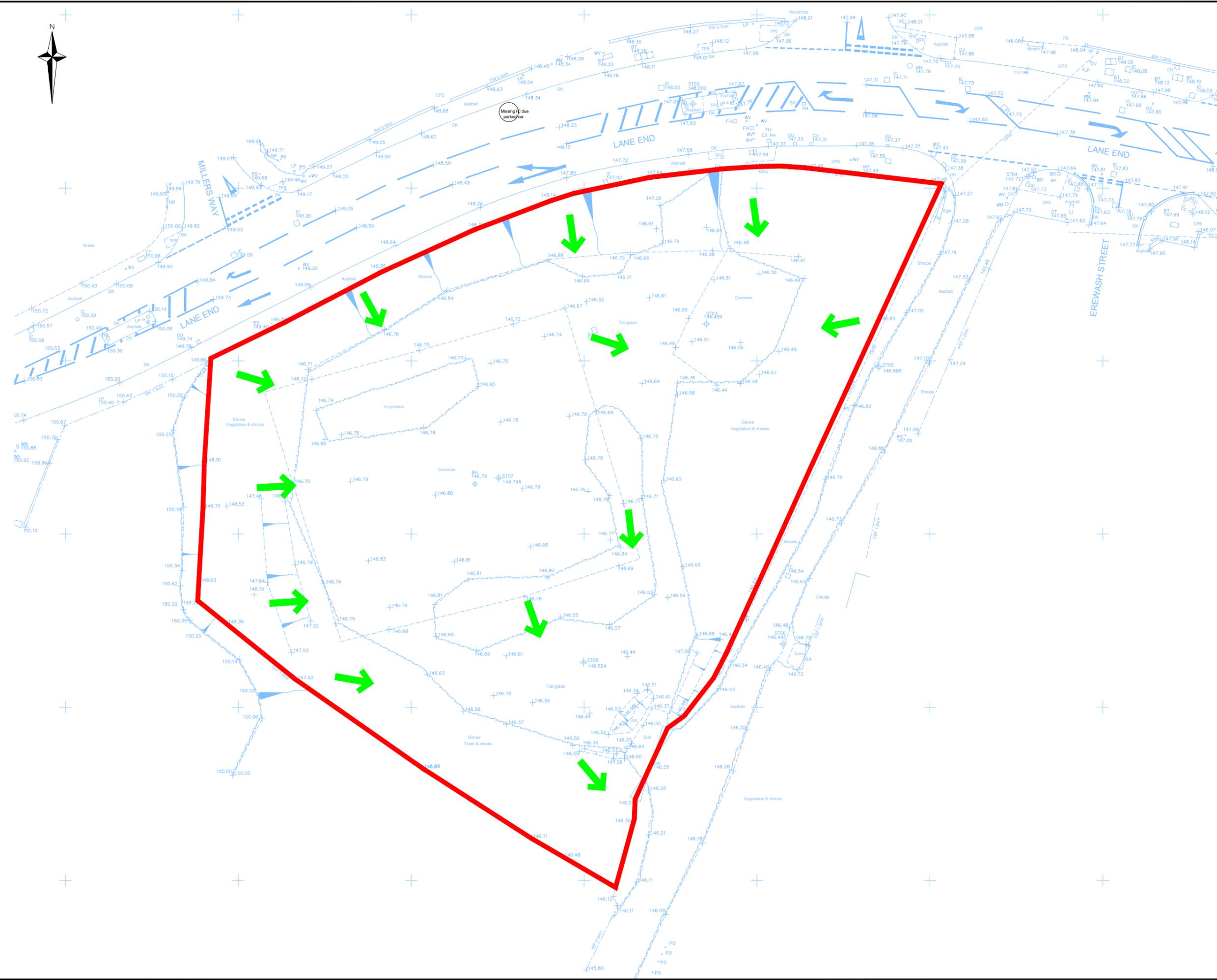


FIGURE 2

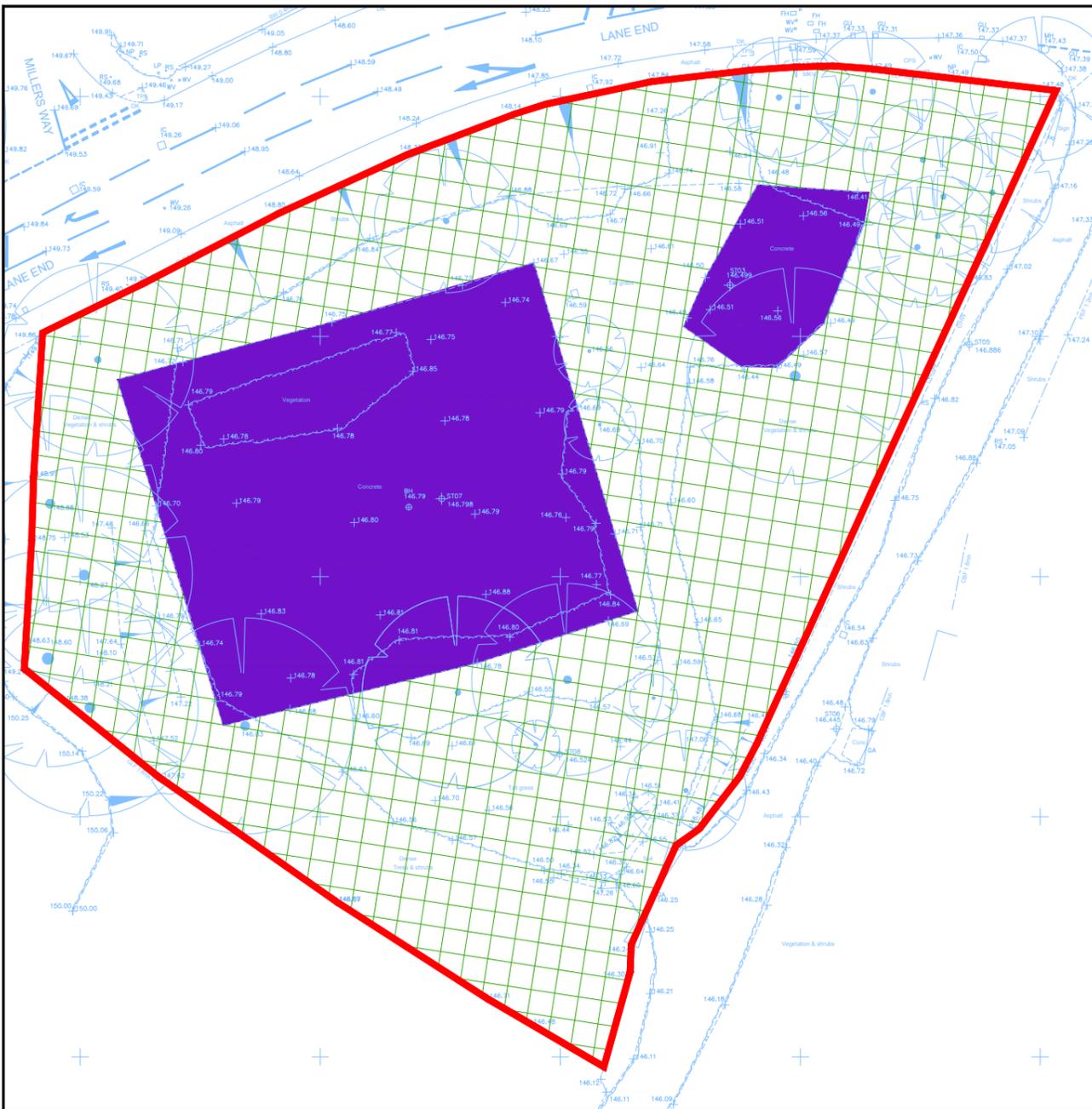
PI	PRELIMINARY ISSUE	24/04/2024	GM	FG
Rev.	Description	Date	By	Chkd

Glanville
Survey > Plan > Engineer

-  Civil Engineering
-  Structural Engineering
-  Transport Planning
-  Highways Engineering
-  Building Surveying
-  Geomatics

Herfordshire | Oxfordshire | Cambridgeshire | Bristol

Client:			
Project:	MCDONALD'S RESTAURANT LANE END, KIRKBY (ST2120)		
Title:	EXISTING SITE AND OVERLAND FLOWS		
Engineer:	FG	Date:	APRIL 2024
Director:	HGB	Scale:	1:200 @ A1
Status:	PRELIMINARY		
Drawing No.	4230177-SK04	Rev	P1



EXISTING SITE



PROPOSED SITE



FIGURE 3

KEY

-  PROPOSED SITE LAYOUT
-  EXISTING SURVEY
-  EXISTING HARDSTANDING = 1243sqm
-  EXISTING SOFT LANDSCAPING = 3005sqm
-  PROPOSED IMPERMEABLE AREAS CONTRIBUTING TO SURFACE WATER RUNOFF = 2620sqm
-  PROPOSED SOFT LANDSCAPING = 1714sqm

NOTES

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P4	REVISED TO LATEST SITE LAYOUT	28/11/2024	GM	FG
P3	REVISED TO LATEST SITE LAYOUT	22/11/2024	GM	FG
P2	REVISED TO LATEST SITE LAYOUT	13/05/2024	GM	FG
Rev.	Description	Date	By	Chkd



Civil Engineering Highways Engineering
 Structural Engineering Building Surveying
 Transport Planning Geomatics

Hertfordshire | Oxfordshire | Cambridgeshire | Bristol

Client:			
Project:	MCDONALD'S RESTAURANT LANE END, KIRKBY (ST2120)		
Title:	EXISTING AND PROPOSED IMPERMEABLE AREAS		
Engineer:	FG	Date:	APRIL 2024
Director:	HGB	Scale:	1:200 @ A1
Status:	PRELIMINARY		
Drawing No.	4230177-SK05	Rev	P4



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- KEY**
-  PROPOSED SITE LAYOUT
 -  +110.00 PROPOSED LEVELS
 -  110.00 PROPOSED CONTOURS 25mm
 -  OVERLAND FLOW ROUTE
 -  SURFACE WATER OVERLAND FLOW ROUTE

FIGURE 4

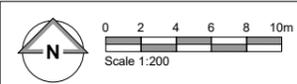
P4	REVISED TO LATEST SITE LAYOUT	28/11/2024	GM	FG
P3	REVISED TO LATEST SITE LAYOUT	22/11/2024	GM	FG
P2	REVISED TO LATEST SITE LAYOUT	13/05/2024	GM	FG
P1	PRELIMINARY ISSUE	24/04/2024	GM	FG
Rev.	Description	Date	By	Chkd

Glanville
Survey > Plan > Engineer

-  Civil Engineering
-  Highways Engineering
-  Structural Engineering
-  Building Surveying
-  Transport Planning
-  Geomatics

Herfordshire | Oxfordshire | Cambridgeshire | Bristol

Client:			
Project:	MCDONALD'S RESTAURANT LANE END, KIRKBY (ST2120)		
Title:	PROPOSED LEVELS AND OVERLAND FLOWS		
Engineer:	FG	Date:	APRIL 2024
Director:	HBG	Scale:	1:200 @ A1
Status:	PRELIMINARY		
Drawing No.	4230177-SK06	Rev	P4

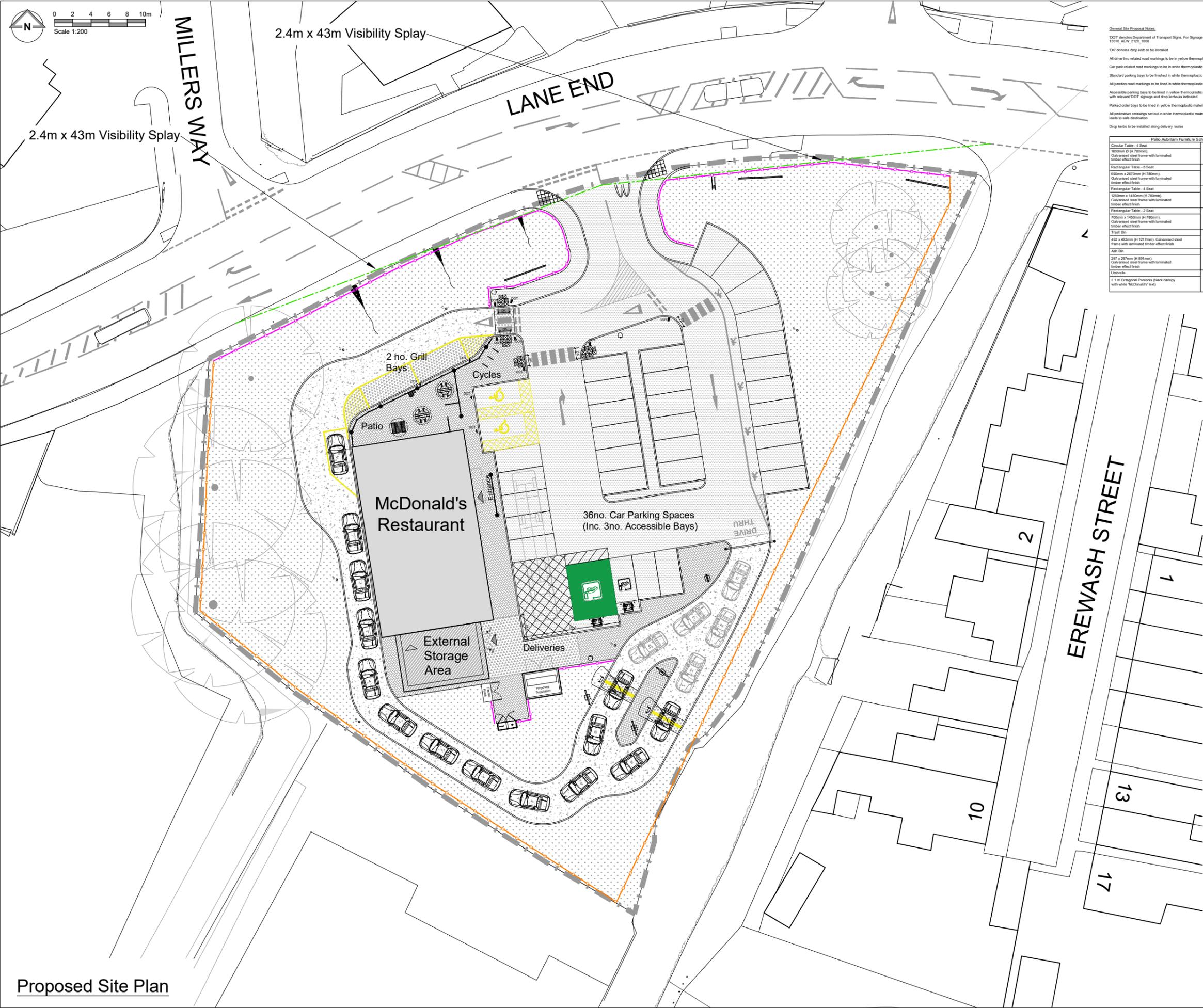


MILLERS WAY

2.4m x 43m Visibility Splay

LANE END

2.4m x 43m Visibility Splay



General Site Physical Notes
 100' diameter Department of Transport Signs. For Signage type refer to AEW drawing no. 13010_AEW_2120_1008
 'X' denotes drop kerb to be installed
 All drive thru related road markings to be in yellow thermoplastic material
 Car park related road markings to be in white thermoplastic material
 Standard parking bays to be finished in white thermoplastic material
 All junction road markings to be lined in white thermoplastic material
 Accessible parking bays to be lined in yellow thermoplastic material to current Part M standards with relevant DOT signage and drop kerbs as indicated
 Parked order bays to be lined in yellow thermoplastic material with relevant DOT signage
 All pedestrian crossings set out in white thermoplastic material. Tactile paving where crossing kerbs to safe destination
 Drop kerbs to be installed along delivery routes

Patio Aubrium Furniture Schedule	
Circular Table - 4 Seat 1600mm Ø (H 750mm) Galvanised steel frame with laminated timber effect finish	
Rectangular Table - 8 Seat 650mm x 2670mm (H 750mm) Galvanised steel frame with laminated timber effect finish	
Rectangular Table - 4 Seat 1200mm x 1450mm (H 750mm) Galvanised steel frame with laminated timber effect finish	
Rectangular Table - 2 Seat 750mm x 1450mm (H 750mm) Galvanised steel frame with laminated timber effect finish	
Touch Bin 482 x 492mm (H 1217mm). Galvanised steel frame with laminated timber effect finish	
Ash Bin 297 x 297mm (H 897mm) Galvanised steel frame with laminated timber effect finish	
Umbrella 2.1m Octagonal Parasol (black canopy with white 'McDonald's' text)	

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CDM 2015
 Client notified of duties: **At Design Workshop**
 Principal Designer: **CBS**
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 Drawing Based:
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 Glanville's Topographical Survey Drawing no. 4230177/4101
 Dated: June 2023
 McDonald's Demise Boundary Indicated:

Proposed Schedule of Parking	
Proposed Accessible Bays	02
Proposed Grill Bays	02
Proposed General Bays	30
Proposed VCP Bays	02
Total Proposed Parking Bays	36

Schedule of Areas	
Proposed Site Area (Hectares)	0.63
Proposed Building (GEA / MF) (Excluding Corral)	827

Proposed Site Finishes	
Tarmacadam - Car Park	
Imprinted concrete - Air-entrained concrete with full layer works, hardening agent and curing system. Monochrome concrete grey, random cobble pattern. Drive Thru Lane	
Marshalls 200x100 Charcoal Keyblock Paving - Paved	
Tarmacadam - Footpaths	
Turf & low level shrubs - Soft Landscaping	
Brushed concrete - DT lane where road markings and delivery route	
Tarmacadam rubber flooring - Outdoor Play Area	
Coarbed ballards Painted Black	
Tactile Blister Paving	
Target Bin	
'LP' Denotes Lamppost	
150mm Diameter stainless steel protective bollard	
Proposed 1100mm High Timber Post & Rail Fence	
Proposed 1100mm High (Close Boarded Timber Fence)	

FIGURE 5

A	27/11/2024	TSS	MC
Car park amended to show pedestrian route off Main street. Parking increased by 1 bay			
-	15/11/2024	BA	TSS
Initial Issue			
REV	Date	Drawn by: -	Checked by: -
Status	Purpose of Issue		
S2	For Information		
drawing stage	Planning		
client	McDonald's Restaurants Ltd		

project	store
Lane End, Kirkby	2120
drawing title	Proposed Site Plan
date	15/11/2024
scale@A1	1:200
drawn	BA
checked	TSS

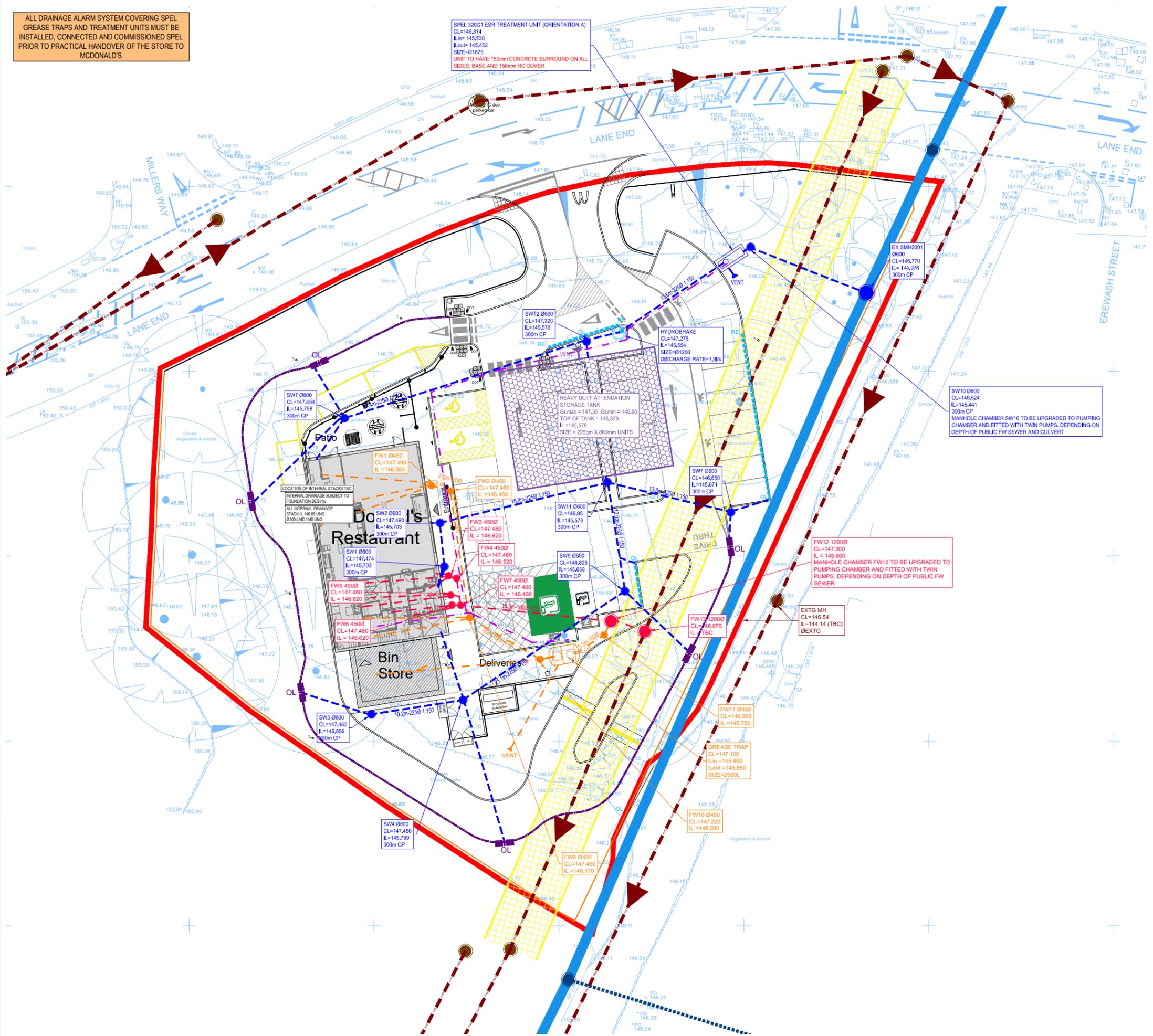
Proposed Site Plan

PLANNING

Rev A 13010_AEW_2120_1004 A
 aew architects 0161 214 4370 www.aewarchitects.com

ALL DRAINAGE ALARM SYSTEM COVERING SPEL GREASE TRAPS AND TREATMENT UNITS MUST BE INSTALLED, CONNECTED AND COMMISSIONED SPEL PRIOR TO PRACTICAL HANDOVER OF THE STORE TO MCDONALD'S

SPEL 320C1 ESR TREATMENT UNIT (ORIENTATION A)
CL=146,814
IL=145,530
Lout=145,452
SIZE=Ø1875
UNIT TO HAVE 150mm CONCRETE SURROUND ON ALL SIDES, BASE AND 150mm RC COVER



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 - ALL DRAINAGE TO BE INSTALLED TO BUILDING REGULATIONS PART H AND/ OR SCOTTISH BUILDING REGULATIONS
 - ALL DRAINAGE TO BS8582.
 - BUILDING INSPECTOR TO INSPECT ALL FOUL DRAINAGE INSTALLATION
 - ALL DRAINAGE ALARM SYSTEMS COVERING GREASE TRAPS AND TREATMENT UNITS MUST BE INSTALLED, CONNECTED AND COMMISSIONED BY THE GROUNDWORK CONTRACTOR PRIOR TO PRACTICAL HANDOVER OF THE STORE TO MCDONALD'S

- KEY**
- TOPOGRAPHICAL SURVEY
 - PROPOSED SITE LAYOUT
 - SITE BOUNDARY
 - DRAINAGE LABEL
CP=CATCHPIT
 - PROPOSED GULLY WITH 1500 PIPE
 - PROPOSED SURFACE WATER DRAINAGE PIPEWORK SHOWING LENGTH, PIPE DIAMETER AND GRADE
 - PROPOSED BUILDING SURFACE WATER PPIC CATCHPIT MANHOLE WITH 300mm SUMP
 - PROPOSED RAINWATER DOWN PIPE INVERT 500mm BELOW PROPOSED EXTERNAL LEVEL (ALL OUTLETS 1000 & TO HAVE ROOFING ACCESS UNLESS OTHERWISE INDICATED)
 - RWP
 - AP / OL
 - ACC KERBDRAIN 305 DRAINAGE KERB WITH ACCESS POINT AND OUTLETS
 - ACC MONO DRAIN PD1000 U.N.O 10.0 DRAINAGE CHANNEL (BLACK)
 - PROPOSED FOUL WATER DRAINAGE PIPEWORK SHOWING LENGTH, PIPE DIAMETER AND GRADE
 - PROPOSED BUILDING FOUL WATER DRAINAGE INSPECTION CHAMBER. DOUBLE SEALED COVER AND FRAME
 - PROPOSED GREASE WATER DRAINAGE PIPEWORK SHOWING LENGTH, PIPE DIAMETER AND GRADE
 - PROPOSED BUILDING GREASE WATER DRAINAGE INSPECTION CHAMBER. DOUBLE SEALED COVER AND FRAME
 - ALARMED 2000L SPEL GREASE TRAP WITH HARD WIRE TO MANAGERS OFFICE DOUBLE SEALED COVER AND FRAME
 - GT 1150 LITRE GREASE TRAP
 - 1100 DUCTS FOR GREASE TRAP CABLES TO INCOMING ELECTRICS CUPBOARD (MUST BE INSTALLED, CONNECTED AND COMMISSIONED BY THE GROUNDWORK CONTRACTOR PRIOR TO PRACTICAL HANDOVER)
 - LINED IMPERMEABLE HEAVY DUTY CELLULAR STORAGE
 - SPEL ESR TREATMENT UNIT 320 C1 ORIENTATION A
 - CONTROL CHAMBER - HYDROBRAKE FLOW CONTROL 1.9L/s
 - EXISTING COMBINED SEWER (LINE AND LEVEL TBC)
 - EXISTING CULVERT (LINE AND LEVEL TBC)
 - ASSUMED SEWER EASEMENT

ALL FOULWATER RUNS FROM TOILETS SHALL BE CONNECTED TO THE 45 OR 0 DEGREE. BLANKING FLANGES REQUIRED ON UNUSED INLETS

P5	SITE LAYOUT AND DRAINAGE UPDATED	28.11.24	GM	FG
P4	SITE LAYOUT AND DRAINAGE UPDATED	22.11.24	FC	FG
P3	UPDATED TO SUIT LATEST SITE LAYOUT	13.05.24	GM	FG
P2	UPDATED TO SUIT LATEST SITE LAYOUT	24.04.24	FC	FG
Rev.	Description	Date	By	Chkd

Glanville
Survey > Plan > Engineer

- Civil Engineering
- Structural Engineering
- Transport Planning
- Highways Engineering
- Building Surveying
- Geomatics

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Client: **McDonald's RESTAURANT**

Project: **MCDONALD'S RESTAURANT LANE END, KIRKBY ST2120**

Title: **PROPOSED DRAINAGE LAYOUT LAYOUT**

Engineer: FG Date: APR 2024

Director: FG Scale: 1:200@A1

Status: PRELIMINARY

Drawing No. 4230177-1200 Rev P5

FIGURE 6



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- KEY**
- PROPOSED SITE LAYOUT
 - EXISTING SURVEY
 - FLOOD ZONE 3

EXISTING SURFACE LEVEL DATA

SURFACE LEVEL DATA					
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR	AREA	VOLUME
1	146.10	146.20	Light Green	11.465m ²	119.970m ³
2	146.20	146.30	Light Green	48.634m ²	117.229m ³
3	146.30	146.40	Light Green	56.955m ²	111.331m ³
4	146.40	146.50	Light Green	65.911m ²	105.537m ³
5	146.50	146.60	Light Green	112.905m ²	95.164m ³
6	146.60	146.70	Light Green	59.299m ²	87.808m ³
7	146.70	146.80	Light Green	126.303m ²	78.741m ³
8	146.80	146.90	Light Green	168.259m ²	62.536m ³
9	146.90	147.00	Light Green	84.173m ²	50.723m ³
10	147.00	147.10	Light Green	70.938m ²	43.187m ³
11	147.10	147.20	Light Green	71.421m ²	36.007m ³
12	147.20	147.30	Light Green	63.608m ²	29.351m ³
13	147.30	147.40	Light Green	67.216m ²	22.873m ³
14	147.40	147.50	Light Green	119.014m ²	14.245m ³
15	147.50	147.60	Light Green	44.434m ²	5.223m ³
16	147.60	147.70	Light Green	21.731m ²	1.670m ³
17	147.70	147.80	Light Green	6.753m ²	0.569m ³

PROPOSED SURFACE LEVEL DATA

SURFACE LEVEL DATA					
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR	AREA	VOLUME
1	146.10	146.20	Light Green	17.235m ²	119.758m ³
2	146.20	146.30	Light Green	76.890m ²	114.196m ³
3	146.30	146.40	Light Green	47.060m ²	108.058m ³
4	146.40	146.50	Light Green	76.058m ²	103.080m ³
5	146.50	146.60	Light Green	143.364m ²	90.897m ³
6	146.60	146.70	Light Green	122.453m ²	78.039m ³
7	146.70	146.80	Light Green	97.168m ²	66.916m ³
8	146.80	146.90	Light Green	110.486m ²	56.698m ³
9	146.90	147.00	Light Green	95.162m ²	46.281m ³
10	147.00	147.10	Light Green	82.621m ²	37.352m ³
11	147.10	147.20	Light Green	64.736m ²	29.966m ³
12	147.20	147.30	Light Green	43.126m ²	24.602m ³
13	147.30	147.40	Light Green	43.099m ²	20.557m ³
14	147.40	147.50	Light Green	105.485m ²	13.291m ³
15	147.50	147.60	Light Green	52.296m ²	5.044m ³
16	147.60	147.70	Light Green	16.706m ²	1.331m ³
17	147.70	147.80	Light Green	8.042m ²	0.305m ³

FIGURE 7

P3	LAYOUT UPDATED	28/11/2024	GM	FG
P2	LAYOUT UPDATED	22/11/2024	FC	FG
P1	PRELIMINARY ISSUE	24/04/2024	GM	FG
Rev.	Description	Date	By	Chkd

Civil Engineering, Structural Engineering, Transport Planning, Highways Engineering, Building Surveying, Geomatics

Herfordshire | Oxfordshire | Cambridgeshire | Bristol

Client:

Project: **McDONALD'S RESTAURANT LANE END, KIRKBY (ST2120)**

Title: **PROPOSED FLOOD COMPENSATION PLAN**

Engineer: FG Date: APRIL 2024

Director: HBG Scale: 1:200 @ A1

Status: PRELIMINARY

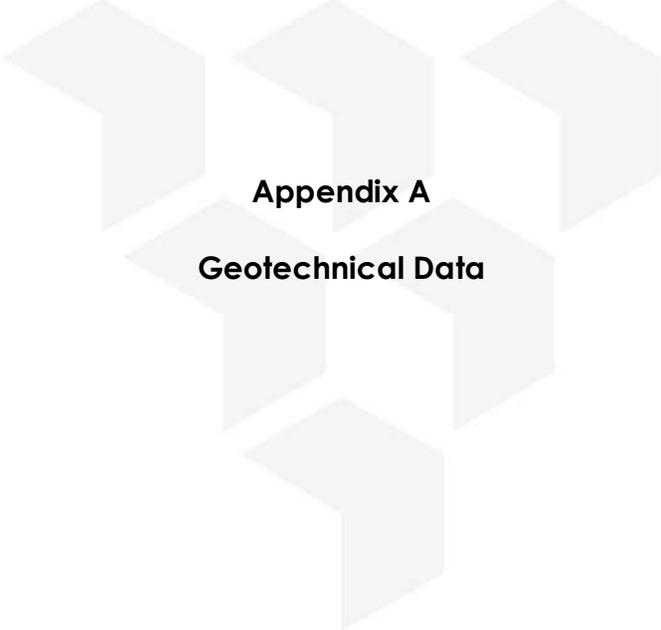
Drawing No. 4230177-SK07 Rev P3

	min level	max level	EG volume	PG Volume	Level for Level Diff	Cumulative Diff
1	146.10	146.20	119.970	119.758	-0.212	-0.212
2	146.20	146.30	117.229	114.167	-3.062	-3.274
3	146.30	146.40	111.331	107.818	-3.513	-6.787
4	146.40	146.50	105.537	101.983	-3.554	-10.341
5	146.50	146.60	95.164	89.436	-5.728	-16.069
6	146.60	146.70	87.808	76.936	-10.872	-26.941
7	146.70	146.80	78.741	66.790	-11.951	-38.892
8	146.80	146.90	62.526	56.690	-5.836	-44.728
9	146.90	147.00	50.586	46.281	-4.305	-49.033
10	147.00	147.10	42.605	37.334	-5.271	-54.304
11	147.10	147.20	35.560	29.901	-5.659	-59.963
12	147.20	147.30	29.286	24.601	-4.685	-64.648
13	147.30	147.40	22.869	20.557	-2.312	-66.960
14	147.40	147.50	14.245	13.291	-0.954	-67.914
15	147.50	147.60	5.223	5.044	-0.179	-68.093
16	147.60	147.70	1.670	1.331	-0.339	-68.432
17	147.70	147.80	0.569	0.305	-0.264	-68.696





Appendices



Appendix A
Geotechnical Data

GROUND INVESTIGATION FOR A PROPOSED DEVELOPMENT AT

LANE END, KIRKBY-IN-ASHFIELD

Executive Summary

Objectives	<ul style="list-style-type: none"> • To assess the risk to the proposed development from ground contamination, including the environmental suitability of soils for retention beneath the site • To provide recommendations for the off-site disposal classification of surplus soils arising from the proposed development. • To assess the risk to the proposed development from ground gas emissions. • To provide geotechnical recommendations for the design of foundations for a proposed drive-thru restaurant and associated hardstanding. • To assess the appropriate design classification for buried concrete.
Site Description	Approximately 0.4ha irregularly shaped derelict land. At the time of the ground investigation, the site comprised two concrete slabs in the western and northeastern section and some areas of overgrown vegetation that was thicker towards the perimeters of the site.
Scope of the Investigation	Two cable percussion boreholes, eight trial pits, four in situ California bearing ratio (CBR) tests and two soakaway tests, including contamination and geotechnical sampling followed by laboratory testing and four rounds of gas and groundwater monitoring.
Proposed Development	It is understood that a drive-thru restaurant and car park with access roads is to be constructed.
Geology	BGS geological mapping indicates that the site is underlain by made ground overlying the Cadeby Formation (Dolostone).
Site History	The site was developed from Greenfield into a library in the 1960s. The library was converted into a light engineering factory in the 1970s and a metal works was added in the 1980s. It appears that the structures were demolished between 2006 and 2010 and the site has remained vacant since then. River Erewash was indicated to pass through the eastern part of the site in earlier maps but was not indicated on later map editions.
Succession of Strata	Where encountered the concrete slab was about 0.25m thick. Other areas comprised about 0.20m of topsoil consisting of clayey gravelly SAND. The concrete / topsoil was underlain by about 0.8m of sub-base comprising very gravelly sand / sandy CLAY with occasional cobbles overlying sandy very gravelly CLAY of the Cadeby formation to the terminating depth of the exploratory holes (up to 4.5m bgl). Weathered bedrock was encountered at depths of between 1.8m bgl and 4.5m bgl.
Groundwater	Localised groundwater egress was observed at 1.5m bgl during the main fieldwork phase. Groundwater level was recorded between depths of 2.00m bgl (144.86m AOD) and 2.90m (143.92m AOD) during the subsequent monitoring.
Ground Contamination	<p>The levels of contamination detected in the test soils are considered to be within acceptable limits for retention beneath the proposed development, and to present a sufficiently low risk to both short-term and long-term human health and the proposed development end use. However, asbestos cement sheeting was observed in bund material close to the site entrance and works should be undertaken in accordance with the Control of Asbestos Regulations 2012.</p> <p>A supplementary investigation will be required to delineate the elevated concentrations of hydrocarbons found within the groundwater at CP01.</p>
Engineering Properties of Strata	<p>In Situ Penetration Tests: SPTs show that the near-surface natural clay is predominantly very stiff. Weathered sandstone was encountered at depths of 2.3m (CP01) and 3.5m bgl (CP02), in which SPT N-values ≥ 50 were obtained.</p> <p>Plasticity of Fine-grained Soils: Laboratory tests indicate that the natural clay tested is of intermediate plasticity and has low to medium shrinkage and swelling potential.</p>
Geotechnical Assessment	The proposed drive-thru restaurant is understood to be a single-storey structure. There will also be associated car parking and an access road. The proposed finished site/floor

	<p>levels were not known at the time of writing. It is presumed that no significant changes to the current site levels are proposed.</p> <p>Foundations: The restaurant could be supported on pad foundations. Strip foundations are also considered suitable. Foundations should bear on natural clay of at least <i>firm</i> consistency at a minimum depth of 1m bgl. Estimated ground bearing resistances for square pads and strips of various sizes, bearing on <i>firm</i> natural clay at a depth of 1m bgl are given in Section 9.0, for a calculated settlement limited to 25mm. The floor slab could be ground bearing, provided that it is underlain by a suitable thickness of granular fill and following removal of any soft, organic or otherwise unsuitable materials. Allowance should be made for plant suitable for breaking out the concrete hardstanding, where present. Remnant foundations of the former works may also be encountered.</p> <p>New Pavement: Existing topsoil and hardstanding (where present) should be removed and the formation level should be prepared by proof-rolling. Any unsuitable materials should be removed and replaced with compacted granular fill. For formation levels up to 1m bgl, a CBR-value of 3% could be adopted for the design of new pavements.</p>
Off-site Disposal of Surplus Soils	The tested made ground and natural soil may be accepted for off-site disposal as non-hazardous waste and inert waste respectively. Asbestos cement was identified within materials forming a bund near the site entrance, this material should be disposed of as hazardous waste in accordance with the Control of Asbestos Regulations 2012. The advice is given for guidance only and is subject to the Landfill Operators' certification.
Ground Gas	On the basis of the gas monitoring carried out between August and September 2023, no gas protection measures are considered necessary with respect to CO ₂ and CH ₄ . The site is located within an area where between 5 and 10% of dwellings are estimated to be at or above the radon action level. Therefore, radon protective measures are considered necessary in the construction of new dwellings.
Buried Concrete	Buried concrete should conform to Design Sulphate Class DS-2 and a ACEC Class of AC-2s, in accordance with Special Digest 1 (3rd Edition, BRE, 2005).
Limitations	The limitations of this report are highlighted in Section 14.0.



DTS RAE BURN
 GEOTECHNICAL & ENVIRONMENTAL ENGINEERING

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Legend

- Cable Percussion Borehole
 - CBR only
 - Trial Pit and Soakaway/CBR
- All markers are approximate*

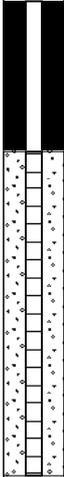
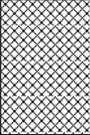
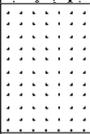
FIGURE 3

Existing Site Layout Plan
 Scale as Shown @A3

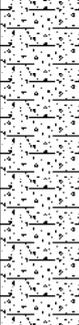
E13723/2: Kirkby in Ashfield
 Prepared for: Glanville Consultants Ltd

				DTS Raeburn t/a Igne Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 hello@igne.com www.igne.com		Trial Pit No. CBR1 Sheet 1 of 1	
Project Name:		Kirkby in Ashfield		Project No. E13723-2		Co-ords: 450 165.68 - 356 063.34 Level: 146.84m AOD	
Location:		Lane end, Kirkby in Ashfield Nottingham NG17 8AP				Dimensions (m): <input type="text"/>	
Client:		Glanville Consultants Ltd				Final Depth: 0.75m	
Date:		09/08/2023					
Scale:		1:25					
Logged by:		PA					
Water Strikes	Samples and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description
	Depth (m bgl)	Type	Results				
				0.10	146.74		Dark clayey gravelly fine to coarse grain SAND with abundant rootlets. Gravel is subangular to angular fine to medium sandstone (TOPSOIL). Accessed as loose by hand tool
				0.75	146.08		MADE GROUND: Brown clayey very gravelly fine to coarse grain SAND with occasional cobbles. Gravel is angular to subangular fine to coarse sandstone, mudstone and brick. Cobble is subangular to angular of sandstone and mudstone (SUB-BASE). Accessed as medium dense to dense by hand tool.
							End of trial pit at 0.75m bgl
1 2 3 4 5							
Remarks	Trial pit terminated at 0.75m bgl for CBR test						Final

				DTS Raeburn t/a Igne Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 hello@igne.com www.igne.com			Trial Pit No. CBR4 Sheet 1 of 1		
Project Name:		Kirkby in Ashfield		Project No. E13723-2		Co-ords: -		Date: 09/08/2023	
Location:		Lane end, Kirkby in Ashfield Nottingham NG17 8AP				Dimensions (m):		Scale: 1:25	
Client:		Glanville Consultants Ltd				Final Depth: 0.55m		Logged by: PA	
Water Strikes	Samples and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description		
	Depth (m bgl)	Type	Results						
				0.20			Soft dark silty gravelly CLAY with abundant rootlets. Gravel is fine to coarse angular sandstone (TOPSOIL).		
				0.55			MADE GROUND: Stiff brown sandy gravelly CLAY with occasional cobbles. Gravel is fine to coarse angular to subangular of sandstone and mudstone. Cobble is subangular to angular of sandstone and mudstone (SUB-BASE).		
							End of trial pit at 0.55m bgl		
								1	
								2	
								3	
								4	
								5	
Remarks	Trial pit terminated at 0.55m bgl for CBR test							Final	

				Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 enquiries@dts-raebum.co.uk www.dts-raebum.co.uk		Borehole No. CP01 Sheet 1 of 1			
Project Name:		Kirkby in Ashfield		Project No. E13723-2		Co-ords: 450173E - 356062N		Hole Type: CP	
Location:		Lane end, Kirkby in Ashfield Nottingham NG17 8AP				Level: 146.86m AOD		Scale: 1:50	
Client:		Glanville Consultants Ltd				Dates: 09/08/2023		Logged by: PA	
Well	Water Strikes	Samples and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
		0.50	D	N=32 (4,6,6,7,8,11)	0.30	146.56		Reinforced concrete with a geomembrane layer at 0.3m bgl	
		1.00	D		1.20	145.66		MADE GROUND: Loose becoming dense brown grey gravelly fine to medium grain SAND. Gravel is coarse subangular to angular of sandstone (SUB-BASE).	
		1.20 - 1.65	B	50 (6,7/50 for 160mm)	2.30	144.56		Very stiff yellowish brown silty sandy gravelly CLAY. Gravel of fine to coarse subangular to angular weathered sandstone.	
		1.20	SPT						
		2.00	D						
	2.10 - 2.41	SPTLS	50 (25 for 90mm/50 for 70mm)	3.16	143.70		Brownish grey weathered fine to medium grain SANDSTONE. Recovered as extremely weak to very weak.		
	2.10 - 2.50	B							
	2.10	SPT							
	3.00	D							
	3.00 - 3.16	SPTLS							
	3.00	SPT							
End of borehole at 3.16m bgl									
Borehole terminated on practical refusal									Final

				Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 enquiries@dts-raebum.co.uk www.dts-raebum.co.uk		Borehole No. CP02 Sheet 1 of 1			
Project Name:		Kirkby in Ashfield		Project No. E13723-2		Co-ords: 450198E - 356075N		Hole Type: CP	
Location:		Lane end, Kirkby in Ashfield Nottingham NG17 8AP				Level: 146.82m AOD		Scale: 1:50	
Client:		Glanville Consultants Ltd				Dates: 09/08/2023		Logged by: PA	
Well	Water Strikes	Samples and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
		0.30	D		0.20	146.62		Reinforced concrete with a geotextile membrane layer at 0.2m bgl	
		0.90	D		0.80	146.02		MADE GROUND: Reddish brown very gravelly fine to coarse grain SAND. Gravel of fine to coarse subangular to angular sandstone and subrounded to rounded quartz fill (SUB-BASE).	1
		1.20 - 1.47 1.20	B SPT	50 (25 for 90mm/50 for 185mm)				Very stiff red dish brown sandy gravelly CLAY. Gravel of coarse subangular to angular sandstone.	2
		1.90	D		1.80	145.02		Very stiff yellowish brown to grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to angular of sandstone.	3
		2.20 - 2.65 2.20 - 2.70 2.20	SPTLS D SPT	N=31 (4,5/7,7,8,9)	2.40	144.42		Very stiff light brownish grey slightly sandy slightly silty gravelly CLAY. Gravel is fine to coarse subangular to angular of sandstone.	4
		3.00 3.20 - 3.64 3.20 - 3.70 3.20	D SPTLS B SPT	N=50 (4,6/50 for 295mm)	3.50	143.32		Brownish grey weathered fine to medium grain SANDSTONE. Recovered as extremely weak to very weak.	5
		4.30 4.40 - 4.53 4.40	D SPTLS SPT	50 (25 for 70mm/50 for 65mm)	4.53	142.29		End of borehole at 4.53m bgl	6
									7
									8
									9
								10	
Remarks	Borehole terminated on practical refusal								Final

				DTS Raeburn t/a Igne Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 hello@igne.com www.igne.com		Trial Pit No. TP01 Sheet 1 of 1	
Project Name:		Kirkby in Ashfield		Project No. E13723-2		Co-ords: 450169.81 - 356075.42 Level: 146.15m AOD	
Location:		Lane end, Kirkby in Ashfield Nottingham NG17 8AP				Dimensions (m): 	
Client:		Glanville Consultants Ltd				Final Depth: 2m	
Date:		08/08/2023					
Scale:		1:25					
Logged by:		PA					
Water Strikes	Samples and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description
	Depth (m bgl)	Type	Results				
	0.20 - 0.40	D		0.20	145.95		Reinforced concrete with a geomembrane layer at 0.2m bgl
	0.40	ES					MADE GROUND: Brown very gravelly fine to coarse grain SAND. Gravel of fine to coarse angular to subangular sandstone, flint, mudstone and brick (SUB-BASE). Accessed as medium dense by hand tool.
	1.30 - 1.50	D		0.70	145.45		Brown very clayey gravelly fine to coarse grain SAND with occasional cobble. Gravel of angular to subangular fine to coarse sandstone and mudstone and cobble of angular to subangular sandstone and mudstone. Accessed as dense by hand tool.
	1.50	ES					Light grey weathered bedrock with many subangular to angular cobble of mudstone.
				1.80	144.35		
				2.00	144.15		End of trial pit at 2.00m bgl
Remarks	Trial pit terminated at 2m bgl on weathered bedrock						Final

				DTS Raeburn t/a Igne Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 hello@igne.com www.igne.com		Trial Pit No. TP02 Sheet 1 of 1		
Project Name:		Kirkby in Ashfield		Project No.		Co-ords: 450197.37 - 356060.87		
		E13723-2		Level:		146.82m AOD		
Location:		Lane end, Kirkby in Ashfield Nottingham NG17 8AP				Dimensions (m):		
Client:		Glanville Consultants Ltd				Final Depth: 3.4m		
Water Strikes		Samples and In Situ Testing		Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results				
▼		0.40 - 0.60	B		0.30	146.52	Reinforced concrete with a geomembrane layer at 0.3m bgl	
		0.60	ES				Made Ground: Brown gravelly cobbly SAND. Gravel of coarse subangular sandstone and brick and cobble of angular to subangular sandstone (SUB-BASE). Accessed as medium dense to dense by hand tool	
		2.30 - 2.50	D		1.50	145.32	Soft to firm grey silty CLAY.	
		2.50	ES					
		3.20 - 3.40	D		3.00	143.82	Soft to firm grey silty gravelly CLAY. Gravel of fine to coarse angular to subangular sandstone and mudstone.	
		3.40	ES		3.40	143.42	End of trial pit at 3.40m bgl	
Remarks		Water seepage at 1.5m bgl. Trial pit terminated at 3.4m bgl.						Final

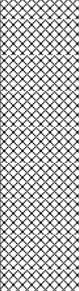
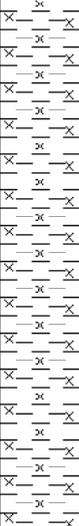
				DTS Raeburn t/a Igne Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 hello@igne.com www.igne.com		Trial Pit No. TP03 Sheet 1 of 1		
Project Name:		Kirkby in Ashfield		Project No.		Co-ords: 450172.98 - 356051.06		
		E13723-2		Level:		146.91m AOD		
Location:		Lane end, Kirkby in Ashfield Nottingham NG17 8AP				Dimensions (m):		
		Glanville Consultants Ltd				Final Depth:		
						2.2m		
Water Strikes		Samples and In Situ Testing		Depth (m bgl)	Level (m AOD)	Stratum Description		
		Depth (m bgl)	Type	Results		Legend		
		0.90 0.90 - 1.10	ES D		0.25 0.40	146.66 146.51	Reinforced Concrete with a geomembrane layer at 0.25 MADE GROUND: Light brown gravelly fine to coarse grain SAND. Gravel of fine to coarse subangular to angular sandstone, mudstone and brick (SUB-BASE). Accessed as medium dense to dense by hand tool. Brown clayey fine to coarse grain SAND with occasional gravel of angular to subangular sandstone and rounded to subrounded flint. Grey weathered bedrock at base.	
		2.00 - 2.20	D					
		2.20	ES		2.20	144.71	End of trial pit at 2.20m bgl	
Remarks		Trial pit terminated at 2.2m bgl on suspected bedrock					Final	

				DTS Raeburn t/a Igne Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 hello@igne.com www.igne.com		Trial Pit No. TP04 Sheet 1 of 1	
Project Name: Kirkby in Ashfield		Project No. E13723-2		Co-ords: 450184.31 - 356044.21		Date: 09/08/2023	
Location: Lane end, Kirkby in Ashfield Nottingham NG17 8AP		Dimensions (m):		Level: 145.54m AOD		Scale: 1:25	
Client: Glanville Consultants Ltd		Final Depth: 1.84m				Logged by: PA	
Water Strikes	Samples and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description
	Depth (m bgl)	Type	Results				
	0.40 0.40 - 0.90	ES D		0.10	145.44		Dark clayey gravelly fine to coarse grain SAND with abundant rootlets. Gravel of fine to medium, subangular to angular sandstone, brick and mudstone (TOPSOIL). Accessed as loose by hand tool. MADE GROUND: Firm brown silty gravelly CLAY with some cobbles of angular sandstone and mudstone. Gravel is fine to coarse angular to subangular sandstone, mudstone and brick (SUB-BASE).
	1.30 - 1.50 1.50	D ES		0.90	144.64		Firm to stiff light brown to grey very gravelly CLAY. Gravel of fine to coarse angular to subangular sandstone.
				1.84	143.70		End of trial pit at 1.84m bgl
Remarks	Trial pit terminated at 1.84m bgl for soakaway test						Final

				DTS Raeburn t/a Igne Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 hello@igne.com www.igne.com		Trial Pit No. TP05 Sheet 1 of 1	
Project Name:		Kirkby in Ashfield		Project No. E13723-2		Co-ords: 450199.34 - 356046.22 Level: 146.50m AOD	
Location:		Lane end, Kirkby in Ashfield Nottingham NG17 8AP		Dimensions (m):		Date: 09/08/2023	
Client:		Glanville Consultants Ltd		Final Depth: 3.03m		Scale: 1:25 Logged by: PA	
Water Strikes	Samples and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description
	Depth (m bgl)	Type	Results				
	0.20 - 0.40	D		0.10	146.40		Dark clayey gravelly fine to coarse SAND with abundant rootlets. Gravel of fine to coarse angular to subangular sandstone and mudstone and brick (TOPSOIL). Accessed as loose to medium dense by hand tool
	0.40	ES					MADE GROUND; Greyish brown clayey very gravelly fine to coarse grain SAND with occasional cobbles of angular to subangular sandstone and mudstone. Gravel of subangular to angular, fine to coarse sandstone and mudstone (SUB-BASE). Accessed as medium dense to dense by hand tool.
	0.70 - 1.00 0.80	B ES					
	1.00 1.00 - 1.20	D B		1.00	145.50		MADE GROUND; Soft to firm sandy gravelly CLAY with some decaying plant remain. Gravel of fine to coarse angular to subangular sandstone.
	1.20 1.20	ES ES					
	1.60 1.60 1.60 - 1.80	ES ES B		1.40	145.10		Soft to firm light reddish brown silty CLAY with disseminated dark materials.
	2.70 2.70 - 3.03	D B		2.70	143.80		Dark clayey gravelly fine to coarse grain SAND. Gravel of fine to coarse angular to subangular sandstone and mudstone. Accessed as dense by hand tool.
				3.03	143.47		End of trial pit at 3.03m bgl
Remarks	Trial pit terminated at 3.03m bgl						Final

				DTS Raeburn t/a Igne Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 hello@igne.com www.igne.com		Trial Pit No. TP06 Sheet 1 of 1	
Project Name:		Kirkby in Ashfield		Project No. E13723-2		Co-ords: 450209.14 - 356062.37 Level: 146.48m AOD	
Location:		Lane end, Kirkby in Ashfield Nottingham NG17 8AP				Dimensions (m): <input type="text"/>	
Client:		Glanville Consultants Ltd				Final Depth: 3.3m	
						Date: 09/08/2023	
						Scale: 1:25	
						Logged by: PA	
Water Strikes	Samples and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description
	Depth (m bgl)	Type	Results				
	0.30 0.30 - 0.50	ES D		0.20	146.28		Dark clayey gravelly fine to medium SAND with abundant rootlets. Gravel of subangular to angular fine to medium sandstone and brick (TOPSOIL). Accessed as loose to medium dense by hand tool.
	1.20 1.20 - 1.40 1.20 - 1.40	ES D D		1.40	145.08		MADE GROUND: Brown clayey very gravelly fine to medium SAND. Gravel of fine to coarse angular to subangular sandstone and brick (SUB-BASE). Accessed as dense by hand tool.
	1.50 1.50 - 1.70	ES D					Firm to stiff dark slightly gravelly CLAY. Gravel of fine to coarse subangular to angular sandstone.
	2.40 - 2.50	D		2.50	143.98		Brown clayey very gravelly fine to medium grain SAND. Gravel of fine to coarse angular sandstone and mudstone. Accessed as dense to very dense by hand tool.
	2.70 - 2.90	D		3.00	143.48		Firm to stiff dark grey CLAY with brown weathered bedrock at base.
	3.10 - 3.30	D		3.30	143.18		End of trial pit at 3.30m bgl
1 2 3 4 5							
Remarks	Trial pit terminated at 3.3m bgl on suspected bedrock						Final

				DTS Raeburn t/a Igne Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 hello@igne.com www.igne.com			Trial Pit No. TP07 Sheet 1 of 1	
Project Name:		Kirkby in Ashfield		Project No. E13723-2		Co-ords: 450206.00 - 356092.03		Date: 09/08/2023
Location:		Lane end, Kirkby in Ashfield Nottingham NG17 8AP				Dimensions (m):		Scale: 1:25
Client:		Glanville Consultants Ltd				Final Depth: 1.6m		Logged by: PA
Water Strikes	Samples and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
	Depth (m bgl)	Type	Results					
	0.10 - 0.20 0.20	D ES		0.20	146.33		Soft dark silty CLAY with abundant rootlets (TOPSOIL).	
	0.50 - 0.80 0.80	D ES		0.80	145.73		MADE GROUND; Firm brown sandy gravelly CLAY with occasional cobbles. Gravel and cobbles of fine to coarse angular to subangular of sandstone and mudstone (SUB-BASE).	
	1.20 - 1.50 1.30	D ES		1.60	144.93		Firm to stiff reddish brown grey mottled CLAY with occasional gravel of fine to coarse angular sandstone and mudstone.	1
							End of trial pit at 1.60m bgl	2
								3
								4
								5
Remarks	Trial pit terminated at 1.6m bgl for soakaway test							Final

				DTS Raeburn t/a Igne Moor Lane, Witton, Birmingham, B6 7HG +44 (0) 121 3445885 hello@igne.com www.igne.com		Trial Pit No. TP08 Sheet 1 of 1	
Project Name:		Kirkby in Ashfield		Project No.		Co-ords: 45022 1.56 - 356094.05	
		E13723-2		Level:		146.48m AOD	
Location:		Lane end, Kirkby in Ashfield Nottingham NG17 8AP		Dimensions (m):		Scale: 1:25	
Client:		Glanville Consultants Ltd		Final Depth: 3.2m		Logged by: PA	
Water Strikes	Samples and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description
	Depth (m bgl)	Type	Results				
	0.20 0.20 - 0.40	ES B		0.40	146.08		Dark clayey gravelly fine to medium grain SAND with abundant rootlets. Gravel of subangular to angular fine to medium sandstone and mudstone (TOPSOIL). Accessed as loose to medium dense by hand tool.
	0.80 0.80 - 1.40	ES D		1.40	145.08		MADE GROUND: Firm dark to light grey gravelly silty CLAY. Gravel of coarse subangular to angular sandstone and mudstone and bricks.
	2.50 - 3.00	B					Stiff brown mottled grey silty CLAY with grey weathered bedrock at base.
	3.00	ES		3.20	143.28		End of trial pit at 3.20m bgl
Remarks	Trial pit terminated at 3.2m bgl on suspected weathered bedrock						Final



Site Investigation & Laboratory Services

Site	KIRKY-IN-ASHFIELD	Contract No	C8371
Client	DTS Raeburn	Date	09/08/2023
Engineer		Test No.	CBR 01
		Depth (m)	0.75

Description: Red brown slightly sandy gravelly CLAY.

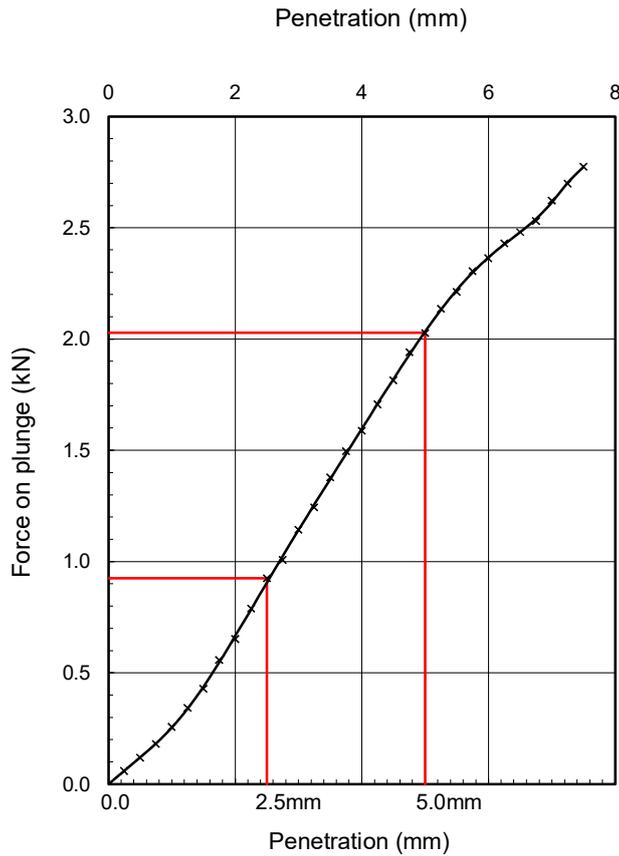
Test Conditions:

Surcharge 4 kg Equivalent 1 kPa

Moisture content beneath plunger: 11 %

Note: No particles larger than 20mm found beneath the plunger

CBR Value: 10%



Cobble approx 5mm below plunger.

Originator	Checked & Approved
HW	<i>RC</i> 12/08/2023

IN-SITU CALIFORNIA BEARING RATIO

BS1377 : Part 9 : 1990 Clause 4.3





Site Investigation & Laboratory Services

Site	KIRKY-IN-ASHFIELD
Client	DTS Raeburn
Engineer	

Contract No	C8371
Date	09/08/2023
Test No.	CBR 02
Depth (m)	0.55

Description: Brown slightly sandy gravelly CLAY.

Test Conditions:

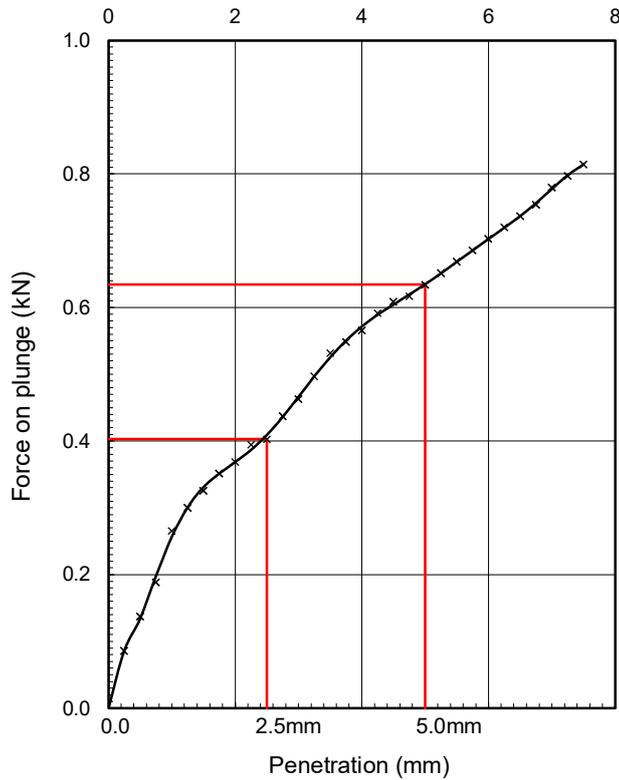
Surcharge 0 kg Equivalent 0 kPa

Moisture content beneath plunger: 18 %

Note: No particles larger than 20mm found beneath the plunger

CBR Value: 3.2%

Penetration (mm)



Originator	Checked & Approved
HW	<i>RC</i> 12/08/2023

IN-SITU CALIFORNIA BEARING RATIO

BS1377 : Part 9 : 1990 Clause 4.3





Site Investigation & Laboratory Services

Site	KIRKY-IN-ASHFIELD
Client	DTS Raeburn
Engineer	

Contract No	C8371
Date	09/08/2023
Test No.	CBR 03
Depth (m)	0.65

Description: Brown sandy gravelly CLAY.

Test Conditions:

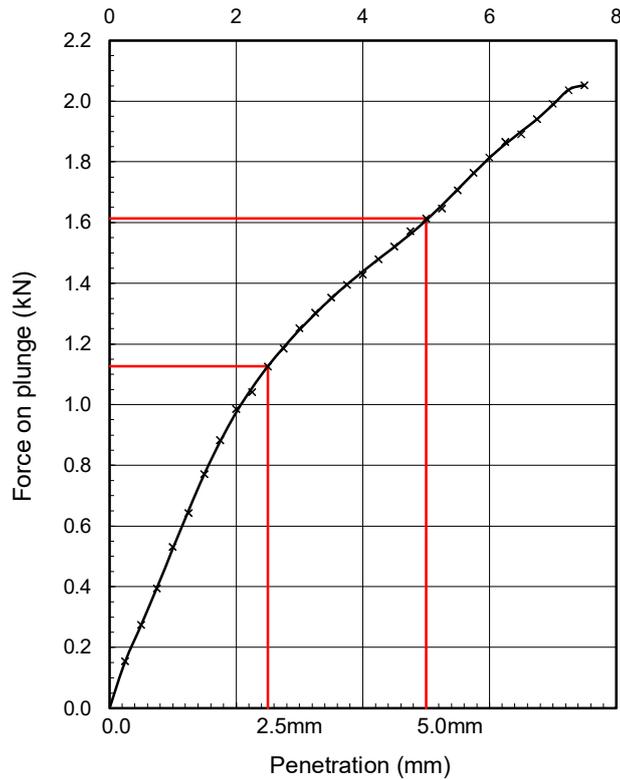
Surcharge 4 kg Equivalent 1 kPa

Moisture content beneath plunger: 16 %

Note: No particles larger than 20mm found beneath the plunger

CBR Value: 8.5%

Penetration (mm)



Originator	Checked & Approved
HW	<i>RC</i> 12/08/2023

IN-SITU CALIFORNIA BEARING RATIO

BS1377 : Part 9 : 1990 Clause 4.3





Site Investigation & Laboratory Services

Site	KIRKY-IN-ASHFIELD	Contract No	C8371
Client	DTS Raeburn	Date	09/08/2023
Engineer		Test No.	CBR 04
		Depth (m)	0.55

Description: Brown slightly clayey gravelly SAND.

Test Conditions:

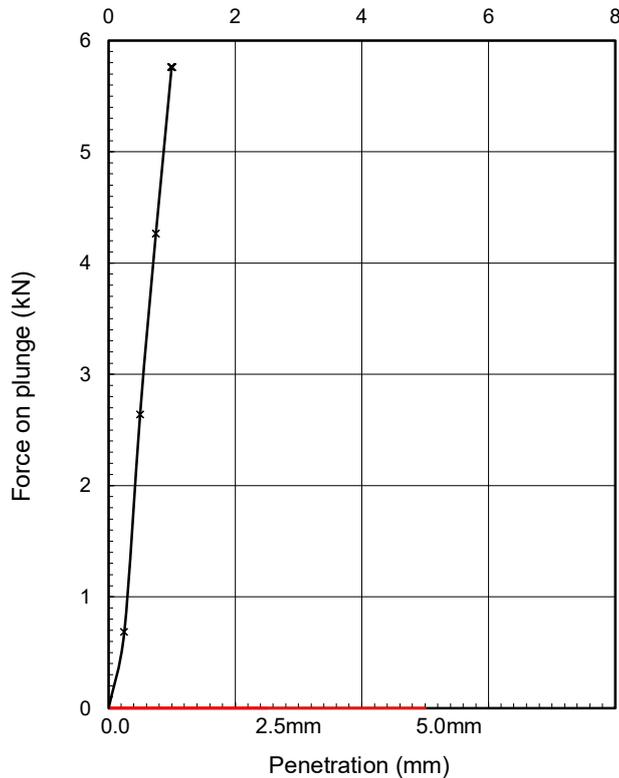
Surcharge 4 kg Equivalent 1 kPa

Moisture content beneath plunger: 13 %

Note: No particles larger than 20mm found beneath the plunger

CBR Value: >44%

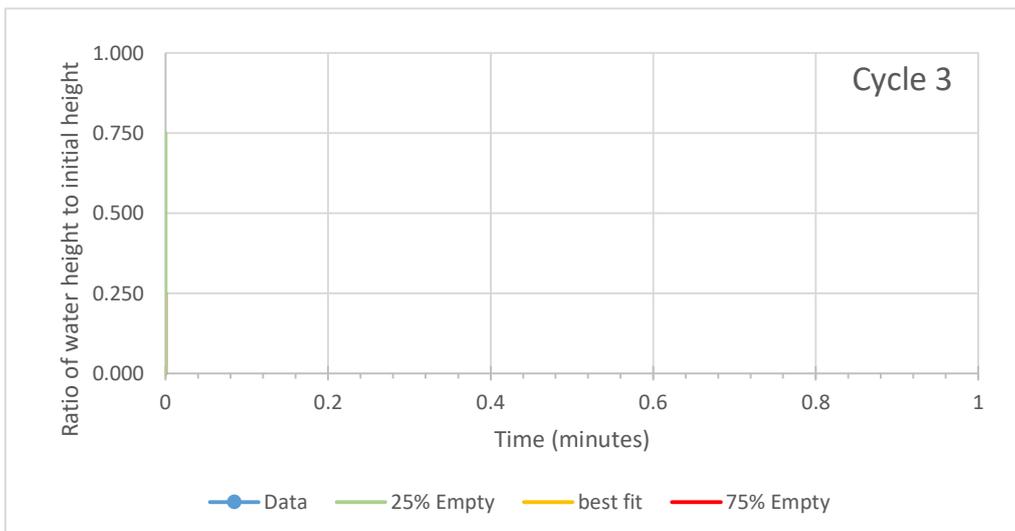
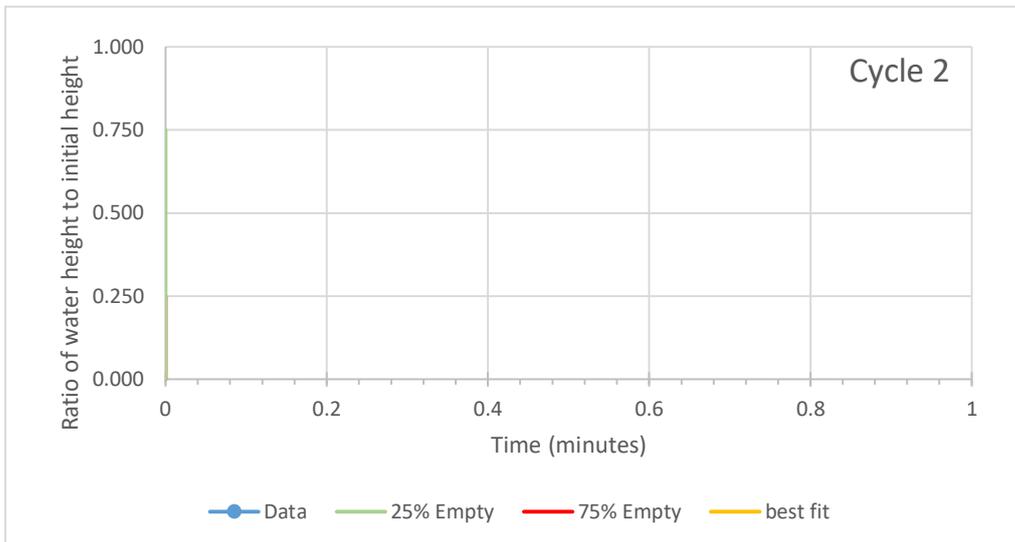
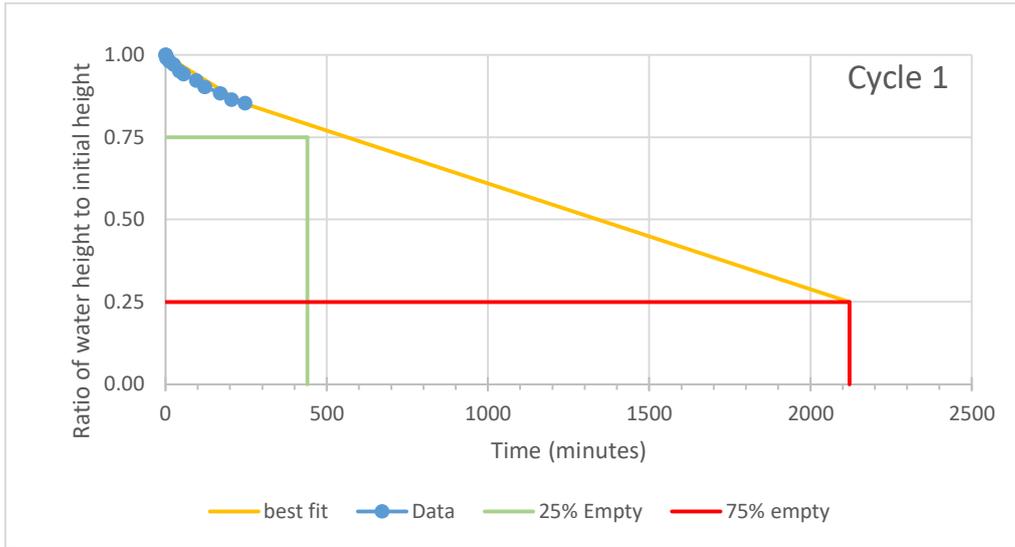
Penetration (mm)



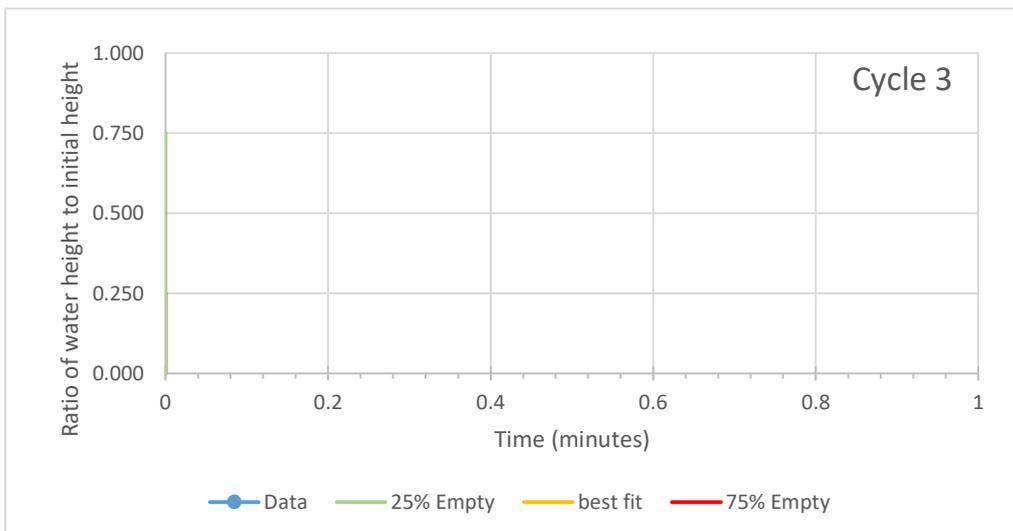
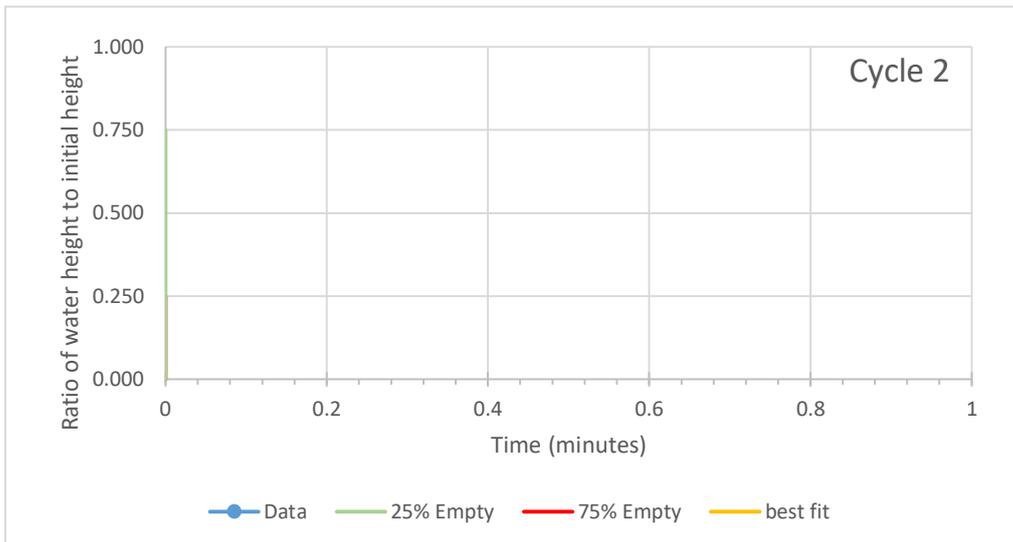
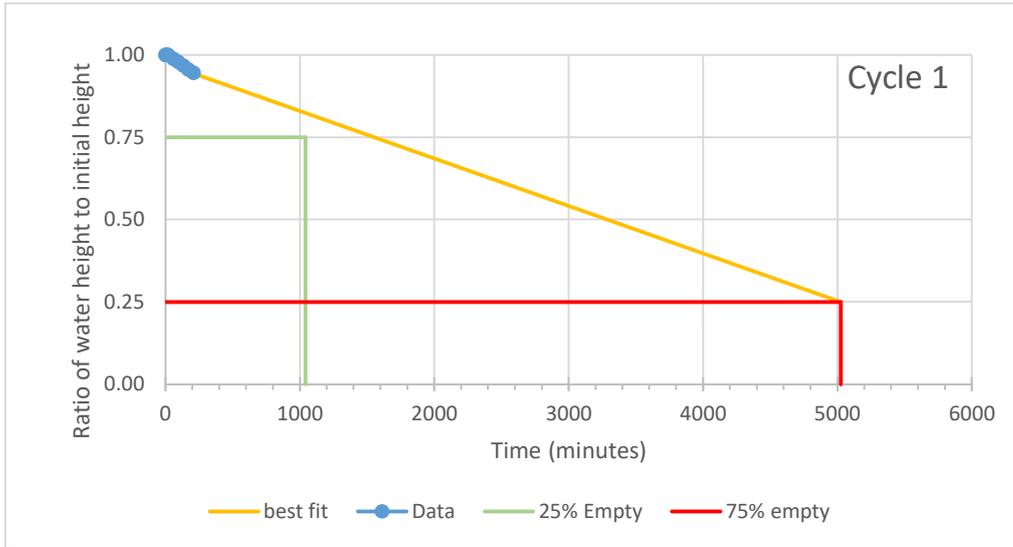
Water seepage into pit
Equipment limits reached before 2.5mm penetration.

Originator	Checked & Approved	IN-SITU CALIFORNIA BEARING RATIO BS1377 : Part 9 : 1990 Clause 4.3	
HW	<i>RC</i> 12/08/2023		

BRE Digest 365 Soakaway Test Results



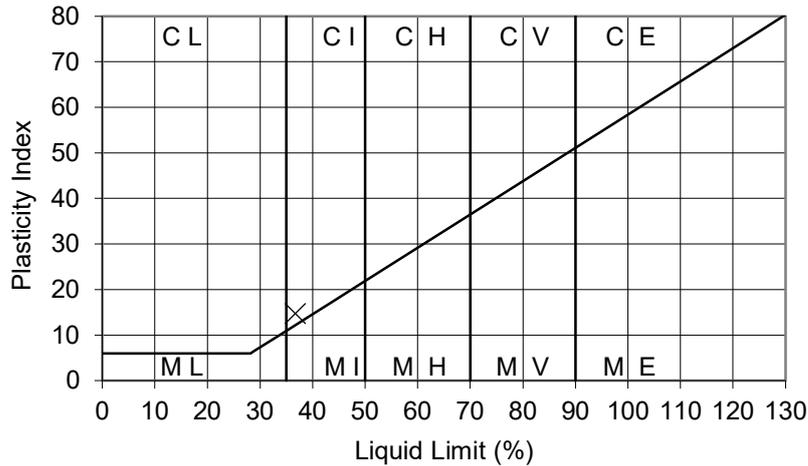
BRE Digest 365 Soakaway Test Results



 SITE INVESTIGATION AND LABORATORY SERVICES	Site	KIRKBY-IN-ASHFIELD	Contract No.	E13723-2
	Client	DTS Raeburn	Hole ID	CP01
	Engineer		Sample Date	09/08/2023
			Depth (m)	1.20-1.65
			Sample Type	Bulk/Soil

Non Engineering Description : Orangey brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse.

Preparation : Sample washed and air dried



Results :

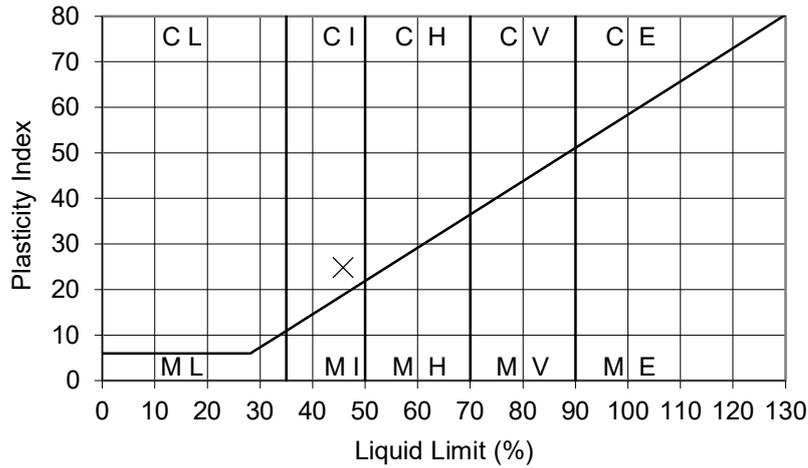
As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	18 %
Percentage retained on 425µm sieve :	9 %
Liquid Limit :	37 %
Plastic Limit :	22 %
Plasticity Index :	15
Equivalent moisture content of material passing 425µm sieve :	20 %
Liquidity Index :	-0.13

Originator	Checked & Approved	Liquid Limit (One Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index BS 1377:Part 2:Clause 4.4:1990 BS 1377:Part 2:Clause 5:1990	
HW	 30/08/2023		

 SITE INVESTIGATION AND LABORATORY SERVICES	Site	KIRKBY-IN-ASHFIELD	Contract No.	E13723-2
	Client	DTS Raeburn	Hole ID	CP02
	Engineer		Sample Date	09/08/2023
			Depth (m)	1.90
			Sample Type	D/Soil

Non Engineering Description : Orangey brown slightly sandy CLAY.

Preparation : Sample as received



Results :

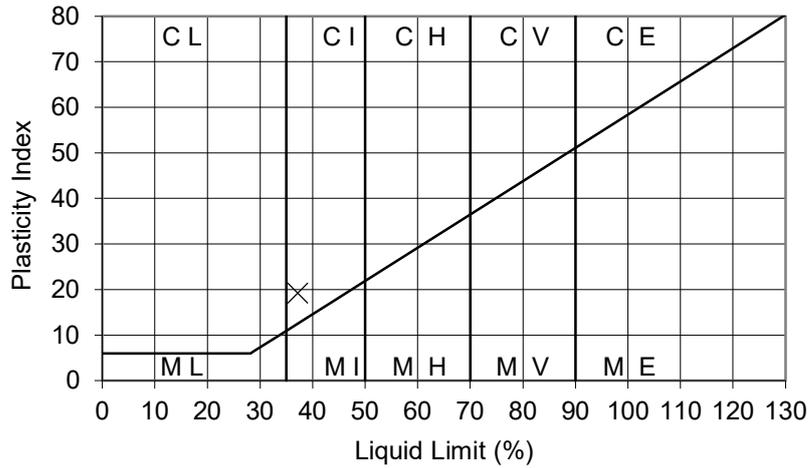
As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	22 %
Percentage retained on 425µm sieve :	0 %
Liquid Limit :	46 %
Plastic Limit :	21 %
Plasticity Index :	25
Equivalent moisture content of material passing 425µm sieve :	22 %
Liquidity Index :	0.04

Originator	Checked & Approved	Liquid Limit (One Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index BS 1377:Part 2:Clause 4.4:1990 BS 1377:Part 2:Clause 5:1990	
HW	 30/08/2023		

 SITE INVESTIGATION AND LABORATORY SERVICES	Site	KIRKBY-IN-ASHFIELD	Contract No.	E13723-2
	Client	DTS Raeburn	Hole ID	TP02
	Engineer		Sample Date	09/08/2023
			Depth (m)	2.30-2.50
			Sample Type	D/Soil

Non Engineering Description : Greyish brown slightly sandy slightly gravelly CLAY. Gravel is fine with organic matter (moss).

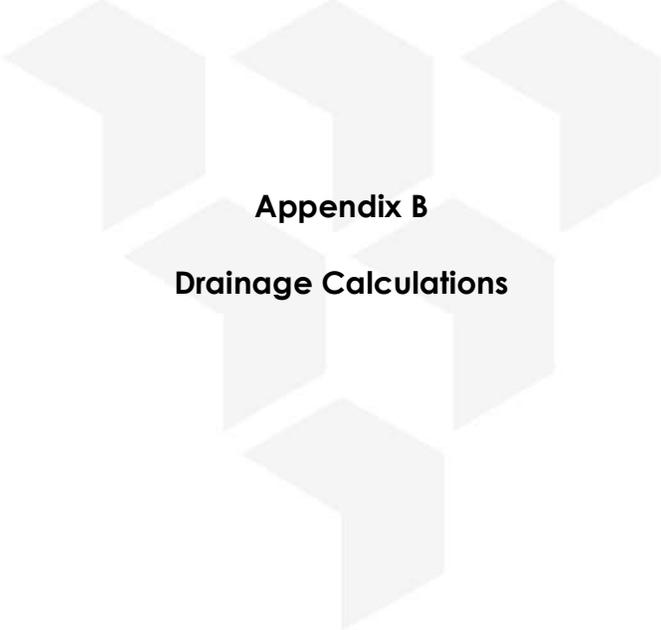
Preparation : Sample washed and air dried



Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	19 %
Percentage retained on 425µm sieve :	2 %
Liquid Limit :	37 %
Plastic Limit :	18 %
Plasticity Index :	19
Equivalent moisture content of material passing 425µm sieve :	19 %
Liquidity Index :	0.05

Originator	Checked & Approved	Liquid Limit (One Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index BS 1377:Part 2:Clause 4.4:1990 BS 1377:Part 2:Clause 5:1990	
HW	 30/08/2023		



Appendix B
Drainage Calculations

Glanville Consultants Ltd		Page 1
575- 599 Maxted Road Hemel Hempstead Herts HP2 7ED	4230177 Kirkby in Ashfield	
Date 2/20/2024 3:30 PM File	Designed by ML Checked by HBG	
Micro Drainage	Source Control 2019.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 715 Urban 0.000
Area (ha) 0.430 Soil 0.450 Region Number Region 3

Results 1/s

QBAR Rural 1.9
QBAR Urban 1.9

Q100 years 4.0

Q1 year 1.7
Q30 years 3.4
Q100 years 4.0

Glanville Consultants Ltd		Page 1
Boundary Way 3 Grovelands Business Center Hemel Hempstead HP2 7TE	McD Kirkby ST2120 Lane End FRA v2	
Date 21/11/2024 File Kirkby FRA issue2.MDX	Designed by ML Checked by FG	
XP Solutions	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm FRA v2

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	100
FEH Rainfall Version	2013
Site Location GB 450189 356075 SK 50189 56075	
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	0.900
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm FRA v2

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.083	4-8	0.143	8-12	0.035

Total Area Contributing (ha) = 0.262

Total Pipe Volume (m³) = 230.850

Network Design Table for Storm FRA v2

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	29.635	0.590	50.2	0.000	5.00	0.0	0.600		o	600	Pipe/Conduit	
S1.001	17.045	0.634	26.9	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	
S2.000	10.022	0.067	149.6	0.020	5.00	0.0	0.600		o	225	Pipe/Conduit	
S2.001	21.080	0.141	150.0	0.063	0.00	0.0	0.600		o	225	Pipe/Conduit	
S2.002	11.959	0.080	150.0	0.026	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.14	146.200	0.000	0.0	0.0	0.0	3.44	973.1	0.0
S1.001	50.00	5.20	145.610	0.000	0.0	0.0	0.0	4.71	1331.4	0.0
S2.000	50.00	5.16	145.866	0.020	0.0	0.0	0.0	1.07	42.4	2.8
S2.001	50.00	5.49	145.799	0.083	0.0	0.0	0.0	1.07	42.4	11.2
S2.002	50.00	5.67	145.658	0.109	0.0	0.0	0.0	1.07	42.4	14.8

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Date 21/11/2024 File Kirkby FRA issue2.MDX	Designed by ML Checked by FG	
XP Solutions	Network 2019.1	

Network Design Table for Storm FRA v2

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S3.000	18.593	0.124	149.9	0.017	5.00	0.0	0.600		o	225	Pipe/Conduit	
S4.000	13.784	0.092	149.8	0.000	5.00	0.0	0.600		o	225	Pipe/Conduit	
S2.003	15.555	0.001	15555.0	0.000	0.00	0.0		0.050	-[↓]		Cellular Storage	
S5.000	27.068	0.180	150.0	0.041	5.00	0.0	0.600		o	225	Pipe/Conduit	
S2.004	3.658	0.024	152.4	0.044	0.00	0.0	0.600		o	225	Pipe/Conduit	
S2.005	13.691	0.091	150.5	0.049	0.00	0.0	0.600		o	225	Pipe/Conduit	
S2.006	3.276	0.022	150.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S2.007	13.445	0.090	149.4	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
S1.002	80.935	0.776	104.3	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	
S1.003	34.103	0.341	100.0	0.000	0.00	0.0	0.600		o	825	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S3.000	50.00	5.29	145.703	0.017	0.0	0.0	0.0	1.07	42.4	2.4
S4.000	50.00	5.22	145.671	0.000	0.0	0.0	0.0	1.07	42.4	0.0
S2.003	50.00	8.87	145.579	0.127	0.0	0.0	0.0	0.08	893.2	17.1
S5.000	50.00	5.42	145.758	0.041	0.0	0.0	0.0	1.07	42.4	5.6
S2.004	50.00	8.92	145.578	0.212	0.0	0.0	0.0	1.06	42.0	28.7
S2.005	50.00	9.14	145.554	0.262	0.0	0.0	0.0	1.06	42.3	35.4
S2.006	50.00	9.19	145.463	0.262	0.0	0.0	0.0	1.07	42.4	35.4
S2.007	50.00	9.40	145.441	0.262	0.0	0.0	0.0	1.07	42.4	35.4
S1.002	50.00	9.97	144.976	0.262	0.0	0.0	0.0	2.38	674.2	35.4
S1.003	50.00	10.16	143.975	0.262	0.0	0.0	0.0	2.97	1587.2	35.4

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Boundary Way 3 Grovelands Business Center Hemel Hempstead HP2 7TE	MCD Kirkby ST2120 Lane End FRA v2	
Date 21/11/2024 File Kirkby FRA issue2.MDX	Designed by ML Checked by FG	
XP Solutions	Network 2019.1	

Area Summary for Storm FRA v2

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.000	0.000	0.000
2.000	User	-	100	0.020	0.020	0.020
2.001	User	-	100	0.063	0.063	0.063
2.002	User	-	100	0.026	0.026	0.026
3.000	User	-	100	0.017	0.017	0.017
4.000	-	-	100	0.000	0.000	0.000
2.003	-	-	100	0.000	0.000	0.000
5.000	User	-	100	0.041	0.041	0.041
2.004	User	-	100	0.044	0.044	0.044
2.005	User	-	100	0.040	0.040	0.040
	User	-	100	0.010	0.010	0.049
2.006	-	-	100	0.000	0.000	0.000
2.007	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.262	0.262	0.262

Free Flowing Outfall Details for Storm FRA v2

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.003	S	145.900	143.634	0.000	0	0

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Online Controls for Storm FRA v2

Hydro-Brake® Optimum Manhole: SHB, DS/PN: S2.005, Volume (m³): 2.0

Unit Reference	MD-SHE-0068-1900-0800-1900
Design Head (m)	0.800
Design Flow (l/s)	1.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	68
Invert Level (m)	145.554
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	1.9	Kick-Flo®	0.508	1.6
Flush-Flo™	0.242	1.9	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)								
0.100	1.7	0.800	1.9	2.000	2.9	4.000	4.0	7.000	5.2
0.200	1.9	1.000	2.1	2.200	3.0	4.500	4.2	7.500	5.4
0.300	1.9	1.200	2.3	2.400	3.1	5.000	4.4	8.000	5.5
0.400	1.8	1.400	2.5	2.600	3.3	5.500	4.6	8.500	5.7
0.500	1.6	1.600	2.6	3.000	3.5	6.000	4.8	9.000	5.8
0.600	1.7	1.800	2.8	3.500	3.7	6.500	5.0	9.500	6.0

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XP Solutions	Network 2019.1	

Storage Structures for Storm FRA v2

Cellular Storage Pipe: S2.003

Manning's N 0.050 Infiltration Coefficient Side (m/hr) 0.00000
 Invert Level (m) 145.579 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	225.0	225.0	0.800	225.0	273.0	0.801	0.0	273.0

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Date 21/11/2024 File Kirkby FRA issue2.MDX	Designed by ML Checked by FG	
XP Solutions	Network 2019.1	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm FRA v2

Simulation Criteria

Volumetric Runoff Coeff 0.750 Foul Sewage per hectare (l/s) 0.000
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 360, 1440
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 25

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	SMHXX	30 Winter	2	+0%					146.200	-0.600
S1.001	SMH2106	30 Winter	2	+0%					145.610	-0.600
S2.000	S3	15 Winter	2	+0%	100/15 Summer				145.914	-0.177
S2.001	S4	15 Winter	2	+0%	100/15 Summer				145.885	-0.139
S2.002	S5	15 Winter	2	+0%	30/15 Summer				145.761	-0.123
S3.000	S6	15 Winter	2	+0%	30/360 Winter				145.743	-0.185
S4.000	S7	360 Winter	2	+0%	30/360 Winter				145.741	-0.155
S2.003	ST1	360 Winter	2	+0%					145.741	-0.639
S5.000	S7	15 Winter	2	+0%	100/30 Winter				145.820	-0.163
S2.004	ST2	360 Winter	2	+0%	30/30 Winter				145.741	-0.062
S2.005	SHB	360 Winter	2	+0%	30/15 Summer				145.741	-0.038
S2.006	SSPEL	360 Winter	2	+0%					145.501	-0.187
S2.007	S10	360 Winter	2	+0%					145.474	-0.193
S1.002	SMH2001	360 Winter	2	+0%					144.985	-0.591
S1.003	SMH2004	360 Winter	2	+0%					143.982	-0.818

PN	US/MH Name	Flooded		Pipe		
		Volume (m ³)	Flow / Cap.	Flow (l/s)	Level Exceeded	Status
S1.000	SMHXX	0.000	0.00	0.0	OK	
S1.001	SMH2106	0.000	0.00	0.0	OK	
S2.000	S3	0.000	0.09	3.3	OK	
S2.001	S4	0.000	0.30	11.7	OK	
S2.002	S5	0.000	0.42	15.3	OK	
S3.000	S6	0.000	0.07	2.8	OK	
S4.000	S7	0.000	0.00	0.0	OK	
S2.003	ST1	0.000	0.00	3.3	OK	
S5.000	S7	0.000	0.17	6.5	OK	
S2.004	ST2	0.000	0.06	1.8	OK	
S2.005	SHB	0.000	0.05	1.9	OK	
S2.006	SSPEL	0.000	0.07	1.9	OK	

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Boundary Way 3 Grovelands Business Center Hemel Hempstead HP2 7TE	McD Kirkby ST2120 Lane End FRA v2	
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XP Solutions	Network 2019.1	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm FRA
v2

PN	US/MH Name	Flooded		Pipe		Level Status Exceeded
		Volume (m ³)	Flow / Overflow Cap. (l/s)	Flow (l/s)		
S2.007	S10	0.000	0.05	1.9	OK	
S1.002	SMH2001	0.000	0.00	1.9	OK	
S1.003	SMH2004	0.000	0.00	1.9	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm FRA
v2

Simulation Criteria

Volumetric Runoff Coeff 0.750 Foul Sewage per hectare (l/s) 0.000
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 360, 1440
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 25

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
									Level (m)	Depth (m)
S1.000	SMHXX	30 Winter	30	+0%					146.200	-0.600
S1.001	SMH2106	30 Winter	30	+0%					145.610	-0.600
S2.000	S3	15 Winter	30	+0%	100/15 Summer				145.987	-0.104
S2.001	S4	15 Winter	30	+0%	100/15 Summer				145.977	-0.047
S2.002	S5	360 Winter	30	+0%	30/15 Summer				145.949	0.065
S3.000	S6	360 Winter	30	+0%	30/360 Winter				145.948	0.020
S4.000	S7	360 Winter	30	+0%	30/360 Winter				145.948	0.052
S2.003	ST1	360 Winter	30	+0%					145.948	-0.432
S5.000	S7	360 Winter	30	+0%	100/30 Winter				145.948	-0.035
S2.004	ST2	360 Winter	30	+0%	30/30 Winter				145.948	0.145
S2.005	SHB	360 Winter	30	+0%	30/15 Summer				145.948	0.169
S2.006	SSPEL	1440 Summer	30	+0%					145.501	-0.187
S2.007	S10	1440 Summer	30	+0%					145.474	-0.192
S1.002	SMH2001	1440 Summer	30	+0%					144.985	-0.591
S1.003	SMH2004	1440 Summer	30	+0%					143.982	-0.818

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m ³)	Flow / Cap.	Flow (l/s)	Overflow (l/s)		
S1.000	SMHXX	0.000	0.00	0.0	0.0	OK	
S1.001	SMH2106	0.000	0.00	0.0	0.0	OK	
S2.000	S3	0.000	0.20	7.2	7.2	OK	
S2.001	S4	0.000	0.77	29.7	29.7	OK	
S2.002	S5	0.000	0.14	5.2	5.2	SURCHARGED	
S3.000	S6	0.000	0.02	0.8	0.8	SURCHARGED	
S4.000	S7	0.000	0.00	0.0	0.0	SURCHARGED	
S2.003	ST1	0.000	0.00	5.8	5.8	OK	
S5.000	S7	0.000	0.05	2.1	2.1	OK	
S2.004	ST2	0.000	0.07	1.9	1.9	SURCHARGED	
S2.005	SHB	0.000	0.05	1.9	1.9	SURCHARGED	
S2.006	SSPEL	0.000	0.07	1.9	1.9	OK	

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XP Solutions	Network 2019.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm FRA v2

PN	US/MH Name	Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Volume (m ³)	Flow / Overflow Cap. (l/s)			
S2.007	S10	0.000	0.05	1.9	OK	
S1.002	SMH2001	0.000	0.00	1.9	OK	
S1.003	SMH2004	0.000	0.00	1.9	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm FRA
v2

Simulation Criteria

Volumetric Runoff Coeff 0.750 Foul Sewage per hectare (l/s) 0.000
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 360, 1440
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 25

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	SMHXX	30 Winter	100	+25%					146.200	-0.600
S1.001	SMH2106	30 Winter	100	+25%					145.610	-0.600
S2.000	S3	15 Winter	100	+25%	100/15 Summer				146.327	0.236
S2.001	S4	15 Winter	100	+25%	100/15 Summer				146.311	0.287
S2.002	S5	360 Winter	100	+25%	30/15 Summer				146.287	0.404
S3.000	S6	360 Winter	100	+25%	30/360 Winter				146.286	0.358
S4.000	S7	360 Winter	100	+25%	30/360 Winter				146.286	0.390
S2.003	ST1	360 Winter	100	+25%					146.286	-0.094
S5.000	S7	360 Winter	100	+25%	100/30 Winter				146.287	0.304
S2.004	ST2	360 Winter	100	+25%	30/30 Winter				146.286	0.483
S2.005	SHB	360 Winter	100	+25%	30/15 Summer				146.286	0.507
S2.006	SSPEL	1440 Summer	100	+25%					145.501	-0.187
S2.007	S10	1440 Winter	100	+25%					145.474	-0.192
S1.002	SMH2001	1440 Winter	100	+25%					144.985	-0.591
S1.003	SMH2004	1440 Winter	100	+25%					143.982	-0.818

PN	US/MH Name	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SMHXX	0.000	0.00	0.0	OK	
S1.001	SMH2106	0.000	0.00	0.0	OK	
S2.000	S3	0.000	0.35	12.4	SURCHARGED	
S2.001	S4	0.000	1.27	49.0	SURCHARGED	
S2.002	S5	0.000	0.24	8.5	SURCHARGED	
S3.000	S6	0.000	0.04	1.4	SURCHARGED	
S4.000	S7	0.000	0.00	0.0	SURCHARGED	
S2.003	ST1	0.000	0.00	9.8	OK	
S5.000	S7	0.000	0.09	3.4	SURCHARGED	
S2.004	ST2	0.000	0.07	1.9	SURCHARGED	
S2.005	SHB	0.000	0.05	1.9	SURCHARGED	
S2.006	SSPEL	0.000	0.07	1.9	OK	

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XP Solutions	Network 2019.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm FRA
v2

PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m ³)	Flow / Overflow Cap. (l/s)	Flow (l/s)		
S2.007	S10	0.000	0.05	1.9	OK	
S1.002	SMH2001	0.000	0.00	1.9	OK	
S1.003	SMH2004	0.000	0.00	1.9	OK	

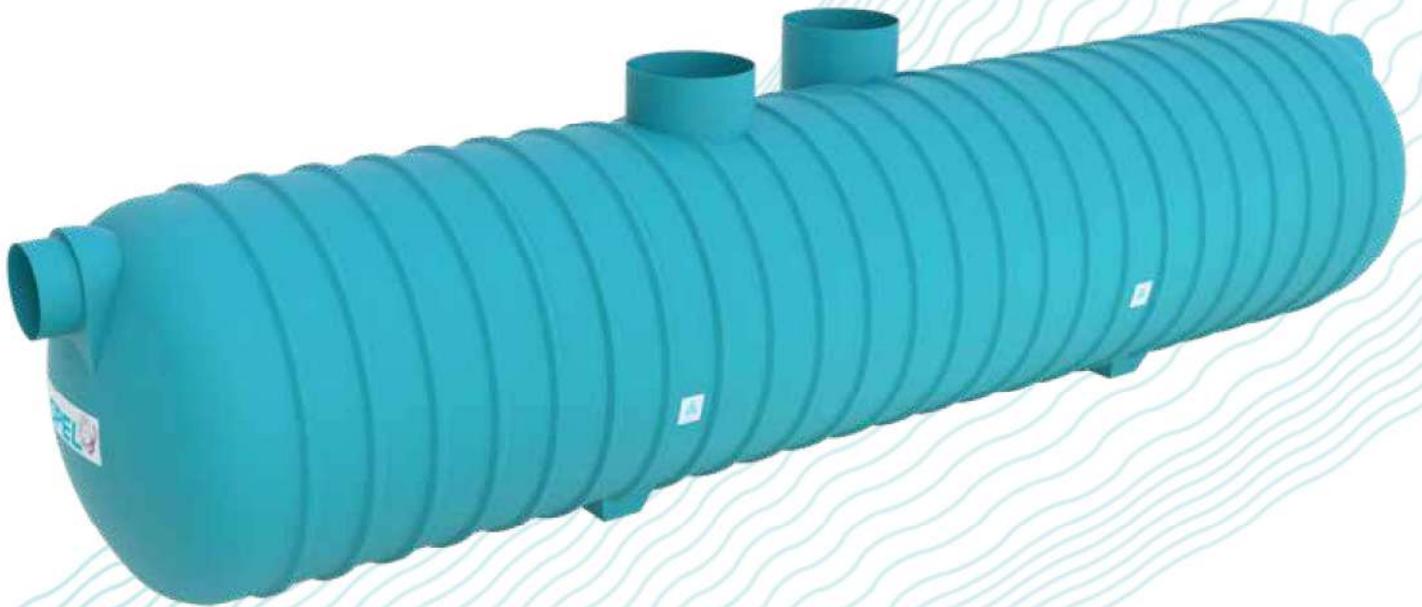


Appendix C
Product Details



Quality solutions protecting our global environment

The *safest answer* for *pollution control* and our *environment*



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t 86 (t f WH LOM8X60sOf sXgf)

) ho) nO TEOMf p) ((OM53

YT3EIV02h1fYFOhA

Speel ESR Stormceptor

110/160mm PVCU 225/300mm
Quantum, 450/900mm GRP
plain spigots

The Speel treatment solution for SuDS

The new SPEL ESR System is fully certified to meet the CIRIA SuDS Mitigation Index. It has been tested by WRc (for TSS and Metals) to the British Water Code of Practice for Manufactured Treatment Devices. This unit is also compliant to the British and European Standard BS EN 858.

SPEL's ESR range is a total treatment system removing Hydrocarbons, Total Suspended Solids (TSS) and Metals (particulate). It's a highly efficient, single unit, water quality SuDS component.

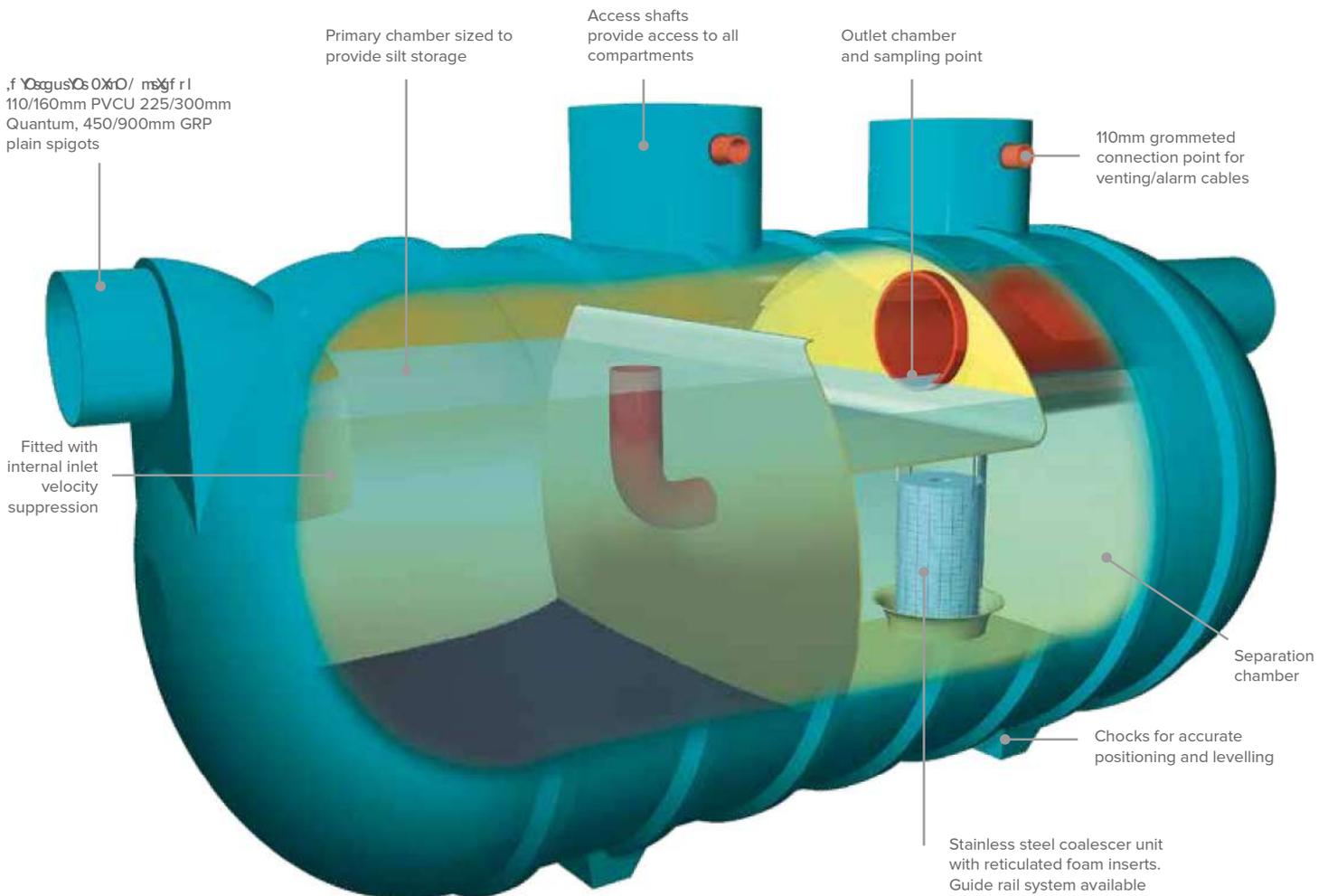
SPEL ESR Stormceptor
Certified Mitigation Index

TSS **100%**

Metals **100%**

Hydrocarbons **100%**

**H R Wallingford test results to BS EN 858*



) &ps) fOW 13TfOWp) ((OM53 c x4f | bb0 xbggy



Surface Water Treatment Device Performance Declaration

Testing carried out according to British Water Code of Practice

Product Details	Description
Manufacturer	SPEL Products
Treatment Device Name/Model	Stormceptor Type 210 C1/SC
General description	Class 1 By-pass Separator with Silt Capacity
Envisaged application	Treatment of Surface Water Run-off
Pollutant(s) captured	Suspended Solids

Test	Value	Unit
Treatment device capacity	3200	litres
Sediment Storage capacity	1000	litres
Treatment Flow rate	10	l/s
Connected Area	1,333	m ²
Pollution retention flow rate	10	l/s

Parameter	Value	Unit
Maximum capacity flow rate	100	l/s
Device head loss (at treatment flowrate)	0.15	m
Device head loss (at maximum capacity treatment flowrate)	-	m
TSS capture and retention efficiency (Milsil W4 test sediment)	82	%
Zinc capture efficiency (if tested)	Not tested for dissolved metals	%
Zinc retention efficiency (if tested)	Not tested for dissolved metals	%
Copper capture efficiency (if tested)	Not tested for dissolved metals	%
Copper retention efficiency (if tested)	Not tested for dissolved metals	%
Dissolved Metals reduction	0.0	%
Particulate metals reduction*	61.5*	%
Total Metals reduction*	61.5*	%
Total Metals Mitigation Index	0.615*	-

* Extrapolated value in accordance with British Water How to Guide: Applying the CIRIA The SuDS Manual (C753) Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices. Version 7, Section 4.3, (2021- under pre-publication review).

Research and Development

Research and development is at the heart of what we do at SPEL, our passion as Zero Pollution Ambassadors is to be at the cutting edge of clean surface water technology.

Months of rigorous testing has resulted in the new SPEL Stormceptor ESR Range.

Certificates of compliance from WRC and HR Wallingford for the SPEL Stormceptor ESR Range



SPEL's Head of Technical Development alongside the WRC testing officer.

&Vof31f:M5 ChWpMv:VOM 3Mf 4OWu v3Weg / 30W

The SuDS Manual is leading good practise in drainage design, SPEL are endorsing this with the release of the new SPEL Stormceptor ESR range.

9gs-Y 8ur mOf MCM 8gWf (988)	. CshY	* yMqLHd gf r
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*H R Wallingford test results to BS EN 858

n MCMsg sWOLYrSCHMT. XTHSgf ,f MQR
sWot 86 qf TOI Of Cisir Rgb l

- British/European Standard BS EN 858-1 2002 certification.
- The SPEL 25 year shell Warranty.
- 50 year+ life expectancy.
- ISO9001 quality assurance.
- ISO14001 committed to environmental improvement

ci R Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

ci R Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Tables from The SuDS Manual (C753), p568-569

For reference notes, please see the full manual: https://www.ciria.org/Memberships/The_SuDS_Manual_C753_Chapters.aspx

Technical Specifications for Stormwater Treatment Units

ei h0 Goms m g, fi@r l Hg

Model	Series	Treated Flow Rate - l/s	Maximum Flow	Catchment area (m ²)*	Oil storage (litres)	Silt capacity (litres)	Overall length* (mm) L	Overall diameter (mm)	Inlet Invert (mm) A	Base to Inlet (mm) B	Base to outlet (mm) C	Max in/out pipe diameter** (mm)	Number of access shafts (dia. mm)			
													600	750	900	1200
210C1/ESR	200	10	100	1,333	150	1,000	2,920	1,225	560	1,350	1,300	300	-	1	-	-
212C1/ESR	200	12	120	1,600	180	1,200	3,570	1,225	560	1,350	1,300	300	-	1	-	-
215C1/ESR	200	15	150	2,000	225	1,500	4,237	1,225	560	1,350	1,300	300	-	1	-	-
320C1/ESR	300	20	200	2,665	300	2,000	3,200	1,875	700	1,450	1,350	450	2	-	-	-
325C1/ESR	300	25	250	3,333	375	2,500	3,540	1,875	700	1,450	1,350	450	2	-	-	-
330C1/ESR	300	30	300	4,000	450	3,000	4,420	1,875	700	1,450	1,350	450	-	1	1	-
340C1/ESR	300	40	400	5,333	600	4,000	5,760	1,875	740	1,410	1,310	450	1	1	-	-
345C1/ESR	300	45	450	6,000	675	4,500	6,570	1,875	740	1,410	1,310	450	1	1	-	-
350C1/ESR	300	50	500	6,665	750	5,000	7,060	1,875	740	1,410	1,310	450	1	1	-	-
460C1/ESR	400	60	600	8,000	900	6,000	4,400	2,700	950	2,100	2,000	600	1	-	1	-
470C1/ESR	400	70	700	9,333	1,050	7,000	5,250	2,700	950	2,100	2,000	600	1	-	1	-
480C1/ESR	400	80	800	10,665	1,200	8,000	6,170	2,700	950	2,100	2,000	600	1	-	1	-
4100C1/ESR	400	100	1000	13,333	1,500	10,000	7,400	2,700	1,100	1,950	1,850	750	1	-	1	-
4125C1/ESR	400	125	1250	16,665	1,875	12,500	9,050	2,700	1,100	1,950	1,850	750	1	-	1	-
4150C1/ESR	400	150	1500	20,000	2,250	15,000	9,950	2,700	1,100	1,950	1,850	750	-	-	2	-
4160C1/ESR	400	160	1600	21,333	2,400	16,000	11,830	2,700	1,250	1,800	1,700	750	1	1	1	-
5180C1/ESR	500	180	1800	24,000	2,700	18,000	7,470	3,650	1,185	2,690	2,550	900	-	-	-	-
5200C1/ESR	500	200	2000	26,665	3,000	20,000	8,530	3,650	1,185	2,690	2,355	1,200	-	-	-	-
5250C1/ESR	500	250	2500	33,333	3,750	25,000	10,040	3,650	1,185	2,690	2,355	1,200	-	-	-	-
6300C1/ESR	600	300	3000	40,000	4,500	30,000	10,310	4,150	1,325	2,850	2,675	1,200	-	-	-	-
6350C1/ESR	600	350	3500	46,665	5,250	35,000	11,470	4,150	1,325	2,850	2,675	1,200	-	-	-	-
6400C1/ESR	600	400	4000	53,333	6,000	40,000	12,690	4,150	1,325	2,850	2,675	1,200	-	-	-	-
6500C1/ESR	600	500	5000	66,665	7,500	50,000	15,870	4,150	1,325	2,850	2,675	1,200	-	-	-	-
6600C1/ESR	600	600	6000	80,000	9,000	60,000	18,260	4,150	1,325	2,850	2,675	1,200	-	-	-	-
6700C1/ESR	600	700	7000	93,333	10,500	70,000	22,250	4,150	2,850	2,850	2,675	1,200	-	-	-	-

Access shafts dependent on orientation of pipework (see page 7 for orientation options).

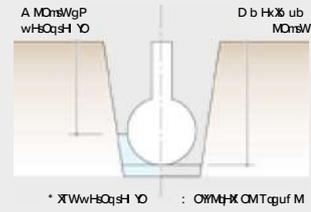
*These catchment areas are based on the SuDS Manual requirement for By-Pass devices to treat the 1 in 1 year storm event (27mm).
 **This dimension is for A-C inlet/outlet options, larger pipe sizes are available for D-I inlet/outlet options.

Tank Shell Specifications

The 'standard' specification is normally adequate for most installations but Heavy, Extra Heavy and Special specifications are available depending upon the burial depth and water table level, in winter. The concern is when the system is emptied completely and remains empty for a period of time.

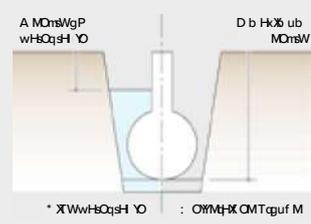
Standard tanks

Series	Depth (m)	Height (m)
200	1.0	4.0
300	0.9	4.0
400	1.3	5.0
500	1.9	5.7
600	2.4	6.2



Heavy tanks

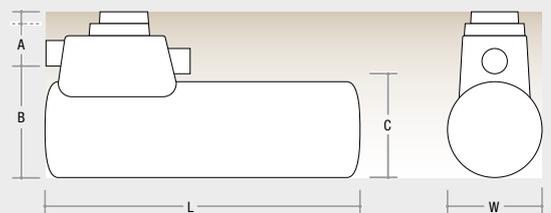
Series	Depth (m)	Height (m)
200	2.0	6.0
300	2.8	5.6
400	3.5	6.0
500	4.5	7.25
600	4.7	7.3



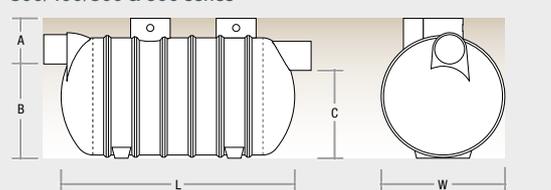
Based on installation in concrete with concrete surround.
 For pea gravel surround, see SPEL Data Manual p13.5

- cSS Y3WBY p) – Inside diameter 1200mm, outside diameter 1225mm.
- dSS Y3WBY p) – Inside diameter 1800mm, outside diameter 1875mm.
- eSS Y3WBY p) – Inside diameter 2600mm, outside diameter 2700mm.
- gSS Y3WBY p) – Inside diameter 3500mm, outside diameter 3650mm.
- i SS Y3WBY p) – Inside diameter 4000mm, outside diameter 4150mm.

200 series



300/400/500 & 600 series



Installation

SPEL Separators can be installed with a concrete or pea gravel surround, dependent upon ground conditions and water table level. Detailed installation instructions are provided with each unit, see Installation TSII or SPEL Data Manual Section 13.

Site access and conditions

It is the responsibility of the contractor to ensure suitable access to good hard ground that is safe and suitable for off-loading.

Off-loading/handling

The contractor is responsible for off-loading. The tank must be handled with care to prevent accidental damage from impact or contact with sharp objects.

Tanks should be lifted using slings, not chains or wire ropes. Do not drag tanks along the ground for any distance and avoid jarring or bumps. Do not lift with water in the tank.

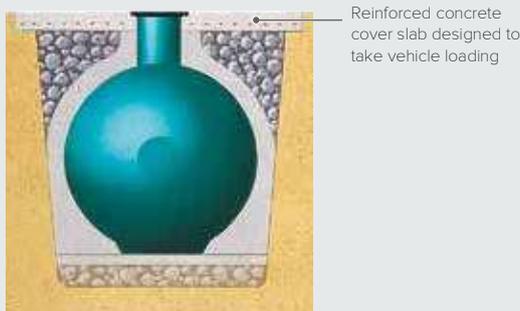
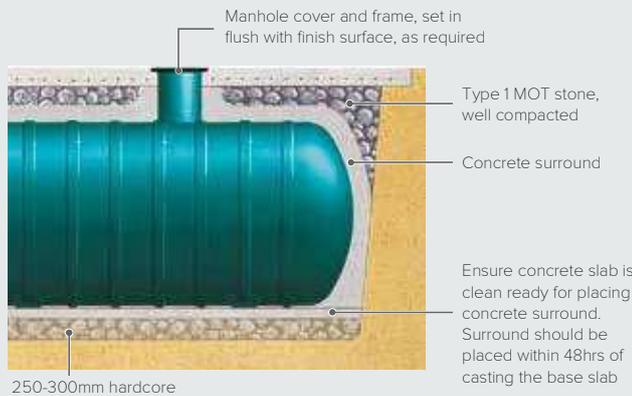
Health and safety

Installation should be carried out by a competent contractor in accordance with Health & Safety at Work legislation and good building practice.

A warning notice should be visible at the top of each access shaft – ‘danger, harmful fumes’ and ‘respirators must be worn in this tank’. Before entering persons must be qualified in accordance with ‘confined space’ requirements.

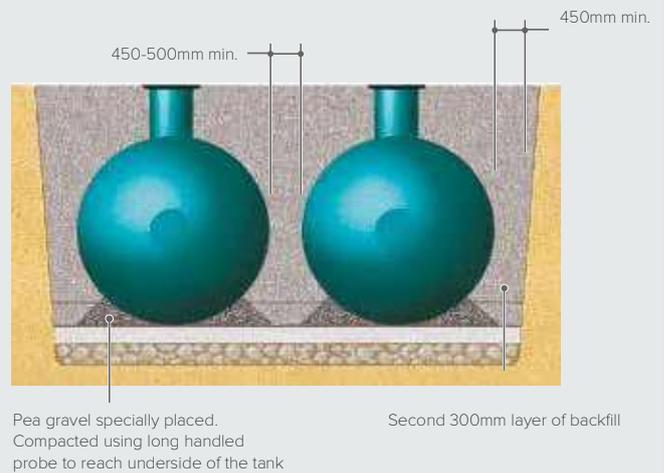
Installation of SPEL Separator tank with chocks and a load bearing cover slab.

Installation of SPEL Separator tank with chocks and a load bearing cover slab.



Installation of SPEL Separator tank where ground over installation is not required to be vehicle load bearing.

Installation of SPEL Separator tank where ground over installation is not required to be vehicle load bearing.



Installation of SPEL Separator tank where ground over installation is not required to be vehicle load bearing.

Where it is economical to do so, SPEL Separator tanks can be surrounded in pea gravel or with similar free flowing clean rounded aggregate. Details of the installation procedure, approved backfill materials and the need for mechanical anchoring in specific circumstances are contained in the SPEL Data Manual and SPEL Separator Installation Instructions.

Maintenance Requirements

We recommend the SPEL Separator is checked at 3, 6 or 12 monthly intervals to determine the depth of silt in the primary chamber.

The SPEL automatic alarm/monitoring system will automatically warn you when the SPEL Separator requires emptying of light liquids. See ref. 3.10 – 3.19. However, silt will accumulate and require removing at intervals depending on the site conditions.

SPELGuard contracts available.

For more information contact us:

info@spelproducts.co.uk | 01743 445 200



SPELGuard Commissioning & Maintenance

u Tf:OMDB3xfW0Y

) &ps 100B13WhMf
5h:23 W:BYyF3I Y

To facilitate easy insertion of coalescer units, the SPEL guide rail system manufactured in stainless steel can be incorporated into SPEL Puraceptors and class 1 Stormceptors.

Brackets fixed to the top and bottom of the coalescer unit simply engage the stainless steel guide rail fixed to the top of the stub access shaft. The coalescer unit is then lowered in the normal way, being guided at the correct angle into the conical base.

Lifting chains are available for the larger coalescer units and where extension shafts are fitted.

Extension guide rails can be incorporated into SPEL extension shafts to suit.

SPEL coalescer unit lifting, locating and locking system

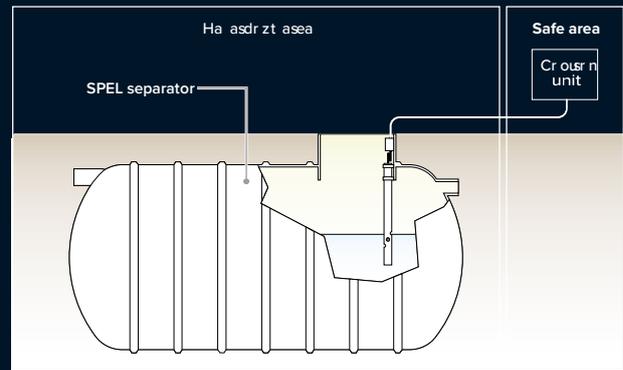
The SPEL lifting, locating and locking system is manufactured in stainless steel and replaces the standard coalescer unit handle.

The locating/locking handle ensures the coalescer unit is seated and locked in its correct position after maintenance.



Above left:
Lifting, locating and locking system with guide rail system.

Above right:
The SPEL coalescer unit with lifting chain.



SPEL offer a range of alarms, for full details refer to the SPEL Data Manual Section 3. Kiosks with beacons and provision for BMS and remote information via browser user interface.

) &ps t 023B B0W lo / aeSS
Oil alarm only – not BMS compatible

) &ps t 023B2u :BcS
Oil, silt and/or high level alarm with volt free terminal for beacon and BMS capability

) &ps t 023B2u :BdS
For oil, silt and/or high level as required. This alarm provides a range of options for BMS and remote information to on or off-site monitoring facilities.

) &ps t 023B2u :B) 0B0U :B) 3T0Wf0W B0W
for remote off-grid areas.

) &ps 3xf3Mf:CM0113YY604Y

Extension access shafts are available for deep invert applications.



Socket joint stub access shaft with extension shaft.

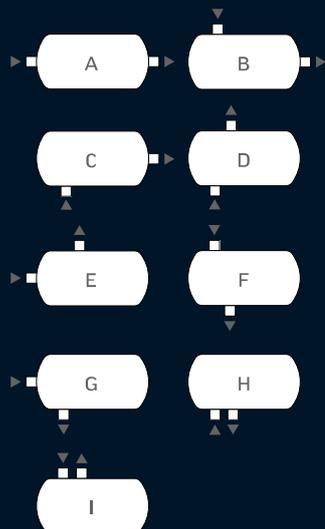
600mm, 750mm, 900mm and 1200mm diameter.

See tripod drawing below for other extension adjustments

Double seal if required

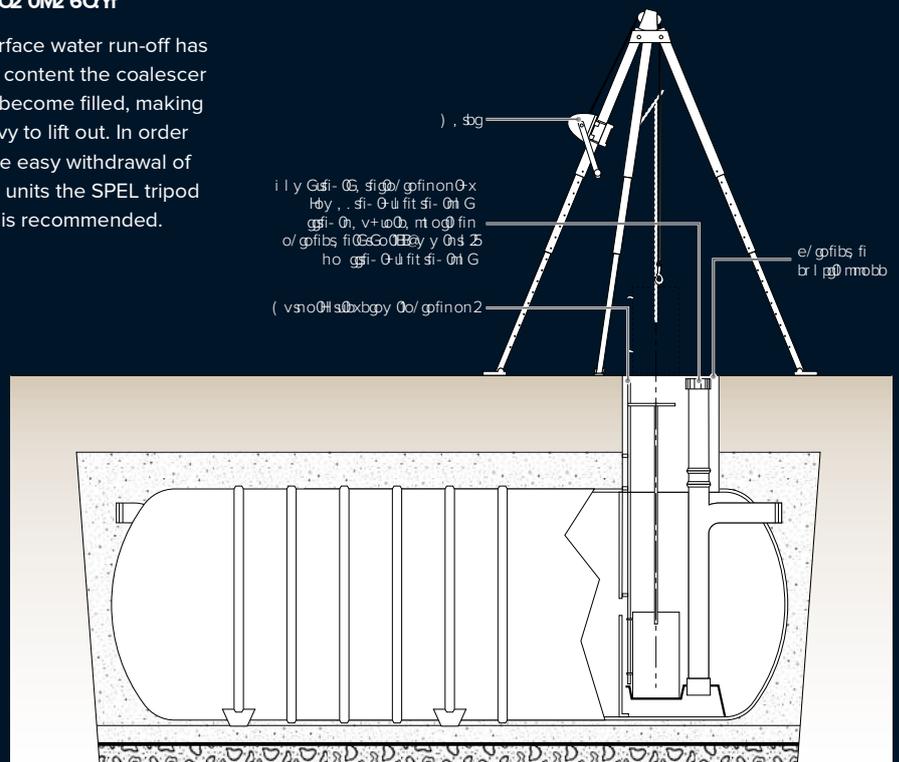
) &ps p) ((0M53 –
rVBfChfBf 0ABMf0f:CM

Dependent upon model and diameter of connections, these nine different orientations are available. However on the larger models it is important to check with our technical department.



) &ps fWf02 0M2 60Yf

Where surface water run-off has a high silt content the coalescer units can become filled, making them heavy to lift out. In order to facilitate easy withdrawal of coalescer units the SPEL tripod and hoist is recommended.



ESR 13T (Enhanced Silt Retention)

Enhanced Silt Retention

SPEL's ESR range is a total treatment system removing Hydrocarbons, Total Suspended Solids (TSS) and Metals (particulate). It's a highly efficient, single unit, water quality SuDS component.



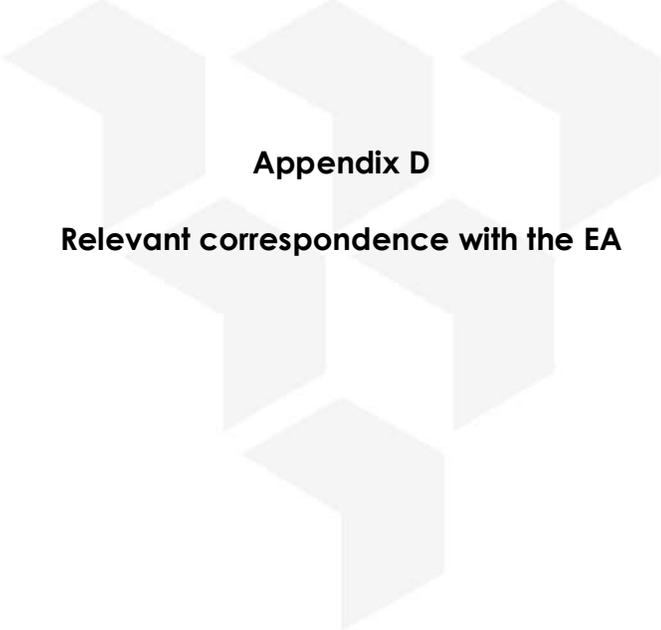
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Phone: +44 (0)1743 445200

Email: info@spelproducts.co.uk / sales@spelproducts.co.uk



spelproducts.co.uk



Appendix D
Relevant correspondence with the EA



Fredi Giliberti
Via Email

Our Ref: EMD-313217

Your Ref:

Date: 07/09/2023

Dear Fredi,

Enquiry regarding - Follow up question.

Thank you for your enquiry which was received on 21/08/2023.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

The Flood Map for Planning includes all sources of flood risk to provide the full wet picture of the site. This refers to the land at risk of flooding and not individual properties at risk. It ignores the presence of defences and does not account for the potential impacts of climate change.

The Environment Agency (empowered under the Water Resources Act 1991) concentrates on the major elements of the drainage system, managing flood risk arising from designated "main rivers" and the sea. The Flood & Water Management Act (2010) has given Lead Local Flood Authorities (LLFAs) responsibility for the management of local flood risk, which includes surface runoff, groundwater and flooding from ordinary watercourses (smaller rivers and streams).

Flood Risk on Site		
Ordinary Watercourse	Potential Risk (no EA data)	LLFA Responsibility
Surface Water	Significant Risk	LLFA Responsibility

The NaFRA 2 will be completed Summer 2024 and the flood zones will then be updated [NaFRA2](#). As such we are not accepting any flood map challenges at this time.

Please refer to [Open Government Licence](#) which explains the permitted use of this information.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely

Rose Archibald
Customers & Engagement Officer
East Midlands

For further information please contact the Customers & Engagement Team on 02084 747770

Direct e-mail:- EMDenquiries@environment-agency.gov.uk

Hertfordshire



Oxfordshire



Cambridgeshire



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