

Surface Water Drainage Design Checklist

This checklist has been created to assist designers, by clearly defining our expectations and requirements for surface water drainage designs that are submitted to support planning applications. It is recommended that applicants and their designers take time, at the outset of the planning process, to familiarise themselves with the checklist and our guidance.

Surface water drainage must be adequately considered when formulating the layout of a site, therefore it is expected that surface water drainage information is submitted with all planning applications. Surface water drainage information may be requested for smaller proposals where drainage is expected to affect determination – for example, in the Lidsey Wastewater Treatment Catchment.

The items listed in the checklist cover our expectations for a fully detailed surface water drainage design. The final details of a design may be agreed via planning condition, or prior to determination of a full, or reserved matters planning application.

Applicants who submit all the information requested by the checklist, as early as possible in the planning process, benefit from quicker review times and less delays caused by requests for further information. The omission of information may lead to objection to, or refusal of planning applications or applications to discharge conditions.

Applicants for major development sites must be aware that West Sussex County Council [WSCC] acting as Lead Local Flood Authority [LLFA] are a statutory consultee for flood risk and surface water drainage design. It is important to consult WSCC guidance in addition to our guidance and this checklist.

A major planning application is defined as:

- The creation of 10 or more residential units,
- Residential development of on a site of 0.5 hectares or more (where the number of residential units is not yet known i.e. for outline applications),
- Non-Residential development or change of use on a site of at least 1 hectare,
- Creation or change of use of 1000 square metres or more of gross floor space (not including housing).

Applicants have the option to apply for confidential pre-application advice relating to their surface water drainage design from either Arun District Council or WSCC. Bespoke advice is not offered outside of a fee-paying application.

ADC pre-application advice: <https://www.arun.gov.uk/pre-application-advice>

WSCC pre-application advice: <https://www.westsussex.gov.uk/roads-and-travel/information-for-developers/flood-risk-management-pre-application-advice/>

Critical Items for Detailed Surface Water Drainage Design

A detailed checklist of our requirements follows this advice. However, we highlight that the failure to adequately address the following critical items will result in an **objection** to any application to discharge a surface water drainage design condition and will likely result in an objection on a full or reserved matters planning application.

It is expected that if any of these items are inadequately addressed by a submission then their correction may result in a redesign of the surface water drainage scheme. A redesign may have the potential for storage structures to increase in volume or plan area.

Critical Item	Reason
Winter groundwater monitoring data.	Adequate winter groundwater monitoring data must be supplied to evidence that infiltration designs have sufficient freeboard from the base of structures and the peak groundwater level. The same data is necessary to ensure that the potential for buoyancy has been adequately considered in attenuation designs.
Winter infiltration testing data.	Adequate winter infiltration testing must be supplied to justify the proposed discharge method and design infiltration rates. Infiltration tests must be completed strictly in accordance with BRE DG 365, CIRIA R156 or a similar approved method. Testing depths must account for peak groundwater levels and correspond with the location and depth of proposed infiltration features. Designs must be based upon the <u>slowest</u> infiltration rate evidenced closest to a proposed infiltration feature. Average design rates will not be accepted. The results of incomplete tests should not be extrapolated to obtain design values for infiltration rates.
The hierarchy for sustainable drainage.	The proposed discharge method must accord with the SuDS hierarchy as given below. Evidence must be supplied to justify the proposed discharge method. 1. Rainwater reuse where possible. 2. Complete discharge into the ground (infiltration). 3. Hybrid infiltration and restricted discharge to an appropriate water body or surface water sewer. 4. Restricted discharge to an appropriate water body. 5. Restricted discharge to a surface water sewer. 6. Restricted discharge to a combined sewer. A water body may be defined as a river, watercourse, ditch, culverted watercourse, reservoir, wetland or the sea. Engineers cannot support any proposed connection of surface water to the foul sewer.

Calculations	Calculations for pre-development run off rates must be based upon the positively drained area only. Proposed discharge rates must not increase flood risk on site or elsewhere. Discharge rates must be restricted to QBAR or 2 l/s/ha, depending on whichever is higher. Designs must be based on the most recently available rainfall data at the time of conditions being applied. <u>FSR rainfall data will not be accepted.</u> FEH rainfall data is based upon more recent records and continues to be updated. Designs must use the correct climate change allowances at the time of determination of the outline or full planning application. CV values for all events must be set to 1. This includes summer, winter, design, and simulation events. The correct allowance for urban creep must be applied. Additional storage must be set to zero unless it can be evidenced where this is provided. Infiltration half-drain times must be less than 24 hours. Infiltration design rates must be applied to the sides of soakaways, or to the base of infiltration blankets. Design rates must not be applied to both the base and sides of infiltration structures. A surcharged outfall must be modelled.
Natural catchments design.	The submission must define the natural drainage characteristics within, and hydraulically linked to, the site and demonstrate that the drainage proposals will integrate with and not compromise the function of the natural and existing drainage systems. The condition, performance (including capacity where appropriate) and ownership of any existing site surface water drainage infrastructure must be accurately reported. Appropriate easements to watercourses and other services must be shown on all plans. Where there are areas of flood risk from any source on the site, it must be shown how a sustainable surface water drainage design can be accommodated on the site without conflicting with those areas of flood risk. Designs must replicate the natural drainage catchments of the site. All surface water drainage designs must therefore drain via gravity to corresponding points of discharge. The use of pumps for surface water drainage is not sustainable and will not be supported.

Plans	Plan areas, depths and levels of drainage infrastructure must accurately correspond with the supporting calculations.
Water quality benefits.	An assessment of water quality is necessary to evidence that the proposed design provides adequate treatment of surface water.
Biodiversity and amenity benefits.	The surface water drainage design must provide biodiversity and amenity benefits.
Trees and planting	There should be no conflict between surface water drainage infrastructure and existing or proposed trees or planting. The design must consider the potential growth of proposed trees and adequate mitigation must be provided to protect drainage infrastructure where conflict <u>cannot</u> be avoided.

Full Detailed Surface Water Drainage Design Checklist

Site Name/Address:	Sefter Farm Extension
Application Description:	Construction of a 2,180m ² extension to the south side of the existing Sefter Farm South production building and hard standing together with a watercourse diversion and resulting reduction in plan area of the irrigation reservoir immediately south of the development proposals at Sefter Farm, Pagham Rd, 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.
- ☐ Depths of holes detailed.
- ☐ Dates of observations and depth to groundwater recorded.
- ☐ Evidence of the strata within borehole or monitoring pits provided.

See Constructive Evaluation information Appendix 3 of the Surface Water Drainage Statement

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 Constructive Evaluation information Appendix 3 of the Surface Water Drainage Statement Peak Level noted as 0.7m below ground level.

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 4.24 and 4.2.5 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 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.*
- ☐ 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 yard 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, Site Layout - Existing Watercourse and Existing Watercourse Section drawings 102 and 103](#)
- ☐ 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. [OWC consent for Ordinary Watercourse relocation and connection of outfalls. These will be applied for post Planning Application.](#)

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 102 which include land levels and contours, the area of construction falls to the existing ditch at the south of the site and into the site wide drainage system.](#)
 - ☐ Natural flow paths are identified on a plan (where applicable).
[See Existing Watercourses and long sections provided on Site Layout - Existing Watercourse and Existing Watercourse Section drawing 103.](#)
 - ☐ Existing site drainage features are investigated – condition, performance, and ownership. [Existing watercourses and long sections provided on Site Layout - Existing Watercourse and Existing Watercourse Section drawing 103. 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 onsite ordinary watercourse are the receiving water bodies.](#)
 - ☐ Any appropriate easements to watercourses or other infrastructure are investigated. [None existing , see proposed Easement plan for future maintenance 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 102.](#)
 - ☐ An existing drainage catchment plan.

See Existing Site Layout Drawing 102 which includes land levels and drainage

☐ An existing site surface water drainage plan (where applicable). See Existing Site Layout Drawing 102 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

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

See Existing Site Layout Drawings 102 Site Layout - Existing Watercourse and Existing Watercourse Section drawing 103.

☐ 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 residential development.
- CV values, 1
- Rainfall data, FEH 2022
- MADD factor or additional storage. None.

☐ Natural catchments are followed.

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

☐ 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. In part by gravity but also in part to the existing surface water pumping station as part of reuse for irrigation.

☐ Natural systems that deliver specific hydrological function, such as watercourses or wetlands, are preserved. Existing watercourses to the south relocated to preserve natural system, see section 4.5 Surface Water Drainage Statement.

☐ 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 and 202.

☐ 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 onsite ordinary watercourses are the receiving water bodies. Water Quality for discharges detailed in the Surface Water Drainage Statement Section 4.7 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. See Section 4.5 Surface Water Drainage Statement

☐ 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.
All roof water is intercepted and stored and reused for irrigation for all rainfall events creating interception that is greater than the first 5mm of all rainfall events.
- ☐ 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 4.7](#)
- ☐ Adequate freeboard is provided between the top water level of any open storage features and the top of the bank. [See Proposed Reservoir Plan and Sections Drainage 251.](#)
- ☐ There are no clashes with other infrastructure. [Confirmed.](#)
- ☐ Self-cleansing velocities are achieved where pipes are proposed.
[Confirmed see calculations in 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 4.3-4-.4](#)
- ☐ 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). [Not possible all features are lined. See Construction Details drawings 501 and 502.](#)
- ☐ 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. [All systems are lined to prevent groundwater ingress. See Construction Details drawings 501, 511 and 512.](#)
- ☐ 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 the design, Voided stone construction is not buoyant and the Design storm storage in the irrigation reservoir is located above existing ground levels.](#)
- ☐ Amenity benefits are provided by the drainage system (assessed by others). [See Ecology Appraisal and Biodiversity Nett Gain Appraisal.](#)
- ☐ Biodiversity benefits are provided by the drainage system (assessed by others). [See Ecology Appraisal and Biodiversity Nett Gain Appraisal.](#)
- ☐ Landscaping has been designed to ensure ease of maintenance of drainage assets. [See Ecology Appraisal and Biodiversity Nett Gain Appraisal.](#)
- ☐ 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. [See Ecology Appraisal and Biodiversity Nett Gain Appraisal.](#)
- ☐ 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.](#)
- ☐ 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.](#)

Preferred

- ☐ Impermeable areas are shown in m² on the impermeable areas plan(s). [See Surface Water Drainage Statement Appendix 4.](#)
- ☐ Demarcated impermeable areas correspond with the distribution of those areas in the supporting calculations. [See Surface Water Drainage Statement Appendix 4 and Appendix 5.](#)

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.](#)
- ☐ 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 6.](#)
- ☐ 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 non residential.](#)
- ☐ 100% Annual Exceedance Probability [AEP] + Climate Change Allowance [CCA] (1 in 1 year) event calculations provided. [See Surface Water Drainage Statement Appendix 5.](#)
- ☐ 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.](#)
- ☐ 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 6.](#)
- ☐ 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 6.](#)

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 Sections 4.](#)
- ☐ 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 Sections 4 Appendix 5.](#)
- ☐ 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 101,201,202.](#)
- ☐ Existing site sections and levels. [See Drawings 102 and 103](#)
- ☐ Proposed site sections and levels. [See Drawings 101 and 401.](#)
- ☐ Long and cross sections for the proposed drainage system including final finished floor levels. [See drawings 201,202, 401, 501, 511, 512 and 513](#)
- ☐ Exceedance flow management routes. [See Surface Water Drainage Statement Appendix 7.](#)
- ☐ Details of connections to watercourses and sewers. [See drawings 201, 202, 501, 511,512 and 513.](#)
- ☐ 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. [See Proposed realigned ditch 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. [See Proposed realigned ditch 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, 501, 511,512 and 513.](#)
- ☐ 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, 501, 511,512 and 513.](#)
- ☐ All infiltration or attenuation features (including permeable paving) are clearly labelled with their dimensions, invert/base levels and cover levels. [See drawings 201, 202, 501, 511,512 and 513.](#)
- ☐ Control structures are labelled with discharge rates, hydraulic head, invert and cover levels and ideally model number. [See drawings 201, 202, 501, 511,512 and 513.](#)
- ☐ 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 Drawing 101 and Surface Water Exceedance Route Plan in Surface Water Drainage Strategy Appendix 7.](#)
- ☐ 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 Construction Details drawings 501, 511, 512 and 513.](#)

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 and 202 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.