



FLOOD RISK & DRAINAGE IMPACT ASSESSMENT

Car Park Extensions
Caterpillar, Desford

Revision A

2023097-FRA-001

March 2024



Summary

On the instruction of JJL Design & Build, Portland Consulting Engineers has undertaken a site-specific flood risk and drainage impact assessment for the application site as displayed on the Architect's layout drawings.

The application site is intended to extend the main car park at the Caterpillar factory in Desford and is located in a Zone 1 flooding area. The application total site area is approximately 0.889Ha.

An assessment has been made to ascertain any flood risks related to the proposed development.

The following conclusions have been made:

- The proposed development lies within zone 1.
- Ground conditions are not considered suitable for the use of infiltration techniques.
- The nearest watercourse is 450m to the south of the site.
- Surface water flows are required to enter the water course beyond the southeastern boundary is this correct via an existing private drain on site.
- The final site layout should be profiled to shed the local on-site drainage flood water to contain it within the site curtilage.
- Foul water discharge is not required for this site.



Revision Log

Revision	Description	By	Date
Ø	Initial issue	MA	2 nd February 2024
A	Architect's site layout updated	MQ	19 th March 2024

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Introduction

1.1 Background

On the instruction of JJL Design & Build, Portland Consulting Engineers has undertaken a site-specific flood risk and drainage impact assessment for the application site as displayed on the Architect's layout drawings.

The application site is intended to extend the main car park at Caterpillar, Desford. The site is located in a Zone 1 flooding area. The application site area is approximately 0.889Ha.

1.2 Scope of Report

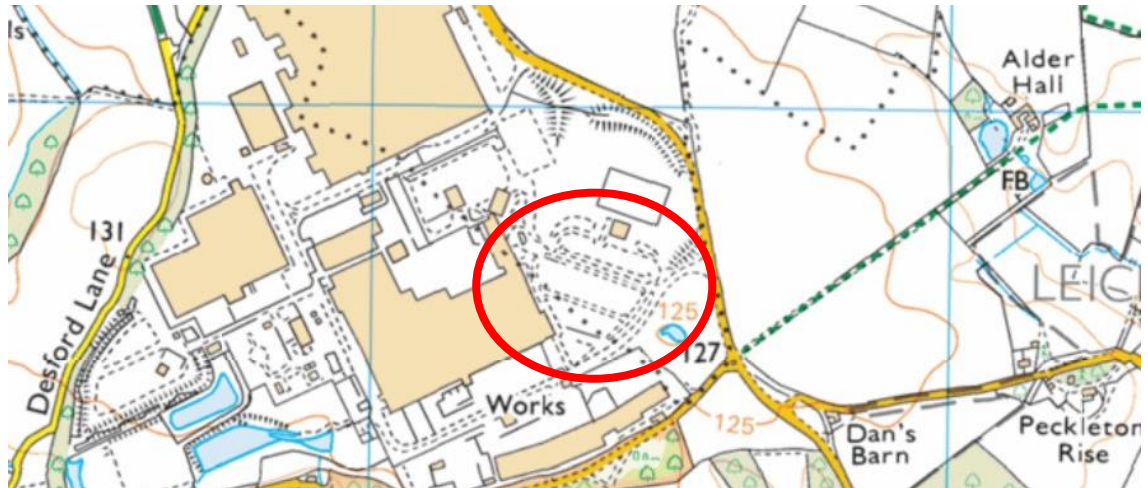
The following tasks were undertaken in the preparation of this report:

- A site visit was carried out in order to identify any risks of flooding to the site, identify drainage patterns, receiving watercourses, and to identify any constraints to the drainage system that may restrict the proposed development.
- Assessment of surface water run-off for the existing site.
- Evaluation of how the proposed development would affect the existing water runoff.
- Coordination with JJL Design & Build to ensure the overall site layout is designed to accommodate SUDS.

2 Site Description

2.1 Site Location

The site is the main car park at Caterpillar, Desford. The approximate National Grid Reference is 448400, 301720.

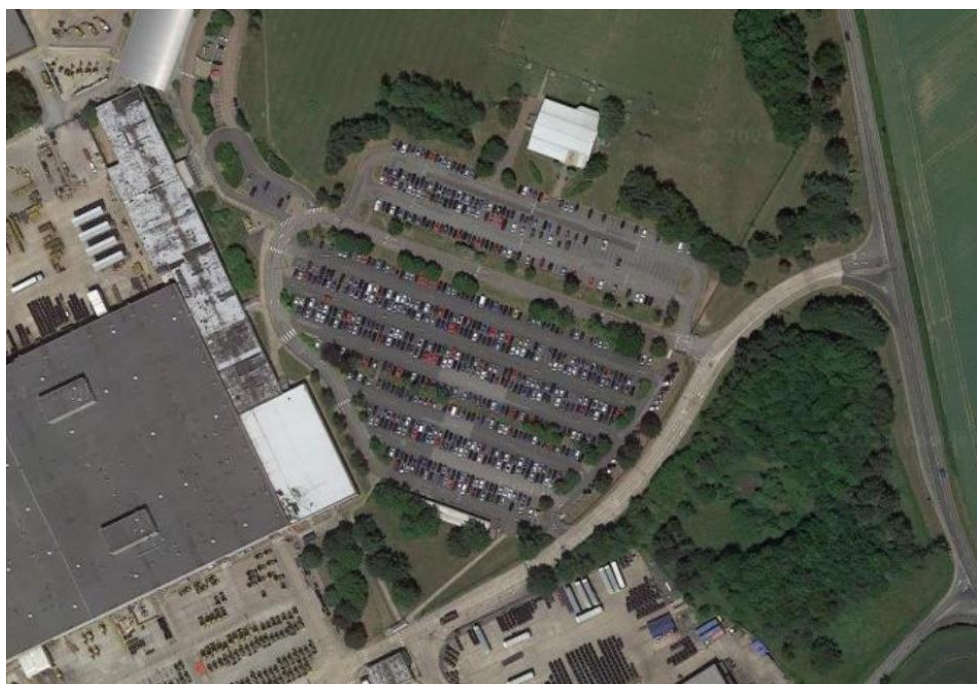


Location Plan (NTS)

2.2 Site Walkover Survey

A site visit was conducted by PCE in order to determine site drainage patterns and key topographical features. A topographical survey is available in Appendix 1.

The site is generally rectangular in plan and is bounded by the Caterpillar factory to the south and west, beyond the northern boundary are Football pitches and to the east is arable land. The site is currently the main car parking facility for the Caterpillar Factory, the site falls northwest to southeast by approximately 850mm.

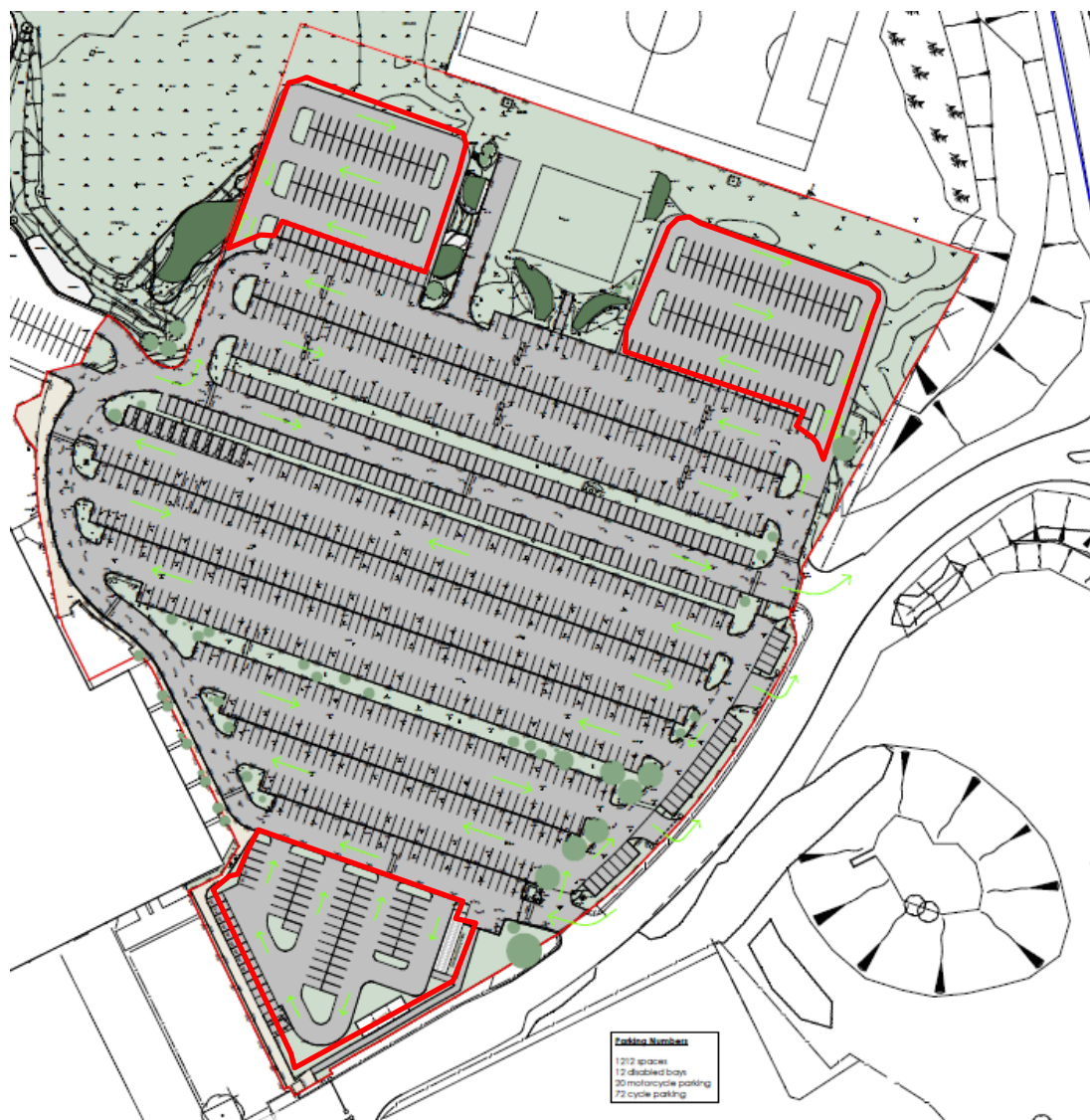


Aerial Photo

3 Proposed Development

3.1 Description

It is proposed to extend the existing car park in three locations. The following illustrative layout has been provided for the purposes of this report. The access will be controlled by the site operator.



Illustrative Proposed Site (NTS)

(Architect's application drawings to be referred to for full details)

For the purposes of the report the following have been indicated as approximate values for the application site:

• Total Development Area	8894m ²
• Northwest Total Area	2527m ²
• Northeast Total Area	2946m ²
• South Total Area	3419m ²
• Total Permeable Area	3389m ²
• Total Impermeable Area:	4107m ²

4. Site Flooding Potential

4.1 Background

The following forms of flooding have been considered:

- Flooding from rivers
- Flooding from the sea
- Flooding from land
- Flooding from groundwater
- Flooding from sewers
- Flooding from reservoirs, canals and other artificial sources

4.2 Flooding from Rivers (Fluvial)

The application site area is located within Zone 1. The car park won't be habited and therefore the development is considered suitable for the location.

4.3 Flooding from the Sea

The site is not at risk of flooding from the sea as the nearest coastal water body is approximately 100km to the Northeast. The risk of flooding from this source is considered **low**.

4.4 Flooding from Land (Pluvial)

The Surface water flood maps shows an area of surface water flooding to the north of the proposed southern carpark. The northwestern car park shows no overland flow issues but there is a small area near the northeastern car park which runs along the boundary

The proposed car park boundaries will largely follow the profile of the existing and therefore the risk from surface 'water run-on' maintains as per the status quo. The risk of flooding to the general site from this source is considered **low**.

4.5 Flooding from Groundwater

Data taken from the British Geological Survey (BGS) indicates that the site is underlain by clays and gravel. The risk of flooding from this source is considered as **low**.

4.6 Flooding from Sewers

SevenTrent do not issue flood maps therefore we cannot say if existing sewer flooding is an issue within the area of the site.

The proposed sewers will be designed to achieve a self-cleansing velocity to prevent blockages which present the main risk of flooding to the systems. The risk of flooding as a result of failure to the drainage system can be deemed as low.

4.7 Flooding from Reservoirs, Canals and other Artificial Sources

Flood maps show the site not at risk when this flooding occurs concurrently with river flooding, therefore this is considered as low risk.

5 Flood Risk Assessment

5.1 Considerations

The following have been assessed and risks classified thus:

Source	Risk
Flooding from Rivers	Low
Flooding from the Sea	Low
Flooding From Land	Low
Flooding from Groundwater	Low
Flooding from Sewers	Low
Flooding from Reservoirs, Canals and other Artificial Sources	Low

5.2 Residual Flood Risk

Surcharging of drainage systems may result in slow inundation however the topography of the site and the surrounding area makes the risk negligible.

6. Drainage Impact Assessment

6.1. Introduction

The effects of a development on the surrounding areas must be considered with surface water run-off and demands on existing sewer systems being assessed along with the implications for downstream watercourses.

6.2. Existing Sites

The current sites are greenfield.

6.3. Proposed Site

The site presented in section 3 has been used for the purposes of this assessment.

6.4. Surface Water Management

The drainage hierarchy has been applied as follows:

Infiltration

The ground is believed to have a low potential for infiltration. This method of surface water disposal has therefore been discounted.

Discharge to Watercourse

The nearest watercourse is to the South of the site, the existing surface water drainage discharges to the watercourse therefore a connection to the exiting private drainage will be made to dispose of the surface water from the proposed areas.

Discharge to Public Surface Water System

Due to the location of the existing private surface water network this will be the most suitable location of discharge. No surface water will discharge into the public system.

6.5. Proposed SUDS System

It is proposed the car parking spaces for the site are to be constructed as a permeable surface with subterranean storage with a connection to the main system. The flows from the main access road will be drained via a lined system that will drain down to a perforated pipe and convey the remaining flows to the existing private drainage.

6.6. Foul Water

6.7. Existing Site

There are no existing foul flows from the site.

6.8. Proposed Site

There are no proposed foul flows.

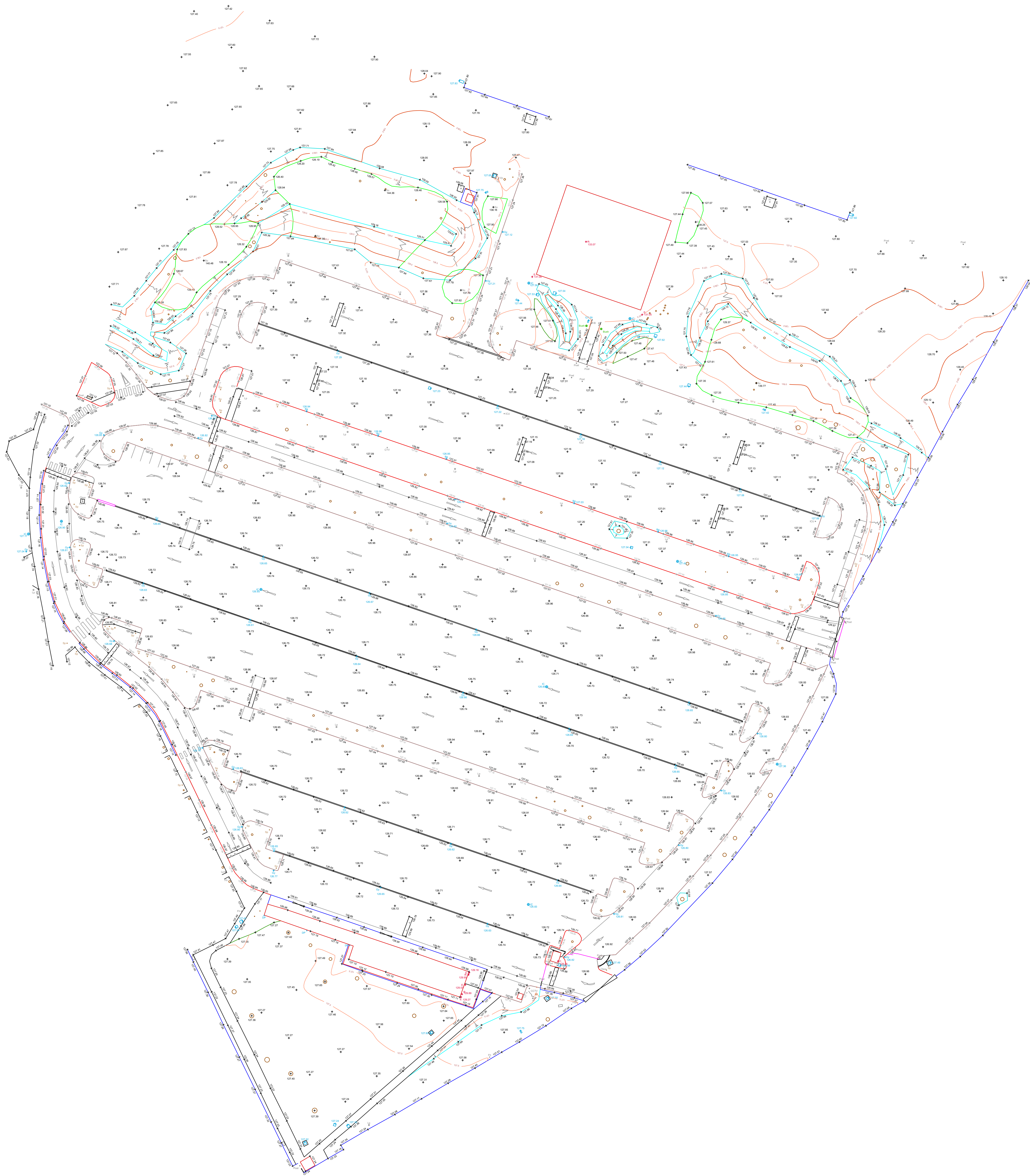
7 CONCLUSIONS

7.1 The site and proposed development has been assessed with the following conclusions:

- The proposed development lies within zone 1.
- The proposed type of development is considered suitable for the site.
- The site has a low probability of flooding from all sources save for pluvial flooding.
- Ground conditions aren't considered suitable for the use of infiltration techniques in the form of soakaways.
- An indirect connection will be made via the existing private drainage network.
- No surface water flows will enter the public system.
- There are no Foul Water flows proposed from the site.

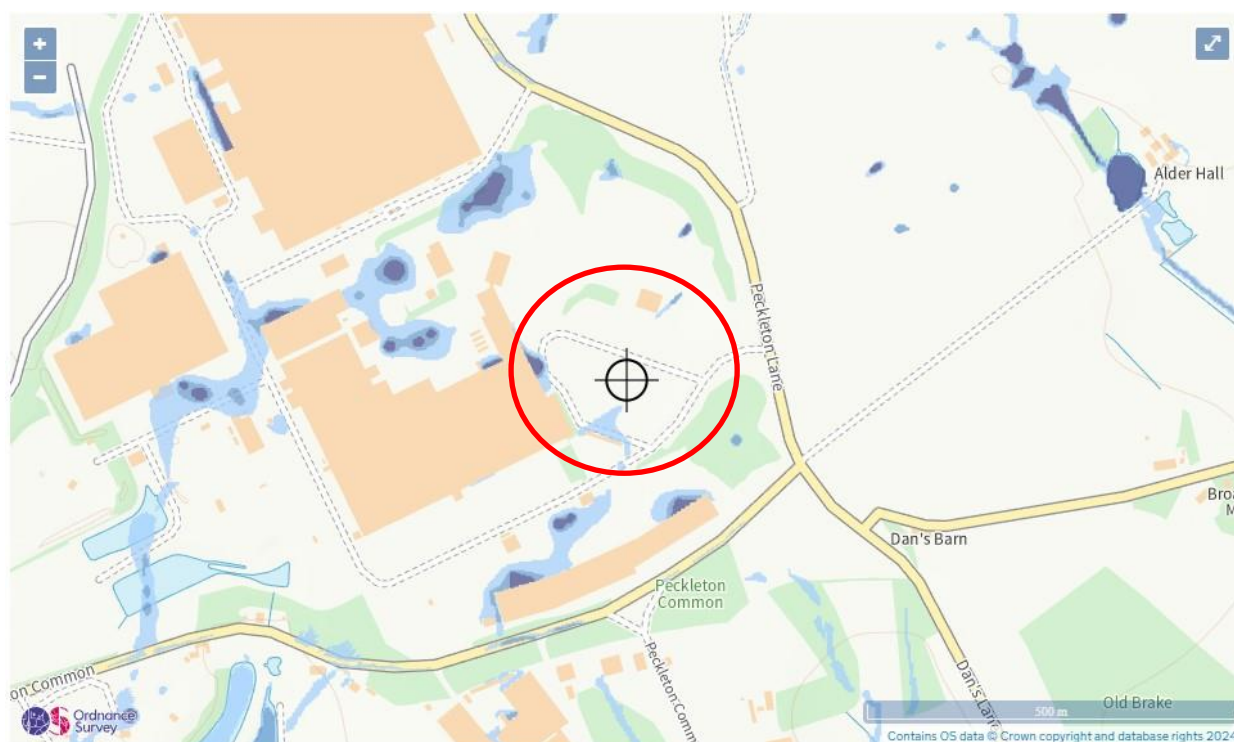
Appendix 1

Topographical Survey



Appendix 2

Flood Maps



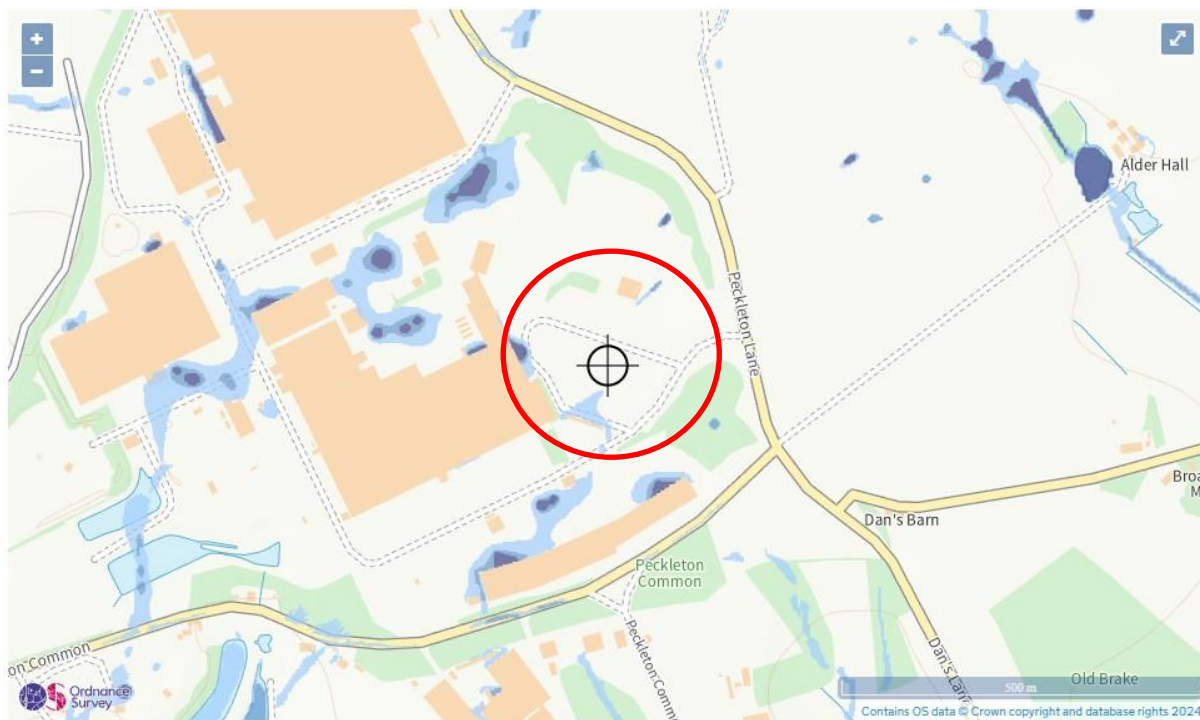
Extent of flooding from surface water

● High ● Medium ● Low ○ Very Low ⊕ Location you selected

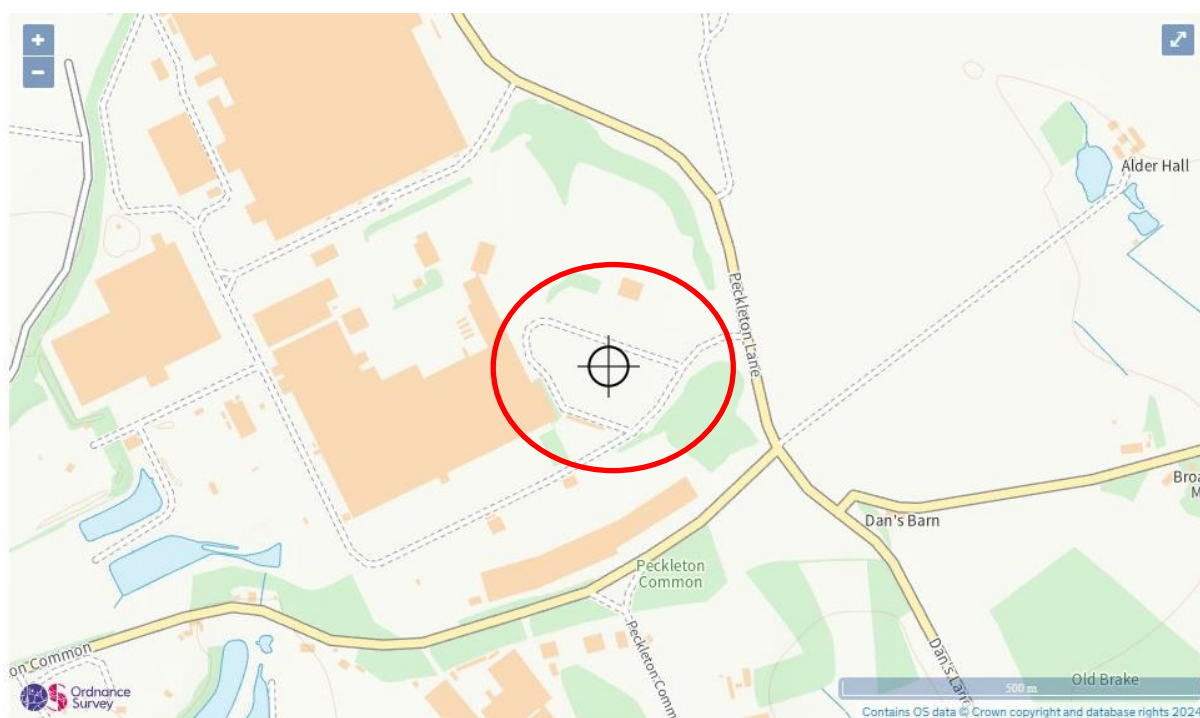
Flood Zone 3

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.



Surface Water Flooding



Extent of Flooding from Reservoirs

Appendix 3

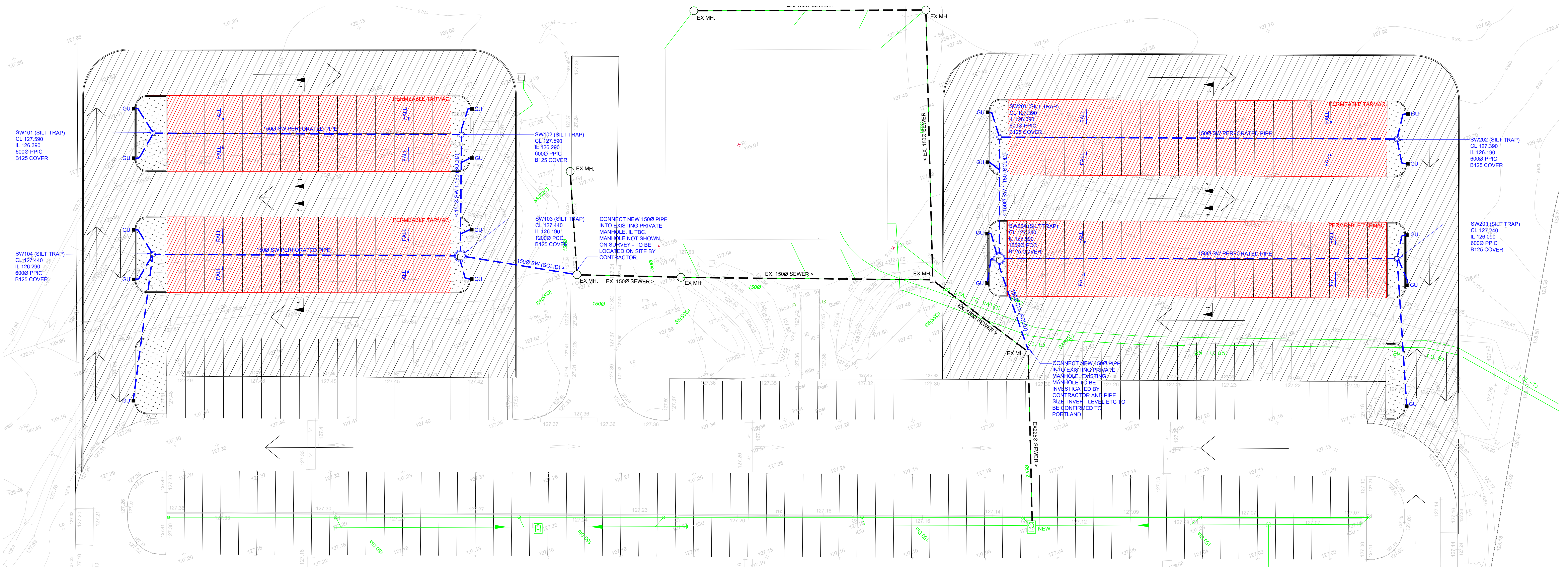
Existing Services Plan

Appendix 4

Drainage Strategy Drawing

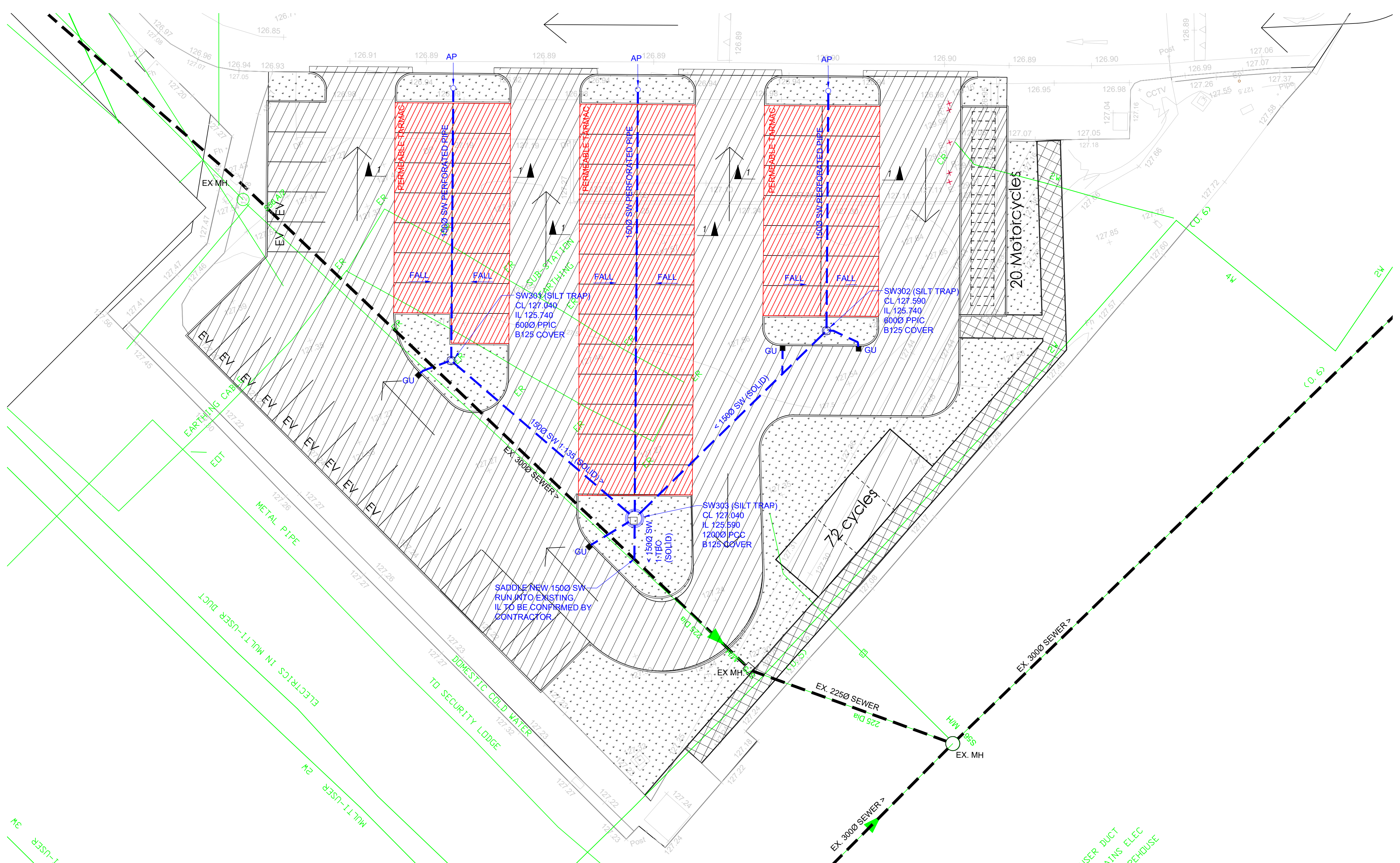
HEALTH AND SAFETY NOTES:
THE FOLLOWING KEY RESIDUAL HEALTH AND SAFETY RISKS HAVE NOT BEEN ELIMINATED BY DESIGN AND ARE IDENTIFIED BELOW:
-
SAFE METHODS AND SYSTEMS OF WORK REMAIN THE RESPONSIBILITY OF THE CONTRACTOR.

/// DENOTES PERMEABLE PAVING WITH SUBTERRANEAN STORAGE

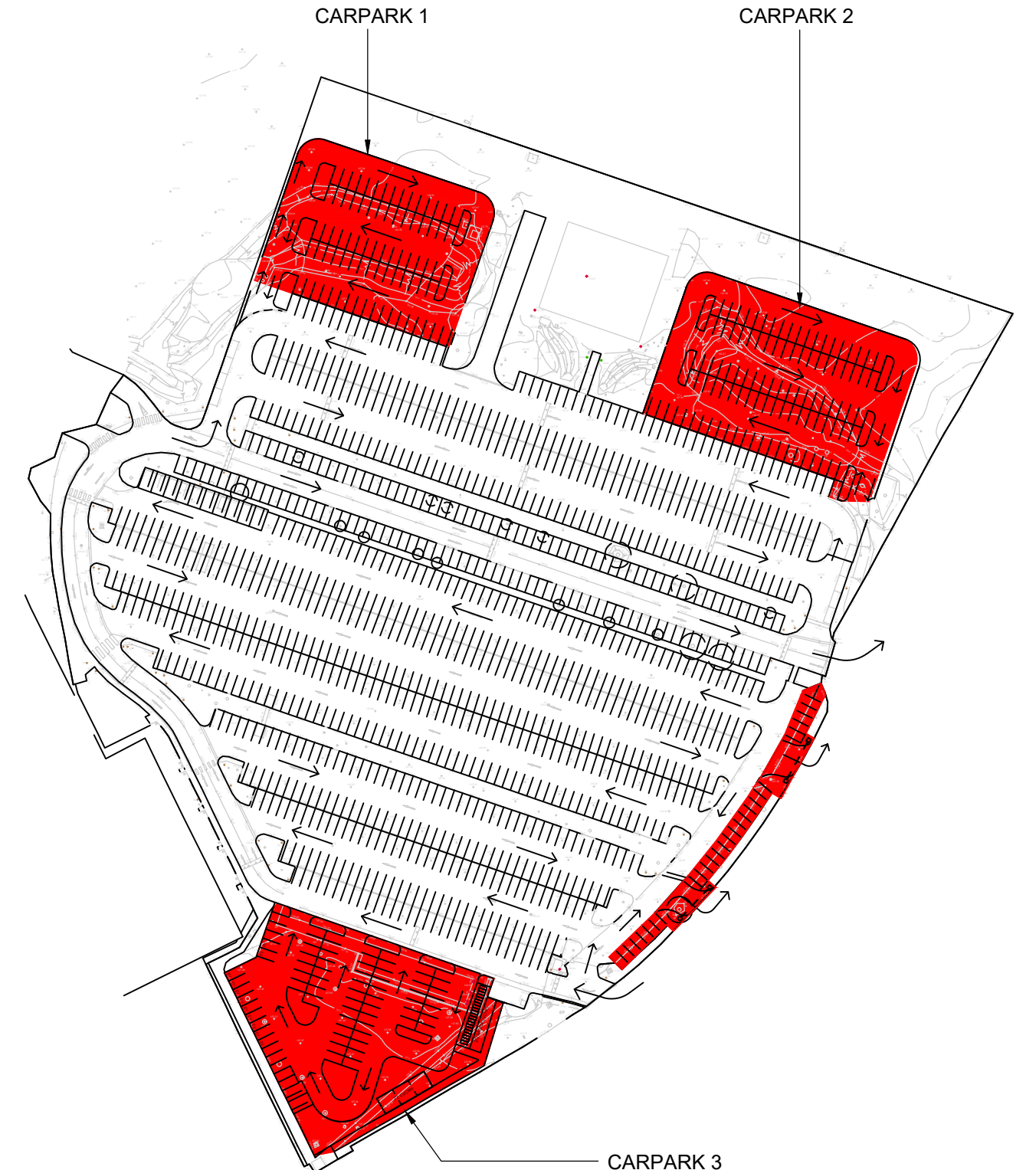


CARPARK 1
1:200

CARPARK 2
1:200



CARPARK 3
1:200



KEY PLAN
NTS

A	LAYOUT UPDATED	MD	MG	MG	19/03/24
Q	PRELIMINARY ISSUE	MD	MG	MG	02/02/24
REV. REVISION NOTES		BY CHK APP DATE			

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CLIENT
JUL DESIGN AND BUILD

PROJECT TITLE
NEW PARKING PROVISIONS
CATERPILLAR UK LTD
PECKLETON LANE, DESFORD

DRAWING TITLE
DRAINAGE STRATEGY

SCALE		AS SHOWN		SHEET SIZE		A0	
DRAWING BY		CHECKED BY		APPROVED BY		DATE	
MQ		MG		MG		22/01/24	
DRAWING STATUS						SUITABILITY	
COMMENT							
PROJECT / DRAWING NUMBER						REVISION	
2023097-PCE-XX-XX-DR-C-SK005						A	

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Appendix 5

Drainage Calculations

Calculated by:

Matthew Alexander

Site name:

Caterpillar

Site location:

Desford

Site Details

Latitude:

52.61178° N

Longitude:

1.2872° W

Reference:

265382882

Date:

Jan 24 2024 10:05

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):

0.253

Methodology

Q_{BAR} estimation method:

Calculate from SPR and SAAR

SPR estimation method:

Calculate from SOIL type

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	640	640
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	1.1	1.1
1 in 1 year (l/s):	0.91	0.91
1 in 30 years (l/s):	2.2	2.2
1 in 100 year (l/s):	2.83	2.83
1 in 200 years (l/s):	3.34	3.34

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Calculated by:

Matthew Alexander

Site name:

Caterpillar

Site location:

Desford

Site Details

Latitude:

52.61144° N

Longitude:

1.28561° W

Reference:

1529554943

Date:

Jan 24 2024 10:05

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Runoff estimation approach

IH124

Site characteristics

Total site area (ha):

0.295

Methodology

Q_{BAR} estimation method:

Calculate from SPR and SAAR

SPR estimation method:

Calculate from SOIL type

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	640	640
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	1.28	1.28
1 in 1 year (l/s):	1.06	1.06
1 in 30 years (l/s):	2.56	2.56
1 in 100 year (l/s):	3.3	3.3
1 in 200 years (l/s):	3.9	3.9

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Calculated by:

Matthew Alexander

Site name:

Caterpillar

Site location:

Desford

Site Details

Latitude:

52.60995° N

Longitude:

1.28718° W

Reference:

1766082575

Date:

Jan 24 2024 10:04

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):

0.342

Methodology

Q_{BAR} estimation method:

Calculate from SPR and SAAR

SPR estimation method:

Calculate from SOIL type

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	640	640
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	1.49	1.49
1 in 1 year (l/s):	1.23	1.23
1 in 30 years (l/s):	2.97	2.97
1 in 100 year (l/s):	3.82	3.82
1 in 200 years (l/s):	4.52	4.52

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