



The Civil Engineering Practice

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Surface Water Drainage Statement

Proposed New Packhouse and Car Park Relocation

**Sefter Farm East
Pagham Road, Bognor Regis, West Sussex**

On behalf of

Barfoots of Botley

May 2025

Document History and Status

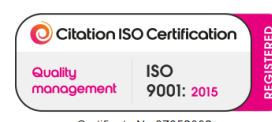
Project Number 24019

Date	Version	Prepared By	Reviewed By	Approved By
2 May 2025	1.0	Steve Doughty Director	Stuart Magowan IEng MICE	Stuart Magowan Director

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CONTENTS

1	Non Technical Summary	1
2	Planning Context	2
2.1	Planning Permission	2
2.2	Planning Conditions	2
3	Existing Site	3
3.1	Site Location	3
3.2	Site Description	3
3.3	Existing Drainage - Existing Staff Parking Area	4
3.4	Existing Drainage - Agricultural Field	4
3.5	Geology and Groundwater	6
4	Development Proposals	7
4.1	Description	7
4.2	Surface Water Drainage Generally	7
4.3	Calculation Design Criteria	8
4.4	Surface Water Drainage - Concrete Service Yard	8
4.5	Surface Water Drainage - Packhouse Roof	9
4.6	Surface Water Drainage - Relocated Staff Parking Area and New Packhouse External Works	10
4.7	Interception Drainage	11
4.8	Water Quality	12
4.9	Risk to Others	14
4.10	Surface Water Exceedance Route	15
5	Conclusions	16
6	List of Appendices, Images and Tables	17

1 Non Technical Summary

- 1.1 This Drainage Statement has been undertaken on behalf of Barfoots of Botley in support of the Discharge of Planning Condition 7 of planning permission P/117/21/PL for the construction of a 6,485m² packhouse east of the existing Sefter Farm South production building and the relocation of the existing staff parking area to the east of the new packhouse at Sefter Farm, Pagham Road, Bognor Regis West Sussex.
- 1.2 The existing permeable parking area will be converted to a concrete service yard.
- 1.3 Surface water collected from the concreted service yard will be discharged in the same manner as existing through its voided subbase into the existing onsite watercourse which discharges via the existing onsite drainage network to the Pagham Rife to the west of the site.
- 1.4 The proposed development will incorporate a sustainable drainage system which will recycle surface water collected from the new roof for irrigation.
- 1.5 Surface water collected from the relocated car park and new external works around the new packhouse will be discharged at a suitably restricted rate to the existing onsite watercourse to the southwest of the site which discharges via the existing onsite drainage network to the Pagham Rife to the west of the site.
- 1.6 Sufficient storage will be provided for all storm return periods up to and including the 1:100 year rainfall event with an allowance for climate change.
- 1.7 This report concludes that a suitable surface water drainage system has been designed to accommodate the anticipated flows from the proposed development.

2 Planning Context

2.1 Planning Permission

2.1.1 The development was granted planning permission on 9 August 2022 under reference P/117/21/PL.

2.2 Planning Conditions

2.2.1 Planning Condition 7 relates to drainage and states that:

‘Development shall not commence, other than works of site survey and investigation, until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SuDS Manual produced by CIRIA.

Winter groundwater monitoring to establish highest annual ground water levels and winter Percolation testing to BRE 365, or similar approved, will be required to support the design of any Infiltration drainage. No building shall be occupied until the complete surface water drainage system serving the property has been implemented in accordance with the agreed details and the details so agreed shall be maintained in good working order in perpetuity.

Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies W SP1, W DM1, W DM2 and W DM3 of the Arun Local Plan. This is required to be a precommencement condition because it is necessary to implement the surface water drainage system prior to commencing any building works.’

3 Existing Site

3.1 Site Location

3.1.1 The development site is located to the east of the Sefter Farm South Packhouse on Sefter Farm, Pagham Road, Bognor Regis, West Sussex, PO21 3PX.



Image 1: Site Location

3.1.2 The closest watercourse is a tributary of the Pagham Rife which is located approximately 220m to the south of the site.

3.1.3 The Pagham Rife which is located approximately 370m to the west of the site. The Pagham Rife is classified as Main River.

3.1.4 A copy of the site location plan is located in Appendix 1 at the rear of this report.

3.2 Site Description

3.2.1 The site is approximately 2.54ha in area and currently comprises an existing staff parking area and access road and an undeveloped agricultural field.

3.2.2 Existing ground levels are highest at the northeastern corner of the site at approximately 6.0m AOD and lowest along the western site boundary at approximately 4.75m AOD.

3.2.3 A copy of the existing site layout plan is located in Appendix 2 at the rear of this report.

3.3 Existing Drainage - Existing Staff Parking Area

3.3.1 The existing staff parking area is of permeable stone construction.

3.3.2 Surface water is collected within perforated pipes beneath the permeable stone and discharged to an onsite conveyance channel which in turn discharges by gravity via a surface water drain located beneath the workers' accommodation to the west of the Sefton South site to the Pagham Rife.

3.4 Existing Drainage - Agricultural Field

3.4.1 Surface water from the existing field in the eastern part of the site discharges as an overland greenfield runoff to a ditch at its southwest corner which forms a part of the wider sites surface water drainage network and ultimately to the Pagham Rife.

3.4.2 Pre-developed greenfield runoff rates have been established using the HR Wallingford tool for Greenfield Runoff Estimation based on the FEH Statistical Method for rainfall estimation.

3.4.3 The Hydrology of Soil Type (HOST) has been confirmed by the National Soil Resources Institute at Cranfield University as soil type 9 which is classified as *'Soils seasonally waterlogged by fluctuating groundwater and with relatively slow lateral saturated conductivity'*.

Calculated by: Steve Doughty

Site name: Sefter Farm

Site location: Pagham

Site Details

Latitude: 50.78889° N

Longitude: 0.73656° W

Reference: 823552576

Date: Mar 11 2025 15:50

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

FEH Statistical

Site characteristics

Total site area (ha): 1

Methodology

Q_{MED} estimation method:

Calculate from BFI and SAAR

BFI and SPR method:

Calculate from dominant HOST

HOST class:

9

BFI / BFIHOST:

0.682

Q_{MED} (l/s):

1.51

Q_{BAR} / Q_{MED} factor:

1.14

Hydrological characteristics

	Default	Edited
SAAR (mm):	700	700
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

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.

(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.

(3) Is $SPR/SPRHOST \leq 0.3$?

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):	1.72	1.72
1 in 1 year (l/s):	1.46	1.46
1 in 30 years (l/s):	3.95	3.95
1 in 100 year (l/s):	5.48	5.48
1 in 200 years (l/s):	6.43	6.43

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Image 2: Greenfield Runoff Calculation

3.4.4 The pre-developed greenfield runoff rates are as follows:

- Q_{bar} 1.72 l/s/ha
- 1:30 year 3.95 l/s/ha
- 1:100 year 5.48 l/s/ha

3.5 Geology and Groundwater

3.5.1 A site investigation was undertaken on site by Constructive Evaluation in February 2022.

3.5.2 Eight boreholes were sunk and confirm the presence of between 700mm and 900mm of clay substrata, over sand. In one borehole at the southwest corner of the site the clay extends to a depth of approximately 4m below ground level.

3.5.3 Groundwater monitoring was undertaken in each of the boreholes between February 2022 and March 2025.

3.5.4 Winter groundwater was recorded at between 600 and 800mm below ground level.

3.5.5 Infiltration testing was undertaken at two locations in March 2022 at a depth of 700mm.

3.5.6 Infiltration rates of 1.16×10^{-6} 1.01×10^{-6} m/s were established in a single round of testing with soakage rates so low that a further two tests as required by BRE365 were not possible.

3.5.7 The Factual Letter report accompanying the soakage testing concluded that *'the rate of infiltration is considered to be poor with the site considered to be unsuitable for traditional soakaways.'*

3.5.8 Extracts from the site investigation together with groundwater monitoring records are located in Appendix 3 at the rear of this report.

4 Development Proposals

4.1 Description

4.1.1 The development proposals are for the construction of a 6,485m² packhouse to the east of the existing Sefter Farm South production building together with associated hard paved external works and the relocation of the existing staff parking area to the east of the new packhouse at Sefter Farm, Pagham Road, Bognor Regis West Sussex.

4.1.2 The development will also convert the existing permeable parking area and existing access road to a concrete service yard.

4.1.1 The areas of the positively drained elements of the development are summarised as follows:

- | | |
|--------------------------------|---------------------|
| • Concrete Service Yard | 5,467m ² |
| • Packhouse Roof Area | 6,489m ² |
| • New Packhouse External Works | 1,478m ² |
| • Relocated Staff Parking Area | 5,191m ² |

4.1.2 A copy of the proposed site layout plan showing the positively drained areas is located in Appendix 4 at the rear of this report.

4.2 Surface Water Drainage Generally

4.2.1 CIRIA report C753 The SuDS Manual-v6 provides guidance on surface water drainage. The aim for surface water runoff is to match greenfield runoff rates and volumes where reasonably achievable.

4.2.2 National planning guidance sets out the drainage hierarchy for surface water drainage and notes the following list of drainage options in order of preference:

1. Infiltration to ground.
2. Discharge to a surface water body.
3. Discharge to a surface water sewer, highway drain, or another drainage system.
4. Discharge to a to a combined sewer.

4.2.3 The preferred surface water drainage strategy should where possible be based on infiltration to ground, however, as previously noted during site investigation work the site was predominantly found to be formed by Made Ground to a maximum depth of 0.80m below ground level over clay substrata.

4.2.4 Winter groundwater has been recorded at between 600 and 800mm below ground level and infiltration is not a practical method of discharging surface water runoff from this site.

4.2.5 The possibility of providing an infiltration based drainage system was also previously investigated and ruled out during the planning application process for the existing Sefter House South packhouse immediately to the west of the proposed development site as detailed in the Flood Risk Assessment for that project which was undertaken in July 2016 by The Civil Engineering Practice Limited. The planning permission reference for that development is P/76/16/PL.

4.3 Calculation Design Criteria

4.3.1 Hydraulic calculations have been undertaken using the following design criteria:

Rainfall Data	FEH-22
Summer CV	1.0
Winter CV	1.0
Maximum Rainfall (mm/hour)	150
Climate Change Allowance	45%
Urban Creep	0% (Commercial development)
Additional Storage (m ³ /ha)	Zero

4.4 Surface Water Drainage - Concrete Service Yard

4.4.1 Surface water collected from the concrete service yard will be discharged at a suitably restricted rate to the existing conveyance channel adjacent to its southern boundary.

4.4.2 The total positively drained area of the service yard and dock levellers will be approximately 5,467m² and the equivalent greenfield runoffs are as follows:

- Q_{bar} (approximate 1:2 year at 1.72 l/s/ha 0.94 l/s
- 1:30 year at 3.95 l/s/ha 2.2 l/s
- 1:100 year at 5.48 l/s/ha 3.0 l/s

4.4.3 HR Wallingford guidance recommends that when Q_{bar} runoff rates are below 2l/s/ha limiting discharge rates should be set to 2l/s/ha.

- 4.4.4 HR Wallingford guidance also notes that where flow rates are less than 5l/s consent for discharge is usually set at 5l/s if a blockage from vegetation and other materials is possible and that lower rates may be set where blockage risk is addressed using appropriate drainage elements.
- 4.4.5 Rates of 1l/s are now achievable for discharges from permeable paving systems.
- 4.4.6 Calculations have been prepared based on a discharge rate no greater than 1l/s during 1:2 year storm event and no greater than 3/s during the 1:100 year plus climate change event.
- 4.4.7 The calculations confirm that a 30% voided subbase laid level at 4.31m AOD with located beneath a 200mm concrete slab discharging to the existing conveyance channel will provide sufficient storage to accommodate this rainfall event with a 1l/s restriction of the Q_{bar} event and a resultant 2.1l/s restriction during the 1:100 year+45% event.
- 4.4.8 While infiltration is not a suitable method for surface water drainage for high intensity storms it is proposed that the voided stone subbase beneath the proposed concrete yard will not be lined so as to maximise the limited permeability available.

4.5 Surface Water Drainage - Packhouse Roof

- 4.5.1 Surface water collected from the new roof will be collected and discharged via a syphonic drainage system to the existing reservoir to the south of the site for reuse within the wider site's irrigation process.
- 4.5.2 That reservoir has a surface area at top of bank of approximately 7,854m² and is maintained with 500mm of freeboard with maximum upper surface water area of approximately 7,335m².
- 4.5.3 The total positively drained area of the new roof will be 6,489m².
- 4.5.4 The syphonic system will be designed to convey a 1:100year +45% storm event.
- 4.5.5 In accordance with Non Statutory Technical Standards for SuDS S4 the runoff collected from the area of the new extension for the 1 in 100 year, 6 hour rainfall event will be stored in the existing irrigation reservoir and reused for irrigation.
- 4.5.6 Calculations have been undertaken to determine the total volume of water collected from the site during a six hour 1:100year +45% rainfall event.
- 4.5.7 This volume will be approximately 609m³ and equates to a rise of 83mm across the existing reservoir resulting in a new freeboard of 417mm remains above the required 300mm minimum.

4.5.8 No alterations are proposed to the existing reservoir outfall which will remain in place and will discharge as existing to the tributary of the Pagham Rife to the south.

4.6 Surface Water Drainage - Relocated Staff Parking Area and New Packhouse External Works

4.6.1 Surface water collected from the relocated staff parking area will be discharged at a suitably restricted rate to the existing conveyance channel to the southwest via the voided subbase beneath the new external works around the new Packhouse.

4.6.2 The positively drained area of the new car park will be 5,191m² and the equivalent greenfield runoffs are as follows:

- Q_{bar} (approximate 1:2 year at 1.72 l/s/ha 0.9 l/s
- 1:30 year at 3.95 l/s/ha 2.1 l/s
- 1:100 year at 5.48 l/s/ha 2.8 l/s

4.6.3 Surface water collected beneath the new external works around the packhouse will be discharged at a suitably restricted rate to the conveyance channel at the southwest of the site.

4.6.4 The positively drained area of the new external works will be 1,478m² and the equivalent greenfield runoffs are as follows:

- Q_{bar} (approximate 1:2 year at 1.72 l/s/ha 0.25 l/s
- 1:30 year at 3.95 l/s/ha 0.6 l/s
- 1:100 year at 5.48 l/s/ha 0.8 l/s

4.6.5 Calculations have been prepared based on a total discharge rate no greater than 1.14l/s during 1:2 year storm event and no greater than 3.6l/s during the 1:100 year plus climate change event.

4.6.6 The calculations confirm that a 30% voided subbase laid level at 5.31m AOD beneath the car park and a 30% voided subbase laid level at 4.9m AOD beneath the new external works which will provide sufficient storage to accommodate this rainfall event with a 1.1l/s restriction of the Q_{bar} event and a resultant 2.2l/s restriction during the 1:100 year+45% event.

4.6.7 The permeable paving will be unlined so as to maximise the limited permeability available.

4.6.8 Copies of the detailed surface water drainage drawing together with supporting calculations are located in Appendix 5 at the rear of this report.

4.6.9 A completed copy of Arun District Council's surface water drainage design checklist is located in Appendix 6 at the rear of this report.

4.7 Interception Drainage

4.7.1 The drainage designs for each element of the development proposals provide interception drainage and is able to capture and retain on site the first 5mm of the majority of rainfall events as follows:

4.7.2 Concrete Service Yard

4.7.2.1 The voided subbase of the concrete yard will act as a filter drain which as noted in section 16.4 of Part D (Technical Detail) of the SuDS Manual will provide a small contribution to interception.

4.7.2.2 While infiltration is not a suitable method for surface water drainage for high intensity storms it is proposed that the voided stone subbase beneath the proposed concrete yard will not be lined so as to maximise the limited permeability available and provide a further level of interception.

4.7.2.3 The existing conveyance channel will similarly provide retention.

4.7.2.4 Section 17.4.2 of Part D of the SuDS manual notes that '*conveyance swales and dry/enhance swales deliver interception because there is usually no runoff from them for the majority of small rainfall events*'.

4.7.2.5 The combination of these drainage elements will retain the first 5mm for the majority of rainfall events.

4.7.3 Packhouse Roof

- 4.7.3.1 100% of rainfall captured from the packhouse roof will be reused for irrigation.
- 4.7.3.2 Section 11.4 of Part D of the SuDS manual notes that Rainwater Harvesting system *'are considered as an effective interception component for the roof contributing to the system'*.
- 4.7.3.3 There will also be a degree of evaporation from the storage reservoir and the first 5mm will be retained on site for all storm events.

4.7.4 Relocated Staff Parking Area and New Packhouse External Works

- 4.7.4.1 With regard to permeable paving section 20.5.2 of Part D of the SuDS manual notes that *'during small events water soaks into the pervious surface, laying course and subbase and is released back into the atmosphere through evaporation once the rainfall has stopped.'*
- 4.7.4.2 The permeable paving will not be lined so as to maximise the limited permeability available.
- 4.7.4.3 The existing conveyance channel will similarly provide retention as previously noted.
- 4.7.4.4 The combination of these drainage elements will retain the first 5mm for the majority of rainfall events.

4.8 Water Quality

- 4.8.1 The proposed development is for commercial agricultural use. In accordance with CIRIA SuDS Manual 2015 (Report C753), the pollution hazard level for this type of development is classified as between low and medium depending on the use / area of the site.
- 4.8.2 The surface water scheme will include mitigation to ensure that surface water is suitably treated and any pollution risk adequately managed prior to irrigation reuse and in the case of the new hardstanding prior to a restricted discharge to the onsite conveyance channel and to the Pagham Rife.
- 4.8.3 Table 26.2 in Chapter 26 of CIRIA report C753 The SuDS Manual provides Pollution Hazard Indices for varying land types. Those of relevance to the development proposals are as follows:

Land Use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Commercial yards and delivery areas	Medium	0.7	0.6	0.7
Commercial / Industrial roofs	Low	0.3	0.2	0.05
Non-residential car parking with frequent change	Medium	0.7	0.6	0.7

Table 1: Pollution Hazard Indices

4.8.4 The surface water drainage design will include the use of permeable paving, permeable subbase acting as a filter drain, on site conveyance channel (swale) and ponds / reservoirs.

SuDS Type	Total suspended solids (TSS)	Metals	Hydrocarbons
Filter Drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Pond / Reservoir	0.7	0.7	0.5
Permeable pavement	0.7	0.6	0.7

Table 2: Pollution Mitigation Indices

4.8.5 Where multiple drainage components are used in series the individual mitigation index of secondary and tertiary components is lowered by 50% due to reduced performance associated with primary treatment.

4.8.6 The proposed infrastructure will meet the target treatment level required as follows:

Commercial Hardstanding	Total suspended solids (TSS)	Metals	Hydrocarbons
Filter Drain	0.4	0.4	0.4
Swale (at 50%)	0.25	0.3	0.3
Total Treatment	0.65	0.7	0.7

Packhouse Roof	Total suspended solids (TSS)	Metals	Hydrocarbons
Pond / Reservoir	0.7	0.7	0.5
Total Treatment	0.7	0.7	0.5

Car Park	Total suspended solids (TSS)	Metals	Hydrocarbons
Permeable pavement	0.7	0.6	0.7
Swale (at 50%)	0.25	0.3	0.3
Total Treatment	0.95	0.9	1.0

Table 3: Pollution Mitigation Provision

4.8.7 It is noted that the total treatment for suspended solids from the commercial hardstanding areas (comprising the concrete service yard and the new packhouse external works) falls 0.05 short of the current guidance due to the recommendation that the individual mitigation index of secondary and tertiary components is lowered by 50%.

4.8.8 Given the proposed maintenance regime the performance of the conveyance channel is unlikely to be affected to this degree.

4.8.9 However, in order to address this it is proposed that a Smart Sponge filter be incorporated into the outfall chambers from the concrete service yard and the new packhouse external works.

4.8.10 An interim drainage management and maintenance plan is located in Appendix 7 at the rear of this report.

4.9 Risk to Others

4.9.1 The proposed surface water drainage system will be designed to current standards incorporating SuDS elements providing attenuation and storage which will minimise runoff leaving the site during times of heavy rain.

4.9.2 Allowance has been made for a 45% increase in rainfall intensities which accords with the latest figures published by the Environment Agency and with the requirements under the National Planning Policy Framework.

4.9.3 The proposed drainage system will incorporate sufficient treatment prior to final discharge thus mitigating the risk of pollution from the site.

4.10 Surface Water Exceedance Route

4.10.1 In the event that part of the onsite surface water drainage network was to become blocked, suffer a failure due to lack of maintenance or be inundated with a storm beyond the 1:100 year +45% design storm surface water would migrate overland to the watercourse to the south of the site and towards the Pagham Rife.

4.10.2 The exceedance route from the reservoir the south of the proposed development will remain as existing to the tributary of the Pagham Rife to its south.

4.10.3 A surface water exceedance route plan is located in Appendix 8 at the rear of this report.

5 Conclusions

- 5.1 The geology of the area is predominantly clay and is not suitable to accommodate an infiltration drainage system.
- 5.2 A suitable SuDS drainage system is proposed which accords with the requirements of national planning policy and Arun District Council's local planning policies W SP1, W DM1, W DM2 and W DM3.
- 5.3 Surface water collected from the concreted service yard will be discharged in the same manner as existing through its voided subbase into the existing onsite watercourse which discharges via the existing onsite drainage network to the Pagham Rife to the west of the site.
- 5.4 The proposed development will incorporate a sustainable drainage system which will ensure 100% of rainwater captured from the packhouse roof will be used for irrigation.
- 5.5 Surface water collected from the relocated car park and new external works around the new packhouse will be discharged at a suitably restricted rate to the existing onsite watercourse to the southwest of the site which discharges via the existing onsite drainage network to the Pagham Rife to the west of the site.
- 5.6 Calculations confirm that surface water runoff generated by the proposed development can be attenuated on site for all rainfall events up to the 1:100 year event including an allowance for climate change.
- 5.7 Water quality improvement will be provided to mitigate against any risk to the receiving waterbodies.
- 5.8 A suitable surface water drainage system has been designed to accommodate the anticipated flows from the proposed development and in terms of drainage the development proposals are suitable at this location.

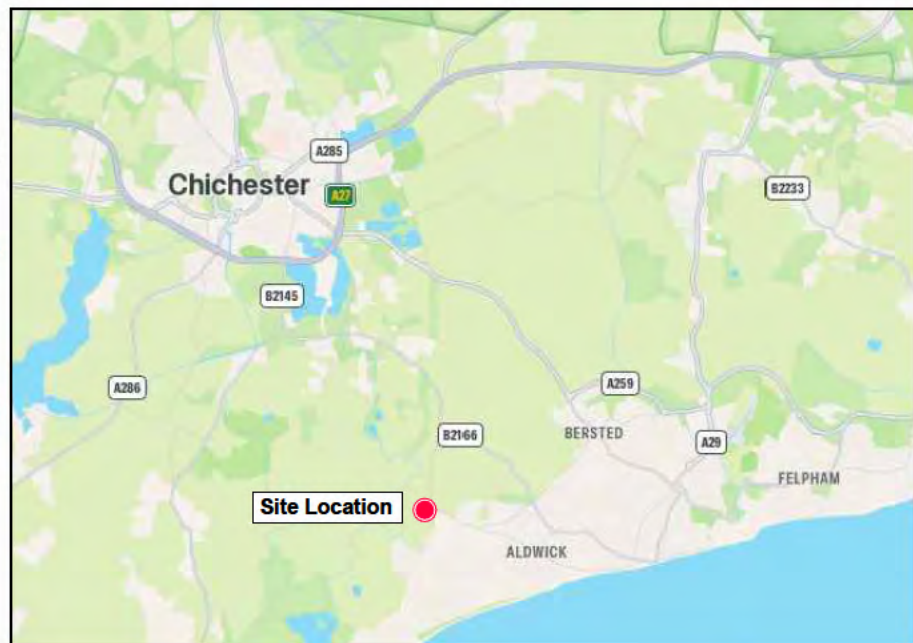
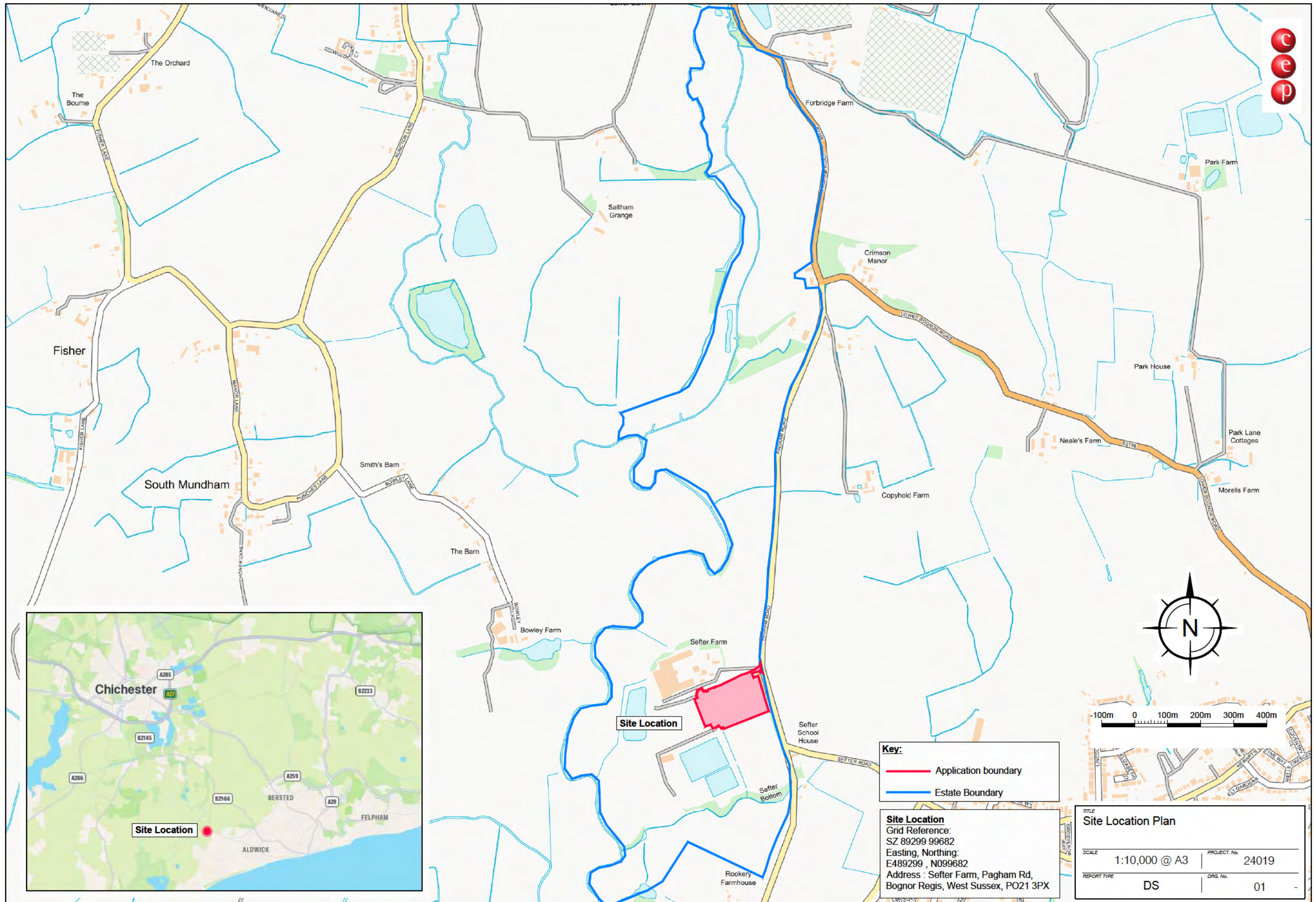
6 List of Appendices, Images and Tables

Appendix 1	Site Location Plan
Appendix 2	Existing Site Layout Plan
Appendix 3	Extracts from Site Investigation and Groundwater Monitoring Records
Appendix 4	Proposed Site Layout and Drained Areas Plan
Appendix 5	Detailed Surface Water Drainage Drawings and Calculations
Appendix 6	Arun District Council's Surface Water Drainage Design Checklist
Appendix 7	Interim Drainage Management and Maintenance Plan
Appendix 8	Surface Water Exceedance Route Plan

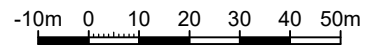
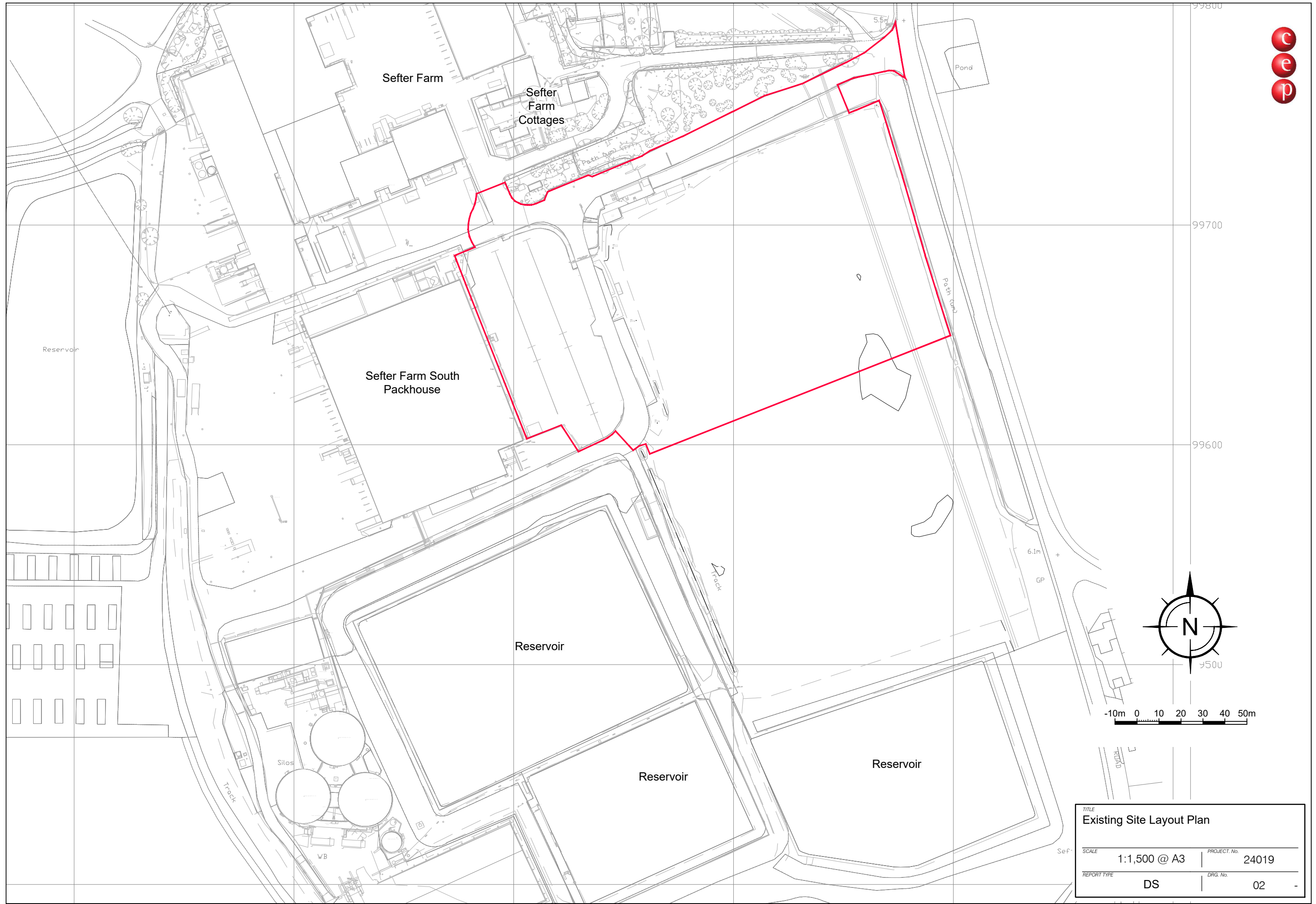
Image 1	Site Location
Image 2	Greenfield Runoff Calculation

Table 1	Pollution Hazard Indices
Table 2	Pollution Mitigation Indices
Table 3	Pollution Mitigation Provision

Appendix 1
Site Location Plan



Appendix 2
Existing Site Layout Plan



TITLE	
Existing Site Layout Plan	
SCALE	PROJECT. No.
1:1,500 @ A3	24019
REPORT TYPE	DRG. No.
DS	02 -

Appendix 3

Extracts from Site Investigation and Groundwater Monitoring Records

Barfoots of Botley, Bognor Regis
Factual Letter Report
FAO: Keith Jamieson

Date: 11/02/2022
Our Ref: 22.1010
Client: Orange Bright Trading Ltd

Site Description

The site comprised the following:

- An agricultural field adjacent to the Barfoots of Botley Ltd factory.

Site Investigation

The site investigation comprised the following:

- Eight windowless sampling boreholes (BH1 – BH8) installed with groundwater monitoring standpipes to a maximum of 4.0mbgl.

The following strata were observed during the site investigation:

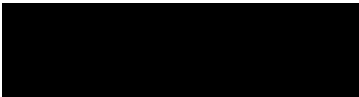
Lithology	Min – Max Depth (mbgl)	Average Depth (mbgl)
Firm dark brown slightly sandy slightly gravelly CLAY	0.0 – 0.8	0.0 – 0.6
Brown clayey gravelly SAND	0.7 – 1.6	0.7 – 1.4
Firm greyish brown sandy slightly gravelly CLAY	0.3 – 2.4	0.5 – 1.4
Yellowish grey SAND	0.7 – 3.0	1.3 – 2.9
Bluish grey mottled brown CLAY	2.4 – 4.0	2.4 – 4.0

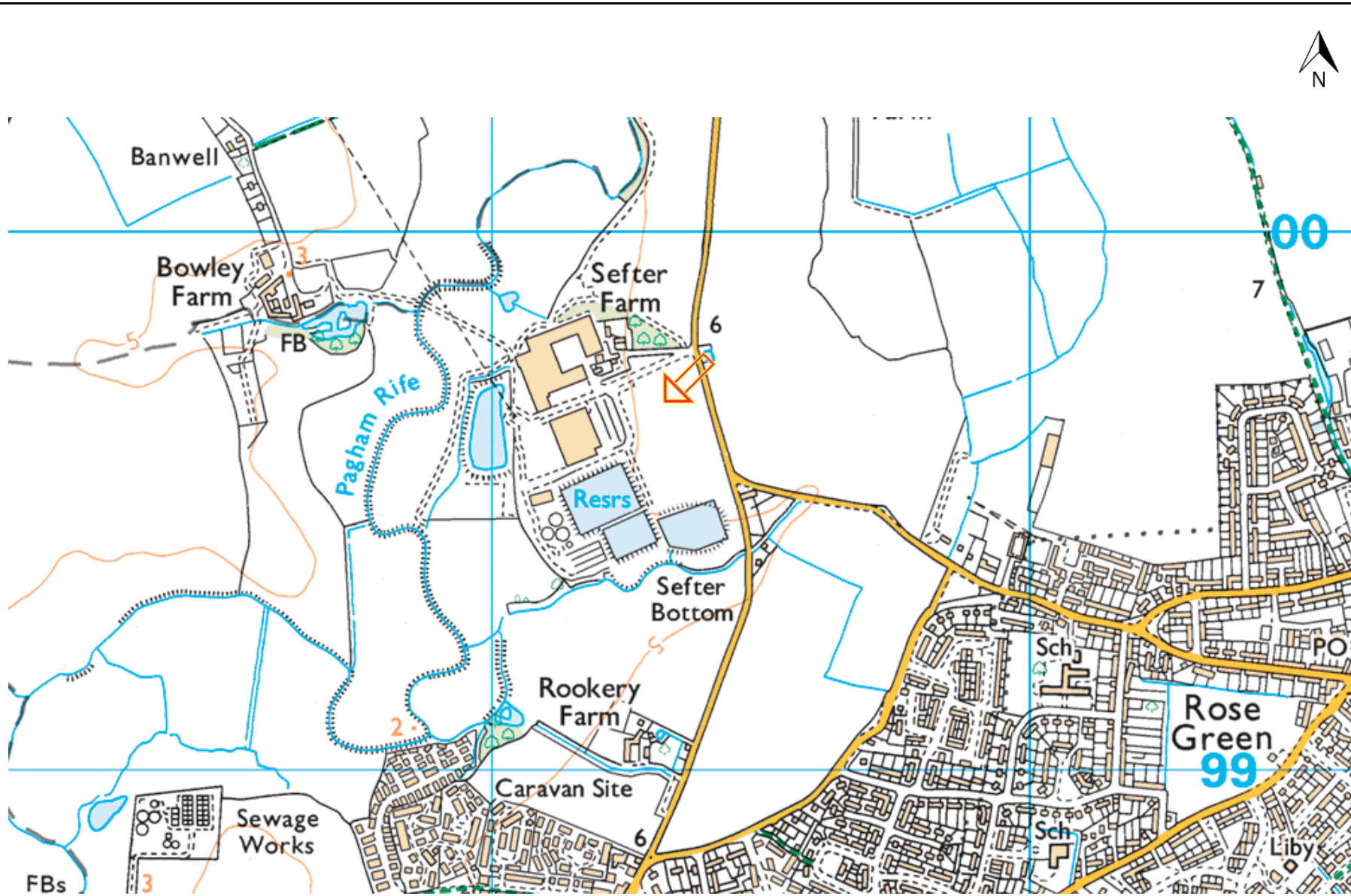
All positions were successfully installed with a 19mm diameter groundwater monitoring standpipe with a raised barrel lockable type cover. It is understood that winter groundwater monitoring will be completed by the Client.

Enclosed are the Site Location Plan and Site Investigation Plan provided as **Figures 1 & 2** respectively, plus the Stratigraphic Logs.

We trust the above information meets your requirements and should you require any further clarification or assistance please do not hesitate to contact CE Ltd.

Kind regards,


Isaac Betts MSc FGS
Engineering Geologist
Constructive Evaluation Limited



- Notes:
1. Do not scale from this drawing.
 2. All dimensions must be checked on site prior to commencement of work.
 3. Where applicable this drawing is to be read in conjunction with other consultants drawings.
 4. This drawing is the copyright of Constructive Evaluation Ltd.

KEY

 Site Location

Drawing Title:

Site Location Plan

Project Reference:

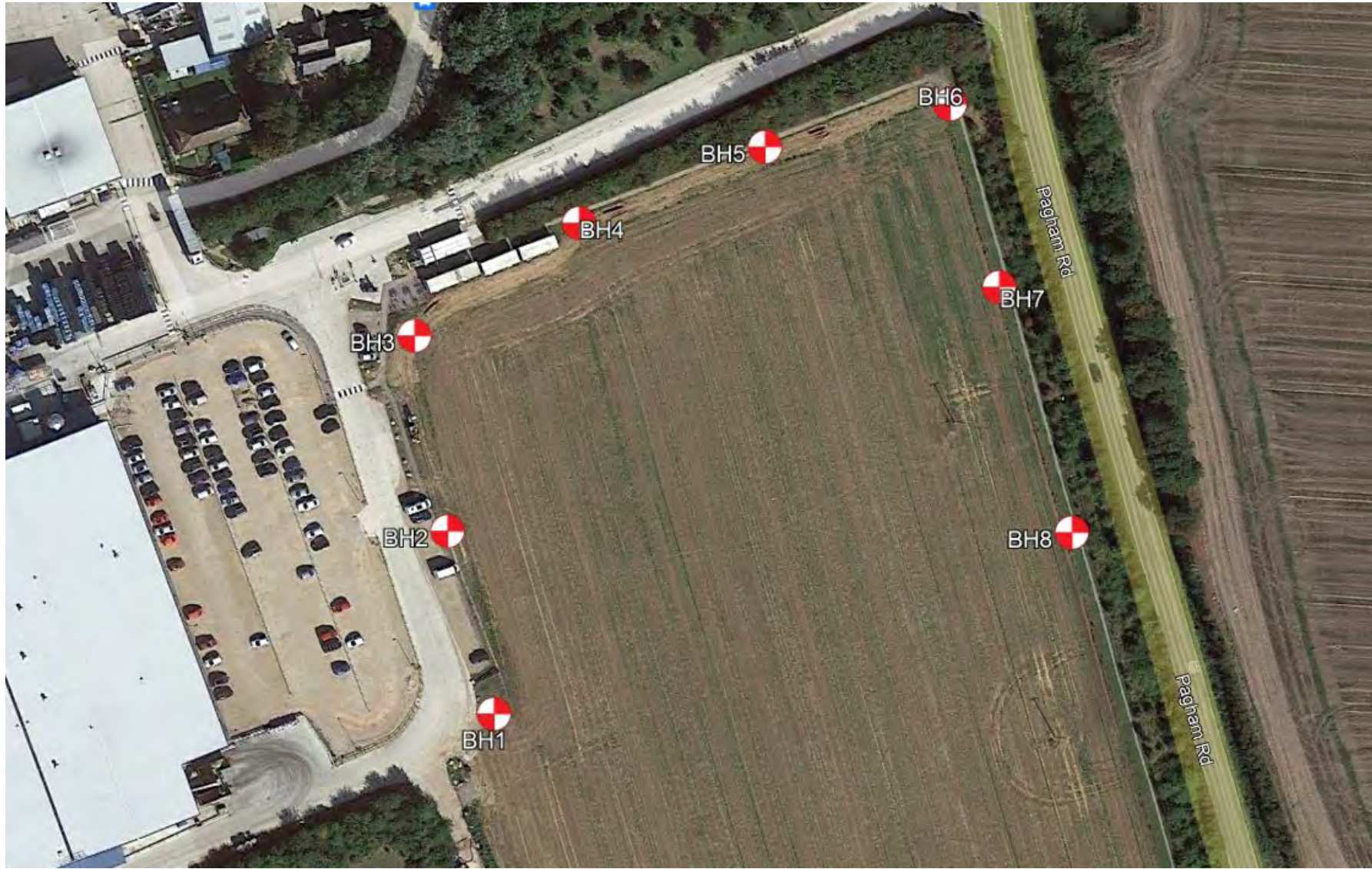
22.1010

Site Name:

Barfoots of Botley, Bognor Regis

Revision: 0
 Drawn by: IB
 Scale: Not to Scale

Figure 1: Site location plan showing the topographical location of the site.



- Notes:
1. Do not scale from this drawing.
 2. All dimensions must be checked on site prior to commencement of work.
 3. Where applicable this drawing is to be read in conjunction with other consultants drawings.
 4. This drawing is the copyright of Constructive Evaluation Ltd.

KEY



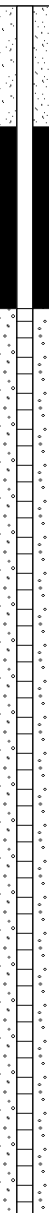
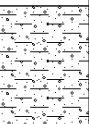
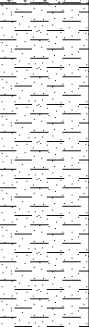
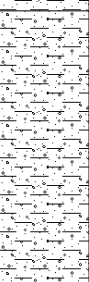
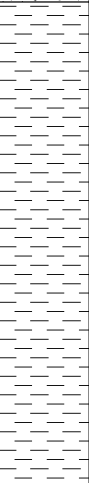
Drawing Title:
Site Investigation Plan

Project Reference:
22.1010

Site Name:
Barfoots of Botley,
Bognor Regis

Revision: 0
Drawn by: IB
Scale: Not to Scale

Figure 2: Site investigation plan showing the final positions of the boreholes.

 constructiveevaluation site investigation • building pathology				Borehole Log				Borehole No. BH1 Sheet 1 of 1	
Project Name: Barfoots of Botley				Project No. 22.1010		Co-ords: 489267E - 99613N		Hole Type WLS	
Location: Sefter Farm House, Pagham Rd, Bognor Regis						Level:		Scale 1:26	
Client: Orange Bright Trading Ltd						Dates: 01/02/2022		Logged By CL	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			Firm dark brown slightly sandy slightly gravelly CLAY.	1
								Firm light brown slightly sandy CLAY.	
					1.50			Firm greyish brown sandy slightly gravelly CLAY.	2
					2.40			Bluish grey mottled brown CLAY.	3
					4.00		End of Borehole at 4.000m		4
									5
Remarks 1. Position CAT and Genny scanned prior to breaking ground and at 0.3m intervals to 1.0mbgl. 2. Groundwater strike at 0.9mbgl. 3. 19mm Groundwater monitoring standpipe installed to a depth of 4.0mbgl.									



Borehole Log

Borehole No.

BH2

Sheet 1 of 1

Project Name: Barfoots of Botley

Project No.
22.1010

Co-ords: 489253E - 99659N

Hole Type
WLS

Location: Sefter Farm House, Pagham Rd, Bognor Regis

Level:

Scale
1:26

Client: Orange Bright Trading Ltd

Dates: 01/02/2022

Logged By
CL

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.50			Firm yellowish brown slightly sandy slightly gravelly CLAY.	
								Soft grey mottled yellowish brown slightly sandy slightly gravelly CLAY.	1
					1.50				
								Dense becoming very dense with depth yellowish grey SAND.	2
					3.00			End of Borehole at 3.000m	3
									4
									5

Remarks

1. Position CAT and Genny scanned prior to breaking ground and at 0.3m intervals to 1.0mbgl.
2. Groundwater strike at 0.9mbgl.
3. 19mm Groundwater monitoring standpipe installed to a depth of 2.6mbgl.





Borehole Log

Borehole No.

BH3

Sheet 1 of 1

Project Name: Barfoots of Botley

Project No.
22.1010

Co-ords: 489246E - 99693N

Hole Type
WLS

Location: Sefter Farm House, Pagham Rd, Bognor Regis

Level:

Scale
1:26

Client: Orange Bright Trading Ltd

Dates: 01/02/2022

Logged By
CL

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.70			Firm yellowish brown slightly sandy slightly gravelly CLAY.	
					1.40			Soft yellowish brown clayey gravelly SAND.	1
					3.00			Dense becoming very dense with depth bluish grey SAND.	2
								End of Borehole at 3.000m	3
									4
									5

Remarks

1. Position CAT and Genny scanned prior to breaking ground and at 0.3m intervals to 1.0mbgl.
2. Groundwater strike at 1.1mbgl.
3. 19mm Groundwater monitoring standpipe installed to a depth of 2.4mbgl.





Borehole Log

Borehole No.

BH4

Sheet 1 of 1

Project Name: Barfoots of Botley

Project No.
22.1010

Co-ords: 489282E - 99720N

Hole Type
WLS

Location: Sefter Farm House, Pagham Rd, Bognor Regis

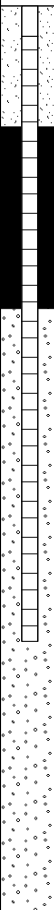
Level:

Scale
1:26

Client: Orange Bright Trading Ltd

Dates: 01/02/2022

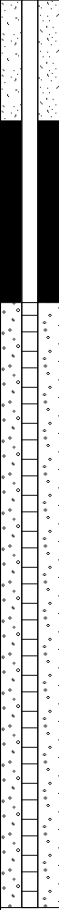
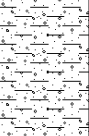
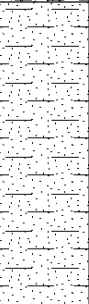
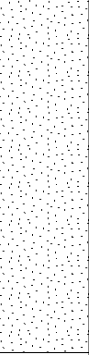
Logged By
CL

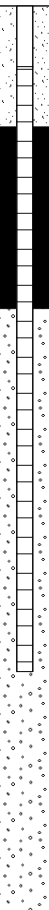
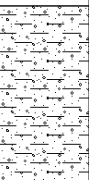
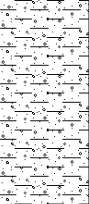
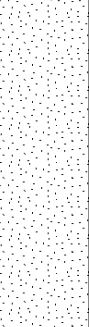
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			Firm dark brown slightly sandy slightly gravelly CLAY.	1
								Firm yellowish brown slightly sandy slightly gravelly CLAY.	
					0.90			Very soft grey clayey gravelly SAND.	2
					1.60			Dense becoming very dense with depth bluish grey SAND.	
					3.00			End of Borehole at 3.000m	3
									4
									5

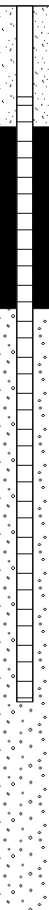
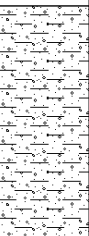
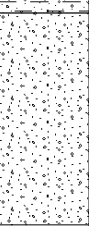
Remarks

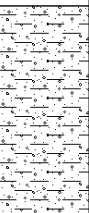
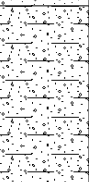
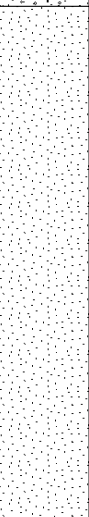
1. Position CAT and Genny scanned prior to breaking ground and at 0.3m intervals to 1.0mbgl.
2. Groundwater strike at 0.9mbgl.
3. 19mm Groundwater monitoring standpipe installed to a depth of 2.1mbgl.



 constructiveevaluation site investigation • building pathology				Borehole Log				Borehole No. BH5 Sheet 1 of 1	
Project Name: Barfoots of Botley				Project No. 22.1010		Co-ords: 489332E - 99741N		Hole Type WLS	
Location: Sefter Farm House, Pagham Rd, Bognor Regis						Level:		Scale 1:26	
Client: Orange Bright Trading Ltd						Dates: 02/02/2022		Logged By CL	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30		 Firm dark brown slightly sandy slightly gravelly CLAY.	1	
					0.80		 Soft yellowish grey mottled brown slightly sandy slightly gravelly CLAY.		
					1.80		 Loose yellowish grey mottled bluish grey clayey SAND.	2	
					3.00		 Dense becoming very dense bluish grey SAND.		
End of Borehole at 3.000m									3
									4
									5
Remarks 1. Position CAT and Genny scanned prior to breaking ground and at 0.3m intervals to 1.0mbgl. 2. Groundwater strike at 1.2mbgl. 3. 19mm Groundwater monitoring standpipe installed to a depth of 3.0mbgl.									

 constructiveevaluation site investigation • building pathology				Borehole Log				Borehole No. BH6 Sheet 1 of 1	
Project Name: Barfoots of Botley				Project No. 22.1010		Co-ords: 489369E - 99755N		Hole Type WLS	
Location: Sefter Farm House, Pagham Rd, Bognor Regis						Level:		Scale 1:26	
Client: Orange Bright Trading Ltd						Dates: 02/02/2022		Logged By CL	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.60		 Firm dark brown slightly sandy slightly gravelly CLAY.	1	
					1.30		 Firm yellowish brown mottled grey slightly sandy slightly gravelly CLAY.		
					1.90		 Dense grey mottled brown SAND.	2	
					3.00		 Dense becoming very dense bluish grey SAND.		
							End of Borehole at 3.000m	3	
								4	
								5	
Remarks 1. Position CAT and Genny scanned prior to breaking ground and at 0.3m intervals to 1.0mbgl. 2. Groundwater strike at 1.1mbgl. 3. 19mm Groundwater monitoring standpipe installed to a depth of 2.2mbgl.									

 constructiveevaluation site investigation • building pathology				Borehole Log			Borehole No. BH7 Sheet 1 of 1		
Project Name: Barfoots of Botley				Project No. 22.1010		Co-ords: 489376E - 99726N		Hole Type WLS	
Location: Sefter Farm House, Pagham Rd, Bognor Regis						Level:		Scale 1:26	
Client: Orange Bright Trading Ltd						Dates: 02/02/2022		Logged By CL	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.80		 Firm dark brown slightly sandy slightly gravelly CLAY.		
					1.50		 Loose yellowish grey mottled light brown gravelly SAND.		
					3.00		 Dense becoming very dense with depth brown mottled bluish grey SAND.		
							End of Borehole at 3.000m		
Remarks 1. Position CAT and Genny scanned prior to breaking ground and at 0.3m intervals to 1.0mbgl. 2. Groundwater strike at 0.9mbgl. 3. 19mm Groundwater monitoring standpipe installed to a depth of 2.3mbgl.									

 constructiveevaluation site investigation • building pathology				Borehole Log				Borehole No. BH8 Sheet 1 of 1	
Project Name: Barfoots of Botley				Project No. 22.1010		Co-ords: 489384E - 99698N		Hole Type WLS	
Location: Sefter Farm House, Pagham Rd, Bognor Regis						Level:		Scale 1:26	
Client: Orange Bright Trading Ltd						Dates: 02/02/2022		Logged By CL	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.70			Firm dark brown slightly sandy slightly gravelly CLAY.	
					1.30			Loose grey mottled brown clayey gravelly SAND.	
					3.00			Dense becoming very dense with depth bluish grey mottled brown SAND.	
							End of Borehole at 3.000m		3
									4
									5
Remarks 1. Position CAT and Genny scanned prior to breaking ground and at 0.3m intervals to 1.0mbgl. 2. Groundwater strike at 1.3mbgl. 3. 19mm Groundwater monitoring standpipe installed to a depth of 2.1mbgl.									

Sefter East	Installed																	
	Feb-22	Mar-22	Sep-24	Sep 24 Mid	Oct-24	Oct 24 Mid	Nov-24	Nov 24 Mid	Dec-24	Dec 24 Mid	Jan-25	Jan 25 Mid	Feb-25	Feb 25 Mid	Mar-25	Mar 25 Mid	Apr-25	Average
1	800	750	900	900	850	750	750	700	600	600	600	650	650	700	700	700		725
2	900	850	1000	950	900	900	800	850	850	900	850	800	800	800	750	700		850
3	900	850	1050	1000	950	900	900	850	800	800	850	850	800	900	950	1000		897
4	950	900	850	850	800	800	800	850	800	800	800	850	900	950	950	1000		866
5	950	900	900	850	850	800	850	800	900	850	800	850	850	900	900	1000		872
6	950	950	950	900	900	800	800	800	800	900	850	850	900	900	900	900		878
7	950	950																
8	950	1000																

Leythorne		Installed																
1 SE		2100	2000	2000	1950	1950	1950	1950	1950	2000	2050	2000	2100	2050	2050	2100		1888
2 NE		2100	2050	2000	2000	2000	2000	1950	1950	2000	1950	1950	1950	1950	1950	2000		1863
3 NW		1900	2000	1900	1900	1900	1850	1800	1750	1600	1700	1700	1750	1800	1800	1700		1691
4 SW		1700	1950	1950	1900	1800	1800	1850	1850	1850	1900	1850	1850	1800	1800	1700		1722

Note - All data rounded to the nearest 50

Barfoots of Botley, Bognor Regis
Factual Letter Report - BRE
FAO: Keith Jamieson

Date: 18/03/2022
Our Ref: 22.1010
Client: Orange Bright Trading Ltd

Site Description

The site comprised the following:

- An agricultural field adjacent to the Barfoots of Botley Ltd factory.

Site Investigation

The site investigation comprised the following;

- Two mechanically excavated trial pits (SA1 & SA2) to a maximum depth of 0.7mbgl,
- Soil infiltration testing was complete within each trial pit in general accordance with BRE DG 365¹.

The following materials were encountered during the Site Investigation.

Material	Min-Max Depth (mbgl)	Average Depth (mbgl)
TOPSOIL	0.0 – 0.3	0.0 – 0.3
Firm brown slightly sandy CLAY	0.3 – 0.7	0.3 – 0.65
Firm brown slightly sandy slightly gravelly CLAY (SA1 only)	0.6 – 0.7	0.6 – 0.7

The final position of the tests are shown in Figure 2.

Geotechnical Observations

The table below summarises the results of the soil infiltration testing:

Locality	SA1	SA2
Soil Infiltration Rate (m/s)	1.16x10⁻⁰⁶	1.01x10⁻⁰⁶

Trial pits SA1 and SA2 were completed to a maximum depth of 0.7mbgl. They were then filled with clean water and water levels recorded over a period of time. The BRE 365 guidance recommends that test locations are filled 3 times to ascertain a worst case infiltration rate. However, due to low infiltration rates it was not possible to complete three full test cycles with only one test being completed at each location during the site works. The test was completed over a period of 24 hours after which the pits were found to be empty or near empty. Calculated infiltration rates of **10⁻⁰⁶ m/s** should be used for design purposes although the rate of infiltration is considered to be **Poor²** with the site considered to be unsuitable for traditional soakaways.

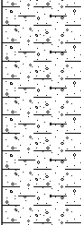
See Appendix A for the complete soil infiltration results, Appendix B for engineers' logs, and Appendix C for site investigation photographs.

Kind regards,

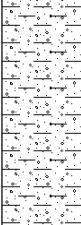

Isaac Betts MSc FGS
Engineering Geologist
Constructive Evaluation Limited

¹ BRE Digest DG 365 – Soakaway Design, revised 2016

² Casagrande, A. and Fadum, R. E., 1940, "Notes on Soil Testing for Engineering Purposes," Harvard University Graduate School of Engineering, Publication 268

				Trial Pit Log			Trialpit No SA1 Sheet 1 of 1		
Project Name: Barfoots of Botley				Project No. 22.1010		Co-ords: 489318.00 - 99720.00 Level:		Date 15/03/2022	
Location: Sefter Farm House, Pagham Rd, Bognor Regis						Dimensions (m):		2.6	
Client: Orange Bright Trading Ltd						Depth 0.70		0.7	
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.30			Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-rounded fine to coarse of flint. (TOPSOIL)		
							Firm brown slightly sandy CLAY. Sand is fine and medium.		
				0.60			Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-rounded fine to coarse of flint.		
				0.70		End of pit at 0.70 m			
Remarks: 1. Mechanically excavated trial pit for soil infiltration testing.									
Stability: Trial pit remained stable throughout excavation and testing.									

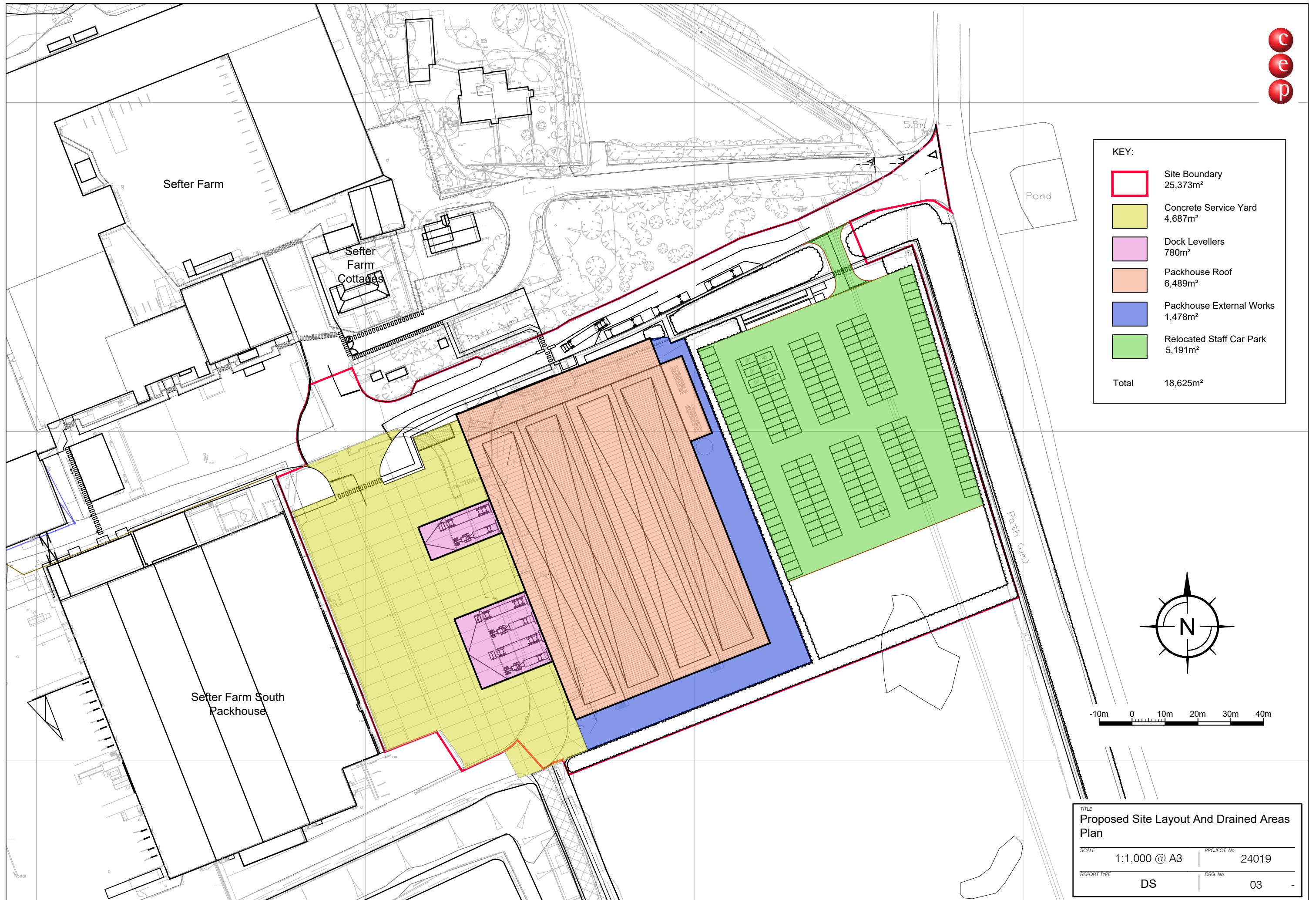


				Trial Pit Log			Trialpit No SA2 Sheet 1 of 1		
Project Name: Barfoots of Botley				Project No. 22.1010		Co-ords: 489366.00 - 99675.00 Level:		Date 15/03/2022	
Location: Sefter Farm House, Pagham Rd, Bognor Regis						Dimensions (m): Depth 0.70		2.7 Scale 1:10 Logged IB	
Client: Orange Bright Trading Ltd									
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.30			Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-rounded fine and medium of flint. (TOPSOIL)		
				0.70			Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-rounded fine and medium of flint.		
							End of pit at 0.70 m		
Remarks: 1. Mechanically excavated trial pit for soil infiltration testing.									
Stability: Trial pit remained stable throughout excavation and testing.									



Appendix 4

**Proposed Site Layout
and Drained Areas Plan**



TITLE Proposed Site Layout And Drained Areas Plan			
SCALE	1:1,000 @ A3	PROJECT No.	24019
REPORT TYPE	DS	DRG. No.	03

Appendix 5

**Detailed Surface Water Drainage Drawings
and Calculations**

PROPOSED PRIVATE DRAINAGE

Surface water pipe and Type E manhole

Type E catch pit chamber with Smart Sponge gully adapter by Naylor

Concrete bag work headwall

SB

Faserfix KS200 concrete drainage with standard sump box

DT

Distribution tank

Fin drain

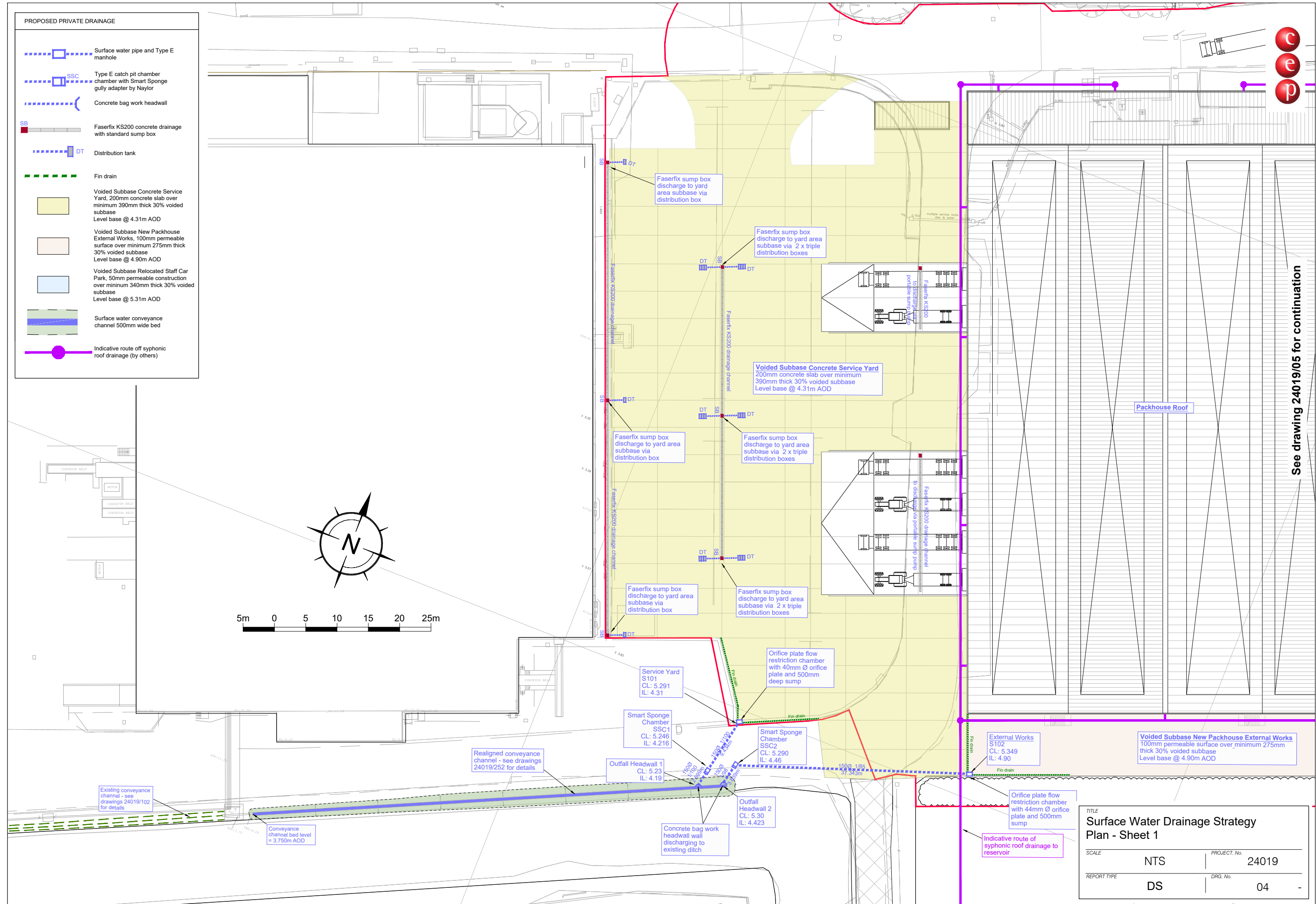
Voided Subbase Concrete Service Yard, 200mm concrete slab over minimum 390mm thick 30% voided subbase
Level base @ 4.31m AOD

Voided Subbase New Packhouse External Works, 100mm permeable surface over minimum 275mm thick 30% voided subbase
Level base @ 4.90m AOD

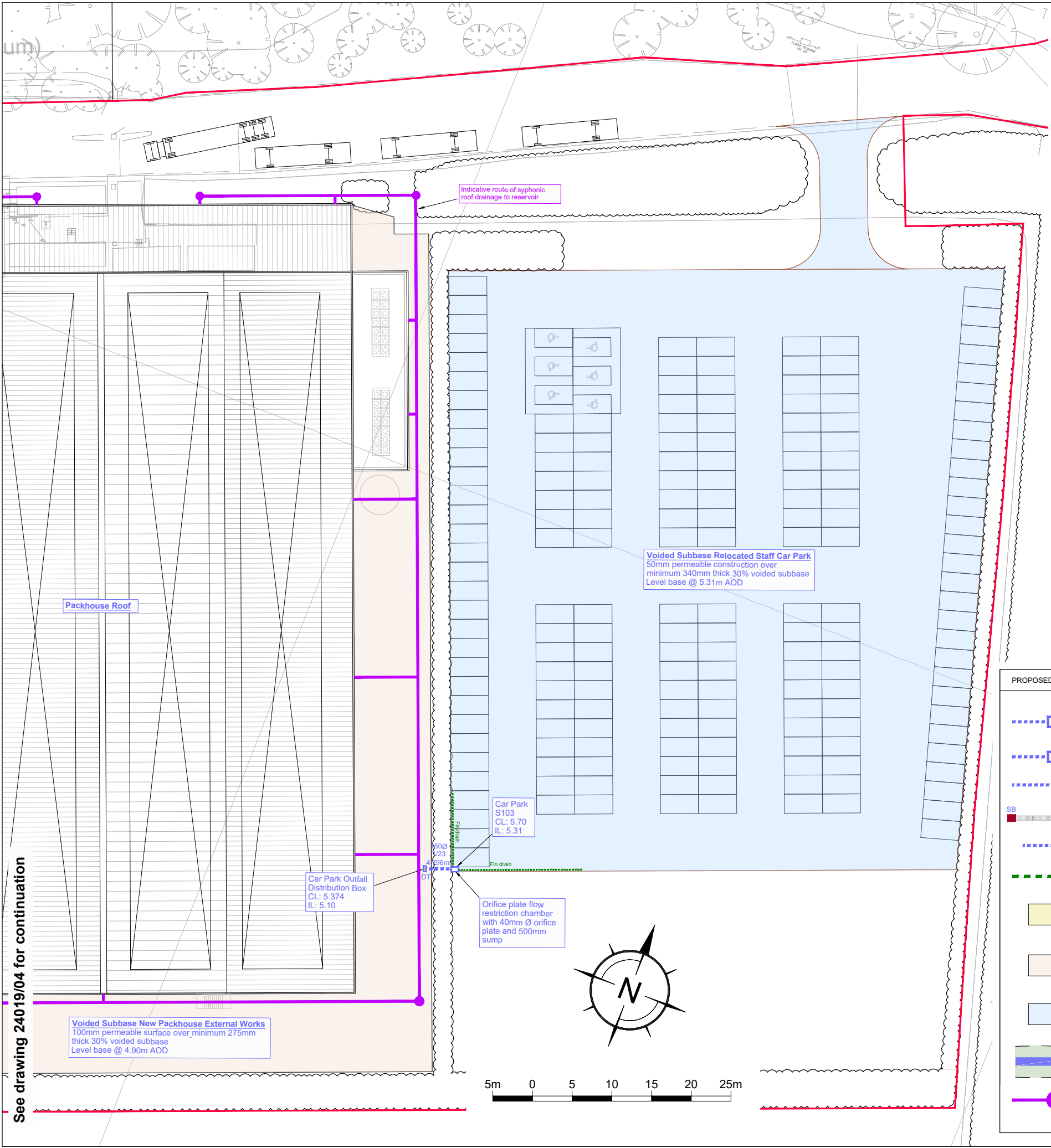
Voided Subbase Relocated Staff Car Park, 50mm permeable construction over minimum 340mm thick 30% voided subbase
Level base @ 5.31m AOD

Surface water conveyance channel 500mm wide bed

Indicative route off syphonic roof drainage (by others)

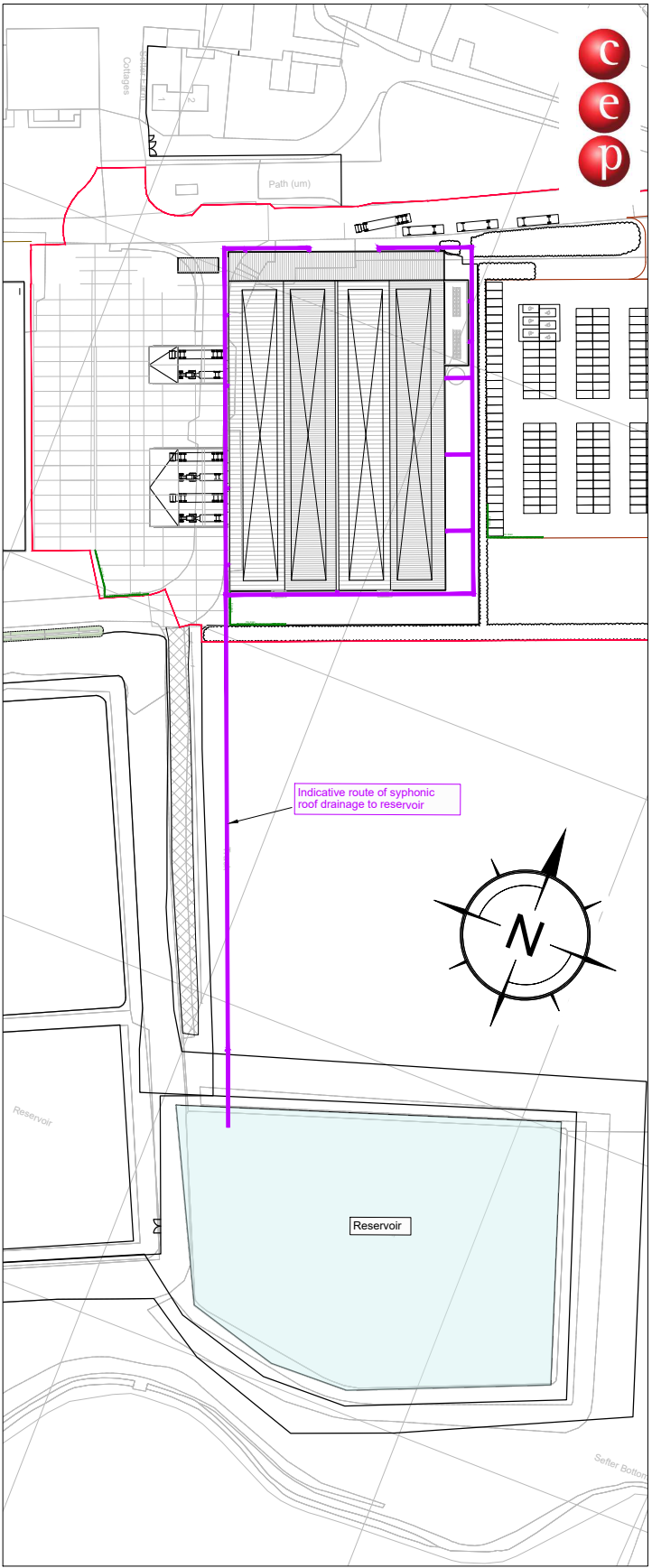


TITLE	
Surface Water Drainage Strategy	
Plan - Sheet 1	
SCALE	NTS
PROJECT No.	24019
REPORT TYPE	DS
DRG. No.	04



See drawing 24019/04 for continuation

PROPOSED PRIVATE DRAINAGE	
	Surface water pipe and Type E manhole
	Type E catch pit chamber chamber with Smart Sponge gully adapter by Naylor
	Concrete bag work headwall
	Faserfix KS200 concrete drainage with standard sump box
	Distribution tank
	Fin drain
	Voided Subbase Concrete Service Yard, 200mm concrete slab over minimum 390mm thick 30% voided subbase Level base @ 4.31m AOD
	Voided Subbase New Packhouse External Works, 100mm permeable surface over minimum 275mm thick 30% voided subbase Level base @ 4.90m AOD
	Voided Subbase Relocated Staff Car Park, 50mm permeable construction over minimum 340mm thick 30% voided subbase Level base @ 5.31m AOD
	Surface water conveyance channel 500mm wide bed
	Indicative route off syphonic roof drainage (by others)



TITLE	
Surface Water Drainage Strategy Plan - Sheet 2	
SCALE	NTS
PROJECT No.	24019
REPORT TYPE	DS
DRG. No.	05

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.150
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	150.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Service Yard	0.547	5.00	5.291	450	489230.729	99598.142	0.981
SSC1			5.247	450	489228.854	99588.896	1.031
Outfall			5.230		489228.321	99586.352	1.040

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	Service Yard	SSC1	9.434	0.600	4.310	4.216	0.094	100.4	150	5.16	56.6
1.001	SSC1	Outfall	2.599	0.600	4.216	4.190	0.026	100.0	150	5.20	56.5

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.003	17.7	112.0	0.831	0.881	0.547	0.0	150	1.022
1.001	1.005	17.8	111.6	0.881	0.890	0.547	0.0	150	1.024

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	9.434	100.4	150	Circular	5.291	4.310	0.831	5.247	4.216	0.881
1.001	2.599	100.0	150	Circular	5.247	4.216	0.881	5.230	4.190	0.890

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	Service Yard	450	Manhole	Private	SSC1	450	Manhole	Private
1.001	SSC1	450	Manhole	Private	Outfall		Junction	

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m ³ /ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160
30	120	240	480	720	1440	2880

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
10	0	0	0
30	0	0	0
30	45	0	0
100	0	0	0
100	45	0	0

Node Service Yard Online Orifice Control

Flap Valve	x	Invert Level (m)	4.310	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.041		

Node Service Yard Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	4.310
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	4687.0	4687.0	0.390	4687.0	4781.6	0.391	0.0	4781.6

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
2880 minute summer	Service Yard	1980	4.400	0.090	4.2	126.4195	0.0000	OK
2880 minute summer	SSC1	1980	4.240	0.024	0.9	0.0038	0.0000	OK
2880 minute summer	Outfall	1980	4.213	0.023	0.9	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
2880 minute summer	Service Yard	1.000	SSC1	0.9	0.513	0.051	0.0167	
2880 minute summer	SSC1	1.001	Outfall	0.9	0.519	0.051	0.0045	140.4

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
2880 minute summer	Service Yard	1980	4.420	0.110	5.1	154.6917	0.0000	OK
2880 minute summer	SSC1	1980	4.241	0.025	1.0	0.0040	0.0000	OK
2880 minute summer	Outfall	1980	4.214	0.024	1.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
2880 minute summer	Service Yard	1.000	SSC1	1.0	0.530	0.058	0.0182	
2880 minute summer	SSC1	1.001	Outfall	1.0	0.537	0.058	0.0050	165.6

Results for 10 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Service Yard	930	4.476	0.166	12.0	232.7813	0.0000	SURCHARGED
960 minute winter	SSC1	930	4.244	0.028	1.3	0.0045	0.0000	OK
960 minute winter	Outfall	930	4.217	0.027	1.3	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	Service Yard	1.000	SSC1	1.3	0.566	0.073	0.0217	
960 minute winter	SSC1	1.001	Outfall	1.3	0.575	0.073	0.0059	139.1

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Service Yard	930	4.516	0.206	14.8	290.0436	0.0000	SURCHARGED
960 minute winter	SSC1	930	4.246	0.030	1.5	0.0048	0.0000	OK
960 minute winter	Outfall	930	4.219	0.029	1.5	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	Service Yard	1.000	SSC1	1.5	0.586	0.083	0.0237	
960 minute winter	SSC1	1.001	Outfall	1.5	0.597	0.083	0.0064	160.2

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Service Yard	1380	4.617	0.307	15.3	432.1928	0.0000	SURCHARGED
1440 minute winter	SSC1	1380	4.250	0.034	1.8	0.0054	0.0000	OK
1440 minute winter	Outfall	1380	4.223	0.033	1.8	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	Service Yard	1.000	SSC1	1.8	0.622	0.104	0.0279	
1440 minute winter	SSC1	1.001	Outfall	1.8	0.635	0.103	0.0075	236.7

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Service Yard	1380	4.571	0.261	13.1	367.0285	0.0000	SURCHARGED
1440 minute winter	SSC1	1380	4.248	0.032	1.7	0.0052	0.0000	OK
1440 minute winter	Outfall	1380	4.221	0.031	1.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	Service Yard	1.000	SSC1	1.7	0.607	0.095	0.0261	
1440 minute winter	SSC1	1.001	Outfall	1.7	0.619	0.095	0.0071	214.5

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Service Yard	1410	4.699	0.389	19.0	547.5623	0.0000	SURCHARGED
1440 minute winter	SSC1	1410	4.252	0.036	2.1	0.0058	0.0000	OK
1440 minute winter	Outfall	1410	4.225	0.035	2.1	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	Service Yard	1.000	SSC1	2.1	0.644	0.118	0.0306	
1440 minute winter	SSC1	1.001	Outfall	2.1	0.657	0.118	0.0083	272.1

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.800
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	150.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.649	5.00	5.300	1500	489270.068	99606.864	1.400
2			5.300	1500	489322.519	99472.832	1.717

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	143.929	0.600	3.900	3.583	0.317	454.0	600	7.11	49.1

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.136	321.2	115.3	0.800	1.117	0.649	0.0	248	1.046

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	143.929	454.0	600	Circular	5.300	3.900	0.800	5.300	3.583	1.117

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1500	Manhole	Adoptable	2	1500	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
10	0	0	0
30	0	0	0
30	45	0	0
100	0	0	0
100	45	0	0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	4.108	0.208	82.3	0.3675	0.0000	OK
15 minute summer	2	11	3.764	0.181	80.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	80.7	1.026	0.251	11.3712	35.7

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	4.158	0.258	121.8	0.4558	0.0000	OK
15 minute summer	2	11	3.805	0.222	120.3	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	120.3	1.145	0.375	15.1466	52.8

Results for 10 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	4.282	0.382	231.4	0.6742	0.0000	OK
15 minute summer	2	11	3.894	0.311	229.3	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	229.3	1.365	0.714	24.1615	100.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	4.358	0.458	299.8	0.8101	0.0000	OK
15 minute summer	2	11	3.938	0.355	295.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	295.7	1.456	0.920	29.1057	129.8

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	4.587	0.687	434.6	1.2142	0.0000	SURCHARGED
15 minute summer	2	11	4.012	0.429	427.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	427.0	1.589	1.329	35.7881	187.9

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	4.462	0.562	374.3	0.9934	0.0000	OK
15 minute summer	2	11	3.979	0.396	365.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	365.2	1.520	1.137	33.9701	162.1

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.76%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	4.925	1.025	542.8	1.8110	0.0000	SURCHARGED
15 minute summer	2	11	4.061	0.478	533.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	533.7	1.932	1.661	37.5891	234.2

Results for 100 year +45% CC 360 minute winter. 1800 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	184	4.094	0.194	71.3	0.3431	0.0000	OK
360 minute winter	2	184	3.752	0.169	71.1	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	1	1.000	2	71.1	0.989	0.221	10.3510	609.3

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.150
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	150.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Carpark	0.519	5.00	5.700	450	489328.941	99654.910	0.390
Carpark Outfall			5.374	450	489324.459	99653.202	0.274
External Works	0.148	5.00	5.349	450	489267.871	99603.802	0.449
SSC2			5.290	450	489232.646	99591.405	0.830
Outfall			5.300		489231.898	99587.844	0.877

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
2.000	Carpark	Carpark Outfall	4.796	0.600	5.310	5.100	0.210	22.8	150	5.04	57.1
1.000	External Works	SSC2	37.343	0.600	4.900	4.460	0.440	84.9	150	5.57	55.0
1.001	SSC2	Outfall	3.639	0.600	4.460	4.423	0.037	98.3	150	5.63	54.7

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
2.000	2.116	37.4	107.1	0.240	0.124	0.519	0.0	150	2.155
1.000	1.092	19.3	29.4	0.299	0.680	0.148	0.0	150	1.112
1.001	1.013	17.9	29.3	0.680	0.727	0.148	0.0	150	1.032

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.000	4.796	22.8	150	Circular	5.700	5.310	0.240	5.374	5.100	0.124
1.000	37.343	84.9	150	Circular	5.349	4.900	0.299	5.290	4.460	0.680
1.001	3.639	98.3	150	Circular	5.290	4.460	0.680	5.300	4.423	0.727

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.000	Carpark	450	Manhole	Private	Carpark Outfall	450	Manhole	Private
1.000	External Works	450	Manhole	Private	SSC2	450	Manhole	Private
1.001	SSC2	450	Manhole	Private	Outfall		Junction	

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations						
15	60	180	360	600	960	2160
30	120	240	480	720	1440	2880

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
10	0	0	0
30	0	0	0
30	45	0	0
100	0	0	0
100	45	0	0

Node Carpark Online Orifice Control

Flap Valve	x	Invert Level (m)	5.310	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.040		

Node Carpark Outfall Offline Orifice Control

Flap Valve	x	Invert Level (m)	5.100	Discharge Coefficient	0.600
Loop to Node	External Works	Diameter (m)	1.000		

Node External Works Online Orifice Control

Flap Valve	x	Invert Level (m)	4.900	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.044		

Node Carpark Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	5.310
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

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	5191.0	5191.0	0.340	5191.0	5277.8	0.341	0.0	5277.8

Node External Works Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	4.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

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	1478.0	1478.0	0.340	1478.0	1524.3	0.341	0.0	1524.3

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute summer	Carpark	1980	5.389	0.079	4.0	123.6098	0.0000	OK
2880 minute summer	Carpark Outfall	1980	5.107	0.007	0.8	0.0011	0.0000	OK
2880 minute summer	External Works	2220	4.984	0.084	1.7	37.2117	0.0000	OK
2880 minute summer	SSC2	2220	4.485	0.025	1.0	0.0039	0.0000	OK
2880 minute summer	Outfall	2220	4.447	0.024	1.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute summer	Carpark	2.000	Carpark Outfall	0.8	1.191	0.022	0.0035	
2880 minute summer	Carpark Outfall	Orifice	External Works	0.8				126.0
2880 minute summer	External Works	1.000	SSC2	1.0	0.553	0.052	0.0673	
2880 minute summer	SSC2	1.001	Outfall	1.0	0.539	0.056	0.0067	157.5

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute summer	Carpark	2040	5.406	0.096	4.8	150.1757	0.0000	OK
2880 minute summer	Carpark Outfall	2040	5.107	0.007	0.9	0.0012	0.0000	OK
2880 minute winter	External Works	2220	5.003	0.103	1.6	45.7480	0.0000	OK
2880 minute winter	SSC2	2220	4.486	0.026	1.1	0.0042	0.0000	OK
2880 minute winter	Outfall	2220	4.449	0.026	1.1	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute summer	Carpark	2.000	Carpark Outfall	0.9	1.230	0.025	0.0039	
2880 minute summer	Carpark Outfall	Orifice	External Works	0.9				149.1
2880 minute winter	External Works	1.000	SSC2	1.1	0.574	0.059	0.0737	
2880 minute winter	SSC2	1.001	Outfall	1.1	0.559	0.063	0.0074	189.9

Results for 10 year Critical Storm Duration. Lowest mass balance: 98.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute summer	Carpark	2100	5.454	0.144	7.0	224.3961	0.0000	OK
2880 minute summer	Carpark Outfall	2100	5.109	0.009	1.2	0.0014	0.0000	OK
2880 minute summer	External Works	2280	5.055	0.155	2.9	68.8164	0.0000	FLOOD RISK
2880 minute summer	SSC2	2280	4.490	0.030	1.4	0.0047	0.0000	OK
2880 minute summer	Outfall	2280	4.452	0.029	1.4	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute summer	Carpark	2.000	Carpark Outfall	1.2	1.294	0.031	0.0046	
2880 minute summer	Carpark Outfall	Orifice	External Works	1.2				200.2
2880 minute summer	External Works	1.000	SSC2	1.4	0.615	0.075	0.0876	
2880 minute summer	SSC2	1.001	Outfall	1.4	0.600	0.081	0.0088	250.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Carpark	1380	5.489	0.179	10.0	279.2873	0.0000	FLOOD RISK
1440 minute winter	Carpark Outfall	1380	5.109	0.009	1.3	0.0015	0.0000	OK
2160 minute winter	External Works	2040	5.092	0.192	3.0	85.1408	0.0000	FLOOD RISK
2160 minute winter	SSC2	2040	4.492	0.032	1.6	0.0050	0.0000	OK
2160 minute winter	Outfall	2040	4.454	0.031	1.6	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	Carpark	2.000	Carpark Outfall	1.3	1.330	0.035	0.0050	
1440 minute winter	Carpark Outfall	Orifice	External Works	1.3				166.8
2160 minute winter	External Works	1.000	SSC2	1.6	0.637	0.084	0.0956	
2160 minute winter	SSC2	1.001	Outfall	1.6	0.621	0.091	0.0096	247.9

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 98.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	Carpark	2040	5.577	0.267	10.4	415.3012	0.0000	FLOOD RISK
2160 minute winter	Carpark Outfall	2040	5.187	0.087	2.8	0.0139	0.0000	OK
2160 minute winter	External Works	2100	5.186	0.286	5.3	127.0411	0.0000	FLOOD RISK
2160 minute winter	SSC2	2100	4.495	0.035	2.0	0.0056	0.0000	OK
2160 minute winter	Outfall	2100	4.457	0.034	2.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute winter	Carpark	2.000	Carpark Outfall	1.7	1.336	0.044	0.0292	
1440 minute winter	Carpark Outfall	Orifice	External Works	5.2				214.0
2160 minute winter	External Works	1.000	SSC2	2.0	0.678	0.106	0.1122	
2160 minute winter	SSC2	1.001	Outfall	2.0	0.661	0.114	0.0112	316.8

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Carpark	1380	5.537	0.227	12.5	354.1546	0.0000	FLOOD RISK
2160 minute winter	Carpark Outfall	2100	5.146	0.046	2.0	0.0073	0.0000	OK
2160 minute winter	External Works	2040	5.143	0.243	3.9	107.6978	0.0000	FLOOD RISK
2160 minute winter	SSC2	2040	4.494	0.034	1.9	0.0054	0.0000	OK
2160 minute winter	Outfall	2040	4.456	0.033	1.9	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	Carpark	2.000	Carpark Outfall	1.5	1.339	0.041	0.0130	
2160 minute summer	Carpark Outfall	Orifice	External Works	4.3				265.5
2160 minute winter	External Works	1.000	SSC2	1.9	0.661	0.096	0.1051	
2160 minute winter	SSC2	1.001	Outfall	1.9	0.645	0.104	0.0105	286.8

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	Carpark	2040	5.648	0.338	12.9	525.8489	0.0000	FLOOD RISK
1440 minute summer	Carpark Outfall	1380	5.251	0.151	14.5	0.0240	0.0000	OK
1440 minute winter	External Works	1380	5.241	0.341	14.4	151.0156	0.0000	FLOOD RISK
1440 minute summer	SSC2	1350	4.497	0.037	2.2	0.0059	0.0000	OK
1440 minute summer	Outfall	1350	4.459	0.036	2.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute winter	Carpark	2.000	Carpark Outfall	1.9	1.330	0.050	0.0462	
960 minute winter	Carpark Outfall	Orifice	External Works	15.0				267.2
1440 minute summer	External Works	1.000	SSC2	2.2	0.696	0.116	0.1201	
1440 minute summer	SSC2	1.001	Outfall	2.2	0.678	0.125	0.0120	295.8

Appendix 6

Arun District Council's

Surface Water Drainage Design Checklist

Full Detailed Surface Water Drainage Design Checklist

Site Name/Address:	Sefter Farm East
Application Description:	Construction of a 6,485m ² packhouse east of the existing Sefter Farm South production building, conversion of the existing staff parking area into a concrete service yard and the relocation of the existing staff parking area to the east of the new packhouse at Sefter Farm, Pagham Road, Bognor Regis West Sussex.

Policy and Guidance Information

Arun District Council Surface Water Drainage Guidance - <https://www.arun.gov.uk/surfacewater>

Land Drainage Consent – <https://www.westsussex.gov.uk/fire-emergencies-and-crime/dealing-with-extreme-weather/flooding/flood-risk-management/ordinary-watercourse-land-drainage-consent/> and <https://www.arun.gov.uk/land-drainage-consent/>

Arun District Council surface water pre-commencement conditions - <https://www.arun.gov.uk/planning-pre-commencement-conditions>

The SuDs Manual [C753] by CIRIA

Sustainable drainage systems: non-statutory technical standards' <https://assets.publishing.service.gov.uk/media/5a815646ed915d74e6231b43/sustainable-drainage-technical-standards.pdf>

Ground Investigation Results

Groundwater monitoring

- ☐ Plan showing location of monitoring points provided. See Existing Site Layout Drawing 101 and Constructive Evaluation information Appendix 3 of the Surface Water Drainage Statement
 - ☐ Depths of holes detailed. Borehole 1 was 4m in depth Boreholes 2-8 were 3m in depth.
 - ☐ Dates of observations and depth to groundwater recorded. Recorded between February -March 2022 and September 2024 and March 2025 data in Constructive Evaluation information Appendix 3 of the Surface Water Drainage Statement
 - ☐ Evidence of the strata within borehole or monitoring pits provided.
- See Constructive Evaluation information Appendix 3 of the Surface Water Drainage Statement, locations are confirmed on the topographical survey information contained in the Existing Site Layout drawing 101.

Requested to aid speed of assessment

- ☐ Plan showing the peak groundwater levels at each monitoring point in mAOD.
- ☐ Peak groundwater levels recorded in metres below ground level and mAOD.
- ☐ If in an area of possible tidal influence, provide a comparison of readings against tide times/levels.

See table of borehole records for Sefter East located in Appendix 3 of the Surface Water Drainage Statement Peak Level noted as 600mm below ground level in Borehole 1, 700mm below ground level in Borehole 2, 800mm below ground level in Borehole 3, 800mm below ground level in Borehole 4, 800mm below ground level in Borehole 5, 800mm below ground level in Borehole 6.

Boreholes 7 and 8 were lost between March 22 and September 2024. Levels of 950mm below ground were recorded at these locations in February 2022.

Infiltration testing

- ☐ Completed strictly in accordance with BRE DG 365, CIRIA R156 or a similar approved method.
- ☐ Plan showing location of trial pits provided.
- ☐ Pit dimensions provided.
- ☐ Depths of testing provided.
- ☐ Dates, times and readings of each test recorded.
- ☐ Calculations for the infiltration rate for each test provided.
- ☐ Evidence of the strata within trial pits provided.
- ☐ Test locations, and depths correspond with the expected location and depths of proposed infiltration features.

See Section 3.5.5 to 3.5.7 and Appendix 3 of the Surface Water Drainage Statement.

Requested to aid speed of assessment

- ☐ Depths of testing provided in m below ground level and mAOD.

See Constructive Evaluation Information Appendix 3 of the Surface Water Drainage Statement
Peak Level noted as 700mm (0.7m) below ground level.

Other

As appropriate, dependent upon specific site conditions

- ☐ Geotechnical advice relating to the siting of infiltration features and risk of dissolution. (Usually where chalk strata is evidenced.) *N/A*
- ☐ Geotechnical advice relating to the risk of slope instability due to infiltration. *N/A*
- ☐ Geotechnical and structural advice where infiltration is proposed closer than 5m to buildings or structures. *N/A*
- ☐ Contamination evaluation assessment where infiltration is proposed in ground that may be contaminated. *N/A*
- ☐ Geotechnical advice where infiltration is proposed into made ground (to be generally avoided). *N/A*
- ☐ Geotechnical advice relating to infiltration capacity, and risk of settlement or instability where careful use of ground raising is proposed. *N/A*
- ☐ Specialist advice and confirmation of acceptability from the Environment Agency where the use of deep bore soakaways is proposed. *N/A*

Surface Water Drainage Statement

Disposal method (Select as appropriate)

- ☐ Rainwater reuse is proposed where possible. *Rainwater reuse from all roofs is proposed for irrigation.*
- ☐ Infiltration is proposed and maximised wherever possible. *High groundwater discounts infiltration to ground as a suitable means of surface water discharge for the design storm event.*
- ☐ Hybrid infiltration and restricted discharge to an appropriate water body or surface water sewer is proposed where a full infiltration design is not possible. *N/A*
- ☐ Restricted discharge to a water body is proposed where a full infiltration design is not possible. *This is the proposed surface water discharge option for the concrete yard and car park area.*
- ☐ Restricted discharge to a surface water sewer is proposed where a full infiltration design is not possible and there are no nearby water bodies. *N/A*
- ☐ Restricted discharge to a public or private highway drainage network is proposed where a full infiltration design is not possible and there are no nearby water bodies or surface water sewers. *N/A*

☐ Restricted discharge to a public combined sewer is proposed where a full infiltration design is not possible and there are no water bodies, surface water sewers, highway, or private drainage systems nearby. [N/A](#)

Disposal method justification

☐ Infiltration has been adequately investigated, in winter, at appropriate and varying depths where appropriate, above peak recorded winter groundwater levels at the given location. [See Constructive Evaluation Information Appendix 3 of the Surface Water Drainage Statement](#)
Peak Level noted as 0.7m below ground level.

☐ Onsite and boundary, open and culverted water bodies are investigated (location, mapping, network, flow direction, ownership/responsibility, depth, and condition). [See Existing Site Layout drawing 101 and Site Layout - Existing Conveyance Channel and Existing Conveyance Sections drawing 102.](#)

☐ Offsite nearby downstream water bodies are investigated (location, mapping, network, flow direction, ownership/responsibility, depth, and condition). [N/A](#)

☐ Surface water sewer network is investigated (location, mapping, network, flow direction, ownership/responsibility, depth, capacity, and condition). [N/A there is no local surface water sewer network.](#)

☐ Public and private downstream highway drainage networks are investigated (location, mapping, network, flow direction, ownership/responsibility, depth, capacity, and condition). [N/A, there is no surface water discharge to the highway network.](#)

☐ Combined downstream sewer network is investigated (location, mapping, network, flow direction, ownership/responsibility, depth, capacity, and condition). [N/A there is no combined sewer network locally.](#)

☐ Any relevant permissions or legal agreements from asset or landowners that are needed are identified and evidence of consents provided. [N/A.](#)

Requested to aid speed of assessment

☐ Any previous relevant correspondence or pre-application advice from the Local Planning Authority [LPA] or the Lead Local Flood Authority [LLFA] regarding the surface water drainage design is included with the statement.

Existing Site Essential

☐ It is clear what the natural drainage characteristics of the site and hydraulically linked areas are. [See Existing Site Layout Drawings 101 which include land levels and contours, the area of construction falls to the existing conveyance channel at the southwest of the site and into the site wide drainage system.](#)

☐ Natural flow paths are identified on a plan (where applicable).
[See Existing Conveyance Channel drawing 102.](#)

☐ Existing site drainage features are investigated – condition, performance, and ownership. [Existing Conveyance Channel and Existing Conveyance Sections drawing 102. All with the site boundary and ownership of Client \(Barfoots of Botley\).](#)

☐ Environmentally sensitive receiving water bodies are identified – for example groundwater source protection zones.

[No specific zoning or protection areas on or adjacent to the site – Pagham Rife and tributary of the Pagham Rife are the receiving water bodies.](#)

☐ Any appropriate easements to watercourses or other infrastructure are investigated. [None existing, see proposed easement for future maintenance noted on Proposed Realigned Conveyance Channel drawing 252.](#)

☐ Existing and future flood risk from any source is detailed.

Flood Zone 1. No risk of flooding from any source.

It is suggested that the above is achieved with the following, which may be combined where appropriate:

☐ An existing topographical plan. See Existing Site Layout Plan 101.

☐ An existing drainage catchment plan.

See Existing Site Layout Drawing 101 which includes land levels and drainage

☐ An existing site surface water drainage plan (where applicable). See Existing Site Layout Drawing 101 which includes land levels and drainage

☐ Flood maps (fluvial, tidal, pluvial, groundwater, sewer, and reservoir) are supplied (or Flood Risk Assessment referred to).

N/A to Drainage Statement – Flood Risk was considered as part of the Planning Permission.

☐ Confirmation and surveys of any existing drainage infrastructure on the site.

See Existing Site Layout Drawings 101 and Existing Conveyance Channel and Existing Conveyance Sections drawing 102.

☐ Full details of any known flooding on the site.

N/A to Drainage Statement.

Proposed Design

Essential

☐ Statement confirming the proposed design criteria including fixed design calculation inputs for the SuDS system. Examples include:

- Climate change allowances, 45%
- Urban creep allowance, None, not applicable to a commercial development.
- CV values, 1
- Rainfall data, FEH 2022
- MADD factor or additional storage. None.

☐ Natural catchments are followed.

Yes, site falls to the southwest and this has been mimicked in the discharge locations, see drainage drawings 201, 202 and 203.

☐ Where phased construction is proposed, the phases correspond to natural catchments and can function independently from each other. N/A

☐ The design is gravity based with no use of pumps. Roof is drained syphonically by gravity to the existing reservoir, the yard and car park by gravity to the existing conveyance channel.

☐ Natural systems that deliver specific hydrological function, such as watercourses or wetlands, are preserved. Existing conveyance channel to the southwest is to be deepened to allow suitable connection but is maintained as part of the proposals, see Drainage Drawings 201, 202 and Proposed Realigned Conveyance Channel drawing 252.

☐ Where there is existing drainage infrastructure on the site it is clearly explained or illustrated what is being retained, upgraded, or removed. See drainage drawings 201, 202, 203 and 252.

☐ Relevant restrictions relating to discharging to an environmentally sensitive receiving water body – for example a groundwater source protection zone - are investigated, reported and adhered to.

No specific zoning or protection areas on or adjacent to the site – Pagham Rife and the tributary of the Pagham Rife are the receiving water bodies. Water Quality for discharges detailed in the Surface Water Drainage Statement Section 4.8 Water Quality.

☐ Details of necessary off-site works and consents are provided. N/A

☐ It is shown how a surface water drainage design will not conflict with additional areas of flood storage or compensation. N/A

☐ Surface water flow entering the site from elsewhere is conveyed safely around or through the site without compromising the SuDS system. N/A surrounding areas positively drained as part of wider site drainage.

- ☐ Where runoff from elsewhere is drained together with the site runoff, the contributing catchment is modelled as part of the drainage system. [N/A](#)
- ☐ If the surface water drainage is designed to flood in the 1% Annual Exceedance Probability [AEP] + Climate Change Allowance [CCA] event, then the flood volume is contained safely on site without flooding any part of a building or utility plant susceptible to water or affecting safe access or egress. [All surface water up to and including the 1%AEP + Climate change is contained within the proposed drainage system. See Calculations in the Drainage Statement Appendix 5.](#)
- ☐ The design provides and evidences interception drainage and is able to capture and retain on site the first 5mm of the majority of all rainfall events.
[See Section 4.7 Interception Drainage in the Surface Water Drainage Statement.](#)
- ☐ Water quality and treatment is adequately assessed – with an assessment appropriate for the scale and proposed use of the site. [See Surface Water Drainage Statement Section 4.8](#)
- ☐ Adequate freeboard is provided between the top water level of any open storage features and the top of the bank. [See Section 4.5.7 and Calculations in Appendix 5 of Surface Water Drainage Statement.](#)
- ☐ There are no clashes with other infrastructure. [Confirmed.](#)
- ☐ Self-cleansing velocities are achieved where pipes are proposed.
[Confirmed see calculations in Surface Water Drainage Statement Appendix 5.](#)
- ☐ 1m freeboard is provided between peak groundwater levels and the base of any infiltration feature. [N/A](#)
- ☐ The proposed discharge rate is explained and justified (for attenuation designs). [See Surface Water Drainage Statement Sections 4.4 - 4.6.](#)
- ☐ Where discharge is proposed to a public surface water or combined sewer, a capacity check confirming that the sewer can receive the proposed flows is submitted. [N/A](#)
- ☐ Adequate freeboard is provided between peak groundwater levels and the base of any attenuation feature (refer below if this is not possible). [Confirmed.](#)
- ☐ Where there is a risk that the base of an attenuation feature may penetrate peak groundwater levels, additional mitigation measures to prevent groundwater ingress are incorporated into the design and construction method statement. [Base of all systems are above recorded peak groundwater levels, systems are unlined to allow interception drainage as required, see Section 4.7 Interception Drainage in Surface Water Drainage Statement.](#)
- ☐ Where there is a risk that the base of an attenuation feature may penetrate peak groundwater levels the effects of buoyancy have been considered in the design. [Buoyancy has been considered as part of the design, Voided stone construction is not buoyant and the design storm storage in the existing irrigation reservoir is located above existing ground levels.](#)
- ☐ Amenity benefits are provided by the drainage system (assessed by others). [N/A to discharge conditions as considered at Planning Approval.](#)
- ☐ Biodiversity benefits are provided by the drainage system (assessed by others). [N/A to discharge conditions as considered at Planning Approval.](#)
- ☐ Landscaping has been designed to ensure ease of maintenance of drainage assets. [Confirmed.](#)
- ☐ The justification and criteria for tree root avoidance and mitigation measures is clear, referencing adopting body standards where applicable. [No trees in area of works.](#)
- ☐ Biodiversity and ecological enhancements do not impede the functionality, maintenance or capacity of the drainage system. [N/A to discharge conditions as considered at Planning Approval.](#)
- ☐ It is confirmed what elements of the SuDS will be private. [All will remain private see Interim Drainage Maintenance and Management Plan.](#)
- ☐ It is confirmed what the adoption arrangements for SuDS components will be. [All will remain private see Interim Drainage Maintenance and Management Plan.](#)
- ☐ A construction method statement for the SuDS system, appropriate to the scale of the development, is submitted. [This should be agreed as part of a suitably worded Planning Condition to be provided by the Principal Contractor prior to commencement of the SuDS System.](#)

☐ A maintenance plan for the SuDS system, appropriate to the scale of the development, is submitted. [Please refer to our SuDS Maintenance Checklist where this is stipulated by condition.] [See Interim Drainage Maintenance and Management Plan.](#)

☐ Any potential health and safety issues relating to SuDS implementation and management have been considered and managed.

[See Interim Drainage Maintenance and Management Plan.](#)

Preferred

☐ Ground raising is avoided where possible.

☐ The drainage system is considered by and contributes to the biodiversity net gain statement (assessed by others).

Impermeable Area/Catchment Plan

Essential

☐ Different drainage catchments are demarcated. [See Surface Water Drainage Statement Appendix 4 Proposed Site Layout and Drained Areas Plan.](#)

☐ Where phased construction is proposed, each phase is shown on a plan. [N/A](#)

☐ An impermeable area plan is provided showing all positively drained areas including open surface water storage plan areas. [See Surface Water Drainage Statement Appendix 4 Proposed Site Layout and Drained Areas Plan.](#)

Preferred

☐ Impermeable areas are shown in m² on the impermeable areas plan(s). [See Surface Water Drainage Statement Appendix 4 Proposed Site Layout and Drained Areas Plan.](#)

☐ Demarcated impermeable areas correspond with the distribution of those areas in the supporting calculations. [See Surface Water Drainage Statement Appendix 4 Proposed Site Layout and Drained Areas Plan and Appendix 5 Causeway Flow Calculations.](#)

Surface Water Drainage Calculations

General

☐ The most recently applicable, or previously agreed FEH rainfall data is used. [FEH 2022 Used See Surface Water Drainage Statement Appendix 5 Causeway Flow Calculations.](#)

☐ CV values for all events are set to 1. This includes summer, winter, design, and simulation events. [Cv value 1 used See Drainage Statement Appendix 5 Causeway Flow Calculations.](#)

☐ The correct climate change allowances, appropriate for the full lifetime of the development, have been applied to all calculations. [Included 45%.](#)

☐ A 10% allowance for urban creep is applied to all residential roof areas. [N/A to commercial development.](#)

☐ 100% Annual Exceedance Probability [AEP] + Climate Change Allowance [CCA] (1 in 1 year) event calculations provided. [See Surface Water Drainage Statement Appendix 5 Causeway Flow Calculations.](#)

☐ 10% AEP + CCA (1 in 10 year) event calculations provided showing that the incoming pipe to any infiltration feature is above this level. [See Surface Water Drainage Statement Appendix 5 Causeway Flow Calculations.](#)

☐ 3.33% AEP + CCA (1 in 30 year) event calculations provided showing that the full surface water volume is contained within the designed system without flooding. [See Surface Water Drainage Statement Appendix 5 Causeway Flow Calculations.](#)

☐ 1% AEP + CCA (1 in 100 year) event calculations provided showing that the full surface water volume is contained safely on site, without flooding any part of a building or utility plant susceptible to water or affecting safe access or egress. [See Surface Water Drainage Statement Appendix 5 Causeway Flow Calculations.](#)

Infiltration

☐ Half drain times do not exceed 24 hours for the 10% AEP + CCA and 1% AEP + CCA events.

[N/A](#)

☐ If half drain times exceed 24 hours for the 1% AEP + CCA event, then advice and agreement from the LPA has been sought and submitted. [N/A](#)

☐ The most precautionary design infiltration rate is used. [N/A](#)

☐ Design infiltration rates are applied to the sides of soakaways only [N/A](#).

☐ Design infiltration rates are applied to the base of permeable paving, infiltration blankets or basins only. [N/A](#)

☐ Where the design infiltration rate is applied to the base an appropriate factor of safety is applied.

[N/A](#)

Attenuation and Restricted Discharge

☐ Greenfield run off rates are based upon the positively drained area of the site only. [See Surface Water Drainage Statement Section 4 and Appendix 5 Causeway Flow Calculations.](#)

☐ Discharge rates are restricted to QBAR or 2 l/s/ha, depending on whichever is higher, for all storms up to the 1% AEP + CCA event. [See Surface Water Drainage Statement Section 4 Appendix 5 Causeway Flow Calculations.](#)

☐ Half drain times and available capacity in the drainage system for subsequent storms are considered. [N/A](#).

☐ Brownfield run off rates are based upon the positively drained area of the site only. [N/A](#)

☐ Brownfield sites aspire to achieve greenfield runoff rates and volumes, where infiltration is not viable. If the proposed run off rate is higher than the greenfield run off rate, then an acceptable justification is provided, and the rate has been agreed with any relevant bodies. [N/A](#)

☐ A surcharged outfall to a watercourse or sewer has been modelled. The surcharge level is the 1% AEP + CCA flood event for the receiving watercourse, or to the top of the bank if appropriate hydraulic modelling is not available. [N/A](#)

☐ A surcharged outfall to a tidal waterbody has been modelled. The surcharge level is based upon present day extreme sea levels with an allowance for sea level rise applied. [N/A](#)

Requested to aid assessment

☐ FEH22 point descriptors for the site are provided.

Drainage Plans and Specifications

Essential

Plans are provided showing:

☐ The proposed design within the proposed site layout. [See drawings 201,202, 203 and 251.](#)

☐ Existing site sections and levels. [See Drawings 101](#)

☐ Proposed site sections and levels. [See Drawings 301, 302, 311 and 312.](#)

☐ Long and cross sections for the proposed drainage system including final finished floor levels. [See drawings 201,202, 203, 251, 501, 511 and 512](#)

☐ Exceedance flow management routes. [See Surface Water Drainage Statement Appendix 8.](#)

☐ Details of connections to watercourses and sewers. [See drawings 201, 202, 203, 501, 511 and 512.](#)

☐ Maintenance access and any arisings storage and disposal arrangements. [See Drawing 252.](#)

These plans must be of sufficient detail that a reviewer can be confident that the design can be constructed without flood risk being increased on site or elsewhere.

Specifications are required for all materials used in the design. We suggest that this is best achieved and illustrated with site specific construction detail drawings. The combination of construction details, with plans and sections, ensure that the proposed standard of construction will facilitate adoption and maintenance by an appropriate body and have structural integrity.

The following checklist is designed to demonstrate the level of detail required:

Easements

- ☐ 3m easements are shown from the top of the bank of all ordinary watercourses, and from the edge of all culverted watercourses on all plans. [Proposed Realigned Conveyance Channel drawing 252.](#)
- ☐ 8m easements are shown from the top of the bank of all main rivers on all plans - unless an alternative easement has been stipulated by the Environment Agency. [N/A](#)
- ☐ Any appropriate easements as stipulated by any public or private utility provider shown on all plans. [N/A](#)
- ☐ Infiltration features (aside from permeable paving that does not take any extra impermeable catchment such as a roof) are shown at least 5m from buildings or structures. [N/A](#)
- ☐ Maintenance easements are shown from the top of the bank from all open SuDS features on all plans. [Proposed Realigned Conveyance Channel drawing 252.](#)
- ☐ Existing trees and their root protection zones are shown on any drainage layout. [N/A No Trees in the location of works.](#)
- ☐ Proposed trees and appropriate easements are shown on any drainage layout. [N/A No Trees in the location of works.](#)

Detail

- ☐ It can be clearly determined what a pipe's diameter, pipe materials, gradients, flow directions and invert levels are from the plans. [See drawings 201, 202, 203, 501, 511 and 512.](#)
- ☐ It can be clearly determined what an inspection chamber or manhole's cover level, invert level, cover loading grade and sump depth (where applicable) are from the plans. [See drawings 201, 202, 203, 501, 511 and 512.](#)
- ☐ All infiltration or attenuation features (including permeable paving) are clearly labelled with their dimensions, invert/base levels and cover levels. [See drawings 201, 202, 203, 501, 511 and 512.](#)
- ☐ Control structures are labelled with discharge rates, hydraulic head, invert and cover levels and ideally model number. [See drawings 201, 202, 203, 501, 511 and 512.](#)
- ☐ Operational characteristics of any other mechanical features are detailed. [N/A](#)
- ☐ Measures to protect drainage from tree root damage are clearly shown on any drainage layout. [N/A](#)
- ☐ Any areas of necessary ground raising are clearly justified and demarked on a plan, with depths and levels. [No land raising proposed.](#)
- ☐ If the 1% AEP + CCA event floods, then the extent and depth of the flooding is shown on a site plan. This plan includes proposed external ground levels and finished floor levels of buildings. [N/A Flood Zone 1.](#)
- ☐ Potential flow routes off site are shown. The plan also includes proposed external ground levels, finished floor levels of buildings and designed slopes on all impermeable surfaces such as highways or car parks. [See Levels Drawings 301, 302 and Surface Water Exceedance Route Plan in Surface Water Drainage Strategy Appendix 8.](#)

- ☐ Cross sections and long sections of all open features are provided.
- ☐ Construction detail drawings are site specific.
- ☐ Construction detail drawings are provided for all components including but not limited to:
 - ☐ Infiltration structures
 - ☐ Attenuation structures
 - ☐ Manholes/inspection chambers
 - ☐ Catchpits/silt traps
 - ☐ Flow control devices
 - ☐ Permeable paving
 - ☐ Headwalls
 - ☐ Channel drains
 - ☐ Gullies
 - ☐ Pipe bed and surround
 - ☐ Pipe to pipe connections
 - ☐ Filter strips or drains
 - ☐ Swales
 - ☐ Bio-retention systems
 - ☐ Ponds and wetlands
 - ☐ Tree pits and measures to protect drainage from root incursion
 - ☐ Water treatment features
 - ☐ Green roofs
 - ☐ Measures to protect drainage from tree roots.
 - ☐ Water butts or alternative methods of water reuse – also to be shown on plans.

See drawings 201, 202, 203, 501, 511 and 512.

The following items are requested to aid assessment or confidence in construction:

- ☐ Where features have a non-uniform plan area, a plan showing the coordinates of the perimeter is provided.
- ☐ All drainage infrastructure is labelled to correspond with the supporting calculations.

See drawings 201, 202, 203 and Surface Water Drainage Statement Appendix 5.

Other

- ☐ Open feature planting specification is provided (to be assessed by others).

This checklist is designed to aid an applicant with their submission. The list is not exhaustive, and our engineers may request additional information to enable them to review a proposal to their satisfaction.

The checklist may also request information that an applicant does not feel is relevant to their submission. In this case the applicant can provide an explanation as to why they have omitted certain information in their drainage statement. However, the appraising engineer reserves the right to request this information if they believe it is necessary for their review.

Appendix 7

**Interim Drainage Management
and Maintenance Plan**

Interim Drainage Management and Maintenance Plan



The Civil Engineering Practice
11 Tungsten Building
George Street
Fishersgate
Sussex
BN41 1RA

Project	Sefter Farm East Pagham Rd, Bognor Regis, West Sussex
Project Number	24019

By Steve Doughty

Date 2 May 2025

1 Introduction

- 1.1 This Interim Drainage Management and Maintenance Plan has been prepared as the initial draft of the document that will become the Drainage Maintenance and Management Manual.
- 1.2 The Drainage Maintenance and Management Manual will be completed as part of the Operation and Maintenance Manual to be provided by the Principal Contractor on completion of construction.
- 1.3 The Drainage Maintenance and Management Manual will be handed over to the Site Operator on project completion.
- 1.4 The Drainage Maintenance and Management Manual will remain a live document and will be used to guide and record the maintenance and management of the surface water drainage system.

2 During Construction

- 2.1 Once appointed the Contractor will prepare a site specific method statement for the control of silt and other pollutants during construction. CIRIA Report C532, Control of water pollution from construction sites, provides further guidance on this.
- 2.2 The Contractor will maintain the proposed drainage system during construction and until the handing over of the site.

3 Surface Water Drainage System

3.1 Overview

- 3.1.1 The surface water drainage system has been designed as a Sustainable Urban Drainage System (SuDS)



- 3.1.2 The system has been designed to collect surface water from the roof of the new packhouse and discharge it to the existing surface water collection network for reuse within the existing site wide irrigation system.
- 3.1.3 The proposed hardstanding areas have been designed with a voided subbase providing storage which will discharge treated surface water at a restricted rate to the Pagham Rife via the existing onsite drainage system.

3.2 How the System Will Function

- 3.2.1 Surface water falling on the roof will be collected in gutters and discharged via a syphonic drainage system into the existing reservoir to the south of the site which forms a part of the site wide surface water irrigation network.
- 3.2.2 Surface water falling on the new hardstanding areas will be filtered through a voided subbase and discharged at a restricted rate to the existing conveyance channel to southwest of the site.
- 3.2.3 These systems will provide water quality improvement to ensure that at the point of discharge the surface water has received suitable pollution mitigation.

4 Schedule of Maintenance

- 4.1 Management of the drainage facilities will be undertaken by the Site Operator.
- 4.2 There are three categories of maintenance activities:

- **Regular maintenance**

Basic tasks undertaken on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.

- **Occasional maintenance**

Tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).

- **Remedial maintenance**

Intermittent tasks that may be required to rectify faults associated with the system. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.

4.3 The following maintenance schedule details the typical tasks to be undertaken at different intervals.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Manage vegetation and remove nuisance plants - aesthetics	As required
	Litter and debris removal - catchpits and conveyance channel	Monthly or as required
	Maintain conveyance Channel to ensure vegetation height remains at between 100mm and 150mm	Monthly or as required
	Cleaning of gutters and any filters on downpipes	3 Monthly
	Remove sediment and debris from silt trap chambers, channel drains and inlet chambers	6 monthly
	Surface water pipework - jetting / rodding	Every 2 years or as required
	Smart Sponge replacement	Annually
Corrective Maintenance	Remove debris / blockages to silt traps / channel drains / headwalls	As required
	Repairs to access chambers / manhole covers	As required
	Inspect inlet, outlet from downpipes, channel drains, conveyance channel, headwalls and gullies for blockages, standing water and clear	As required
	Where there is a build-up of silt in conveyance channel or at inlets of 50mm or more above the design level remove silt and spread on site. Undertake when ground is damp in autumn or early spring and transplant turf / overseed to original design levels	As required
Monitoring	Inspect silt traps and conveyance channel and note the rate sediment has accumulated	Monthly in the first year and then annually
	Determine need to replace Smart Sponge based on above monitoring	Annually

Indicative Schedule of Maintenance for the Proposed Drainage System

Component	Inspection Frequency					
	1 Month	3 Months	6 Months	Annually	After leaf fall in Autumn	2 Years
Gullies, Channels and Gutters		✓			✓	
Catchpits	✓				✓	
Surface and Foul Water Pipework						✓
Conveyance Channel		✓				
Flow Controls			✓			
Smart Sponge				✓		

Inspection Frequency Summary

5 Regular Maintenance Procedures

5.1 The following procedures provide a guide to the two most common maintenance items, jetting and silt removal, to be undertaken on site:

5.2 Jetting

5.2.1 Equipment Required:

- High-pressure water jetting equipment.
- Personal protective equipment (PPE) for operators.

5.2.2 Typical Procedure:

- Perform a pre-jetting inspection to assess the level of sedimentation.
- Insert the jetting hose into the pipe, starting from the upstream end.
- Gradually move the jetting hose downstream, ensuring the entire pipe or structure length is cleaned.
- Monitor the process to avoid any damage to the drainage infrastructure.
- Collect dislodged silt and debris at the downstream end using a vacuum or manual removal.

5.3 Silt Removal and Disposal

5.3.1 Equipment Required:

- Vacuum truck or manual removal tools.
- Containers for temporary storage of silt and debris.

5.3.2 Typical Procedure:

- Collect the dislodged silt and debris from the downstream end of pipe or structure.
- Transfer the collected material to the containers.
- Dispose of the collected silt and debris following local regulations and environmental guidelines.

6 Financing

6.1 The regular and corrective maintenance of all elements of the drainage system will be managed and funded by the Site Operator.

7 Health and Safety

7.1 Designers Residual Risks

- 7.1.1 There are no significant residual risks associated with the construction of the proposed surface or foul water drainage network beyond common site risks that would reasonably be anticipated by a competent Civil Engineering Contractor.

7.2 Construction Phase

- 7.2.1 The Principal Contractor will undertake a construction phase Health and Safety Plan for the site.
- 7.2.2 Prior to handover the Principal Contractor will undertake a review of maintenance activities required and prepare suitable Health and Safety documentation as part of the site hand over documents.

8 Design Life

- 8.1 The design life of the development is likely to exceed the design life of the components within the SuDS network. During the routine drainage inspections it may be determined that some components have reached the end of their functional life cycle.
- 8.2 Where possible repairs should be the first option considered however if repairs are unviable it will be necessary for the Site Operator to arrange for the replacement of the faulty component.

9 Emergency Plan

9.1 Potential flood and maintenance indicators:

- Manholes or inspections chambers overflowing
- Gullies overflowing or ponding
- Channel drains overflowing or ponding
- Other visual indicators of the drainage system not performing as it should

9.2 Should any of the items above occur then immediate action as outlined below should be undertaken:

- Inspect for blockages in the problem area
- Should the problem not be identified via an initial inspection the site operator should appoint a suitable drainage engineer to inspect and survey the system and jet any blockages
- Where it is suspected that there is a problem with the downstream drainage network the Owner or relevant statutory undertaker of that system should be alerted

9.3 Emergency Contact Details

9.3.1 Maintenance Team

TBC

10 Appended Documents

Approved Drainage Drawings and Construction Details (to be added once approved)

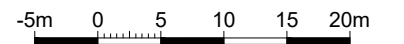
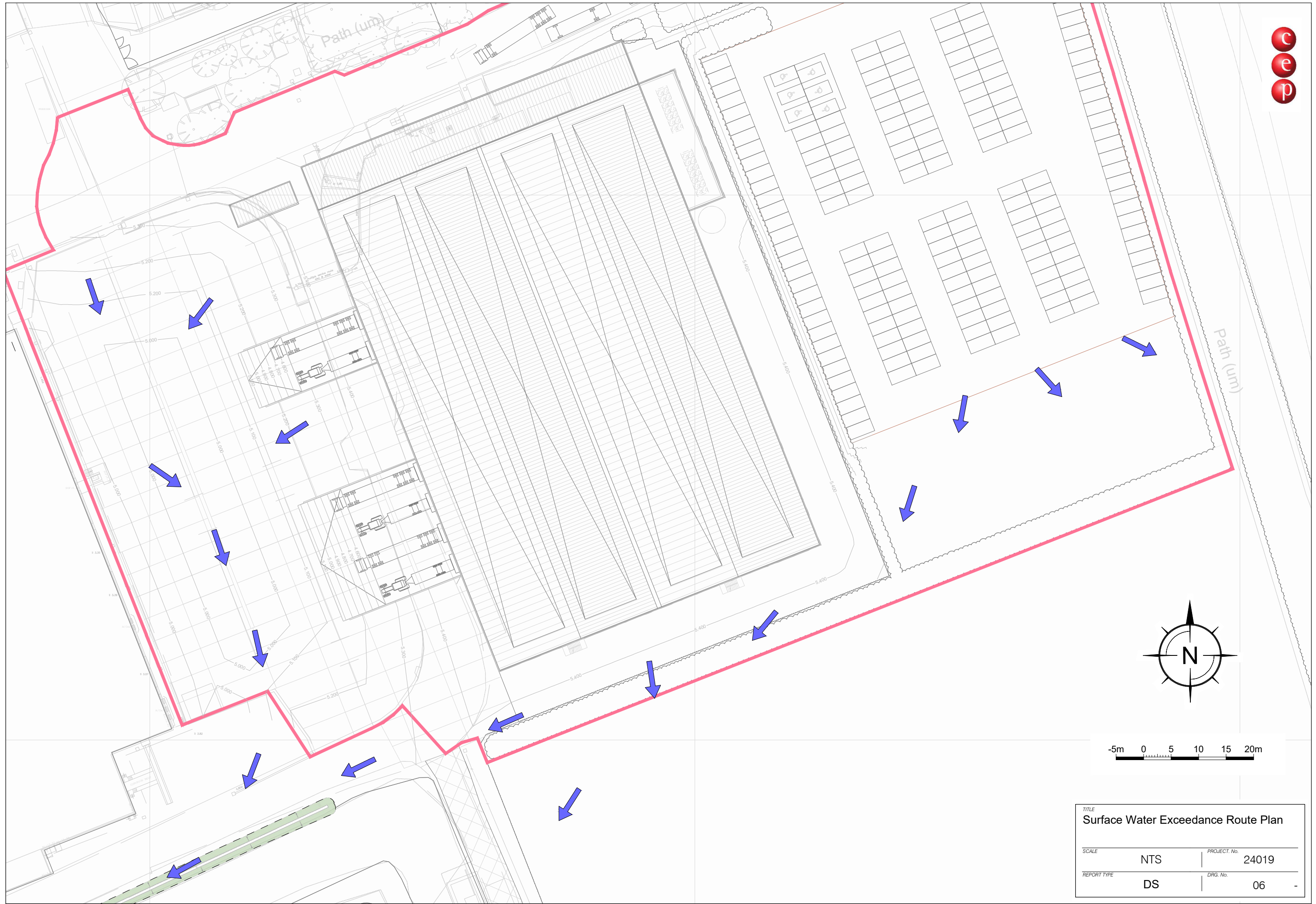
Pre Handover Inspection Checklist (to provided by Principal Contractor)

Maintenance Checklist (to provided by Principal Contractor at handover)

Maintenance Record Pro Forma (to provided by Principal Contractor at handover)

Appendix 8

Surface Water Exceedance Route Plan



TITLE	
Surface Water Exceedance Route Plan	
SCALE	PROJECT No.
NTS	24019
REPORT TYPE	DRG. No.
DS	06 -