# The Sizewell C Project

6.3 Volume 2 Main Development Site
Chapter 2 Description of the Permanent Development
Appendix 2A of the Environmental Statement:
Outline Drainage Strategy

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# Executive Summary

**Schedule 2** of the **Draft Development Consent Order** (Doc. Ref. 3.1(C)), requires that no part of the development may take place until details of the surface and foul water drainage system for that part (including management and maintenance arrangements, means of pollution control, sewage treatment works and a programme of construction and implementation) have been submitted by the undertaker and approved by the local planning authority, following consultation with the Environment Agency, Natural England and the drainage authority. The surface and foul water drainage proposals must be based on sustainable drainage principles and must be in accordance with this outline drainage strategy. Any approved surface and foul water drainage system must be constructed and maintained in accordance with the approved details. All general arrangement layouts shown in this document are indicative and subject to further consideration.

## Storm and surface water approach

This outline drainage strategy has been developed in such a way that it will not adversely affect the hydraulic performance of the existing environment, nor will it materially affect overland flow paths and will protect areas of Sizewell Marshes Site of Special Scientific Interest (SSSI) and other sensitive receptors.

The main drainage principle for the Sizewell C construction site is to mimic the existing environmental runoff patterns where possible. The outline drainage strategy has been developed in line with industry standards, guidance and best practice regarding the safe and sustainable management of surface water run-off.

The overarching surface water drainage philosophy will follow conventional Sustainable Drainage (SuDS) steps / hierarchy presented below, moving from each stage to the next only when the current stage is deemed not practicable within the Sizewell C Project:

- store rainwater for later use (e.g. rainwater harvesting);
- use infiltration techniques (e.g. porous surfaces, swales, trenches);
- attenuate rainwater in basins or open water features for gradual release;
- attenuate rainwater by storing in tanks for gradual release through an outlet; and
- discharge rainwater direct into watercourse or sea.

It is proposed that rainwater harvesting and reuse will form part of a holistic approach to surface water management, particularly in areas that will have a high-water demand such as the Accommodation Campus. The viability of rainwater harvesting will be assessed at detailed design stage as part of the design process. There is a variability of groundwater and strata across the Sizewell C construction sites including the main construction area (MCA), the temporary construction area (TCA), the Land East of Eastlands Industrial Estate (LEEIE) and the associated development sites, and as such each area has a flexibility to the approach taken and the approach has been adapted to suit each area.

### Strategic design criteria

The surface water drainage network will be designed to retain excess storm water which results from a 1 in 100-year return period rainfall event within the site, for both construction and operation phases.

## Surface water management

### Main Construction Area / Main Platform

The MCA will require provision of surface water drainage as soon as construction commences. The requirements will change with development and there will be a need to ensure flexibility over time to allow for transition from current undeveloped site, through construction drainage, to the permanent drainage network.

The operational power station site will be provided with a permanent surface water drainage network. It will be designed to drain all impermeable areas which will include roofs, roads, footpaths and car parks, and will discharge through the cooling water tunnel.

### Temporary Construction Area

The TCA is sub-divided into separate Water Management Zones (WMZs) where surface water would be managed in accordance with the uses within each of the WMZs, using SuDS techniques, infiltrating where possible. Detention basins within each WMZ would store excess runoff. Again, there will be a need to ensure flexibility over time to allow for transition from current undeveloped site, through construction drainage, and back to the former uses upon completion of construction.

### Land East of Eastlands Industrial Estate

The overarching strategy for the surface water run-off associated with LEEIE is storage with infiltration where possible.

Storage would be used to balance runoff from the LEEIE with outfalls to watercourses at greenfield rates. Extreme storm runoff will be attenuated in an attenuation pond within the main development site to the east of the LEEIE before release to the environment through infiltration or discharged at greenfield runoff rate.

### Associated Development sites

The strategy for the surface water run-off associated with the bypasses, access roads, Park and Ride and Freight Management Facilities uses the same SuDS techniques.

The strategy will drain the surface water run-off through infiltration techniques and ensure no additional rainwater runoff area is added to the site wide drainage system.

Where impervious surfacing is necessary, the outline drainage strategy is to convey run-off from these areas into either permeable paving systems (for the car park and laydown areas), infiltration trenches or into discrete soakaways located alongside the operational car parks.

## Foul water management

The overarching foul water outline drainage strategy provides conventional drainage through the steps / hierarchy presented below, moving from each stage to the next only when the current stage is deemed not practicable within the Sizewell C Project:

- Transfer flows to Treatment Works.
- Introduce local foul treatment package plant.
- Specialist low flow package plant.
- Tankering to works.

### Main Construction Area and Temporary Construction Area

The MCA and TCA will be served by temporary Sewage Treatment Plants. The treated effluent will be pumped to the Combined Drainage Outfall (CDO) from where it will discharge to sea.

The permanent sewage treatment plant will receive and treat all domestic foul water generated within the operational site. The treated effluent will be discharged to sea through the cooling water tunnel.

### Land East of Eastlands Industrial Estate

The preferred approach is for foul water to be conveyed to Anglian Water Services Leiston Water Recycling Centre should capacity be available. If no capacity is available, foul water could potentially be treated in or close to LEEIE with an outfall connected with Leiston Drain, as infiltration of treated foul water is not a viable solution at LEEIE due to poor infiltration. If this is not possible, the next option in the hierarchy, cess pits with tankering, will be considered.

## Associated development Sites

The Park and Ride sites and Freight Management Facilities are remote from the main development site. The current proposal is to introduce local package plants and to drain the effluent to ground through SuDS infiltration devices. There is no link to a local treatment plant as this would be the first option. Very low flow rates can impact on the functionality of a package treatment plant, and a low flow package treatment plant will be used if necessary. Tankering to works is an alternative option should the flow be insufficient for the low-flow package treatment plant.

# 1. INTRODUCTION

## 1.1 Purpose of outline drainage strategy

1.1.1 Schedule 2 of the **Draft Development Consent Order** (Doc. Ref. 3.1(C)), requires that no part of the development may take place until details of the surface and foul water drainage system for that part (including management and maintenance arrangements, means of pollution control, sewage treatment works and a programme of construction and implementation) have been submitted by the undertaker and approved by the local planning authority, following consultation with the Environment Agency, Natural England and the drainage authority. The surface and foul water drainage proposals must be based on sustainable drainage principles and must be in accordance with this outline drainage strategy. Any approved surface and foul water drainage system must be constructed and maintained in accordance with the approved details.

1.1.2 This report has been prepared to set out the site wide outline drainage strategy of the Sizewell C nuclear power station for submission with the application for development consent.

1.1.3 The scope of this outline drainage strategy is to provide the principles for drainage and foul water management at the main construction are (MCA), temporary construction area (TCA), Land East of Eastlands Industrial Estate (LEEIE), and associated development sites, in respect of both the construction and operational phases.

1.1.4 This outline drainage strategy primarily focusses on surface water disposal, but also encompasses foul water management and treatment. It has been developed following conventional industry standards, guidance and best practice regarding the safe and sustainable management of surface water run-off and foul drainage. The strategy has also been developed with specific consideration of site issues which would affect the feasibility of specific solutions, such as the availability of land and the nature of the subsoil (allowing for infiltration), the availability of foul drainage facilities (allowing for wastewater disposal emanating from the Accommodation Campus and Temporary Buildings during construction) and the normal operation of the site following completion of the construction phase.

1.1.5 This strategy specifically assesses the drainage requirements of the Sizewell C Project sites.

1.1.6 Water Management Zones (WMZ) have been proposed based on:

- the construction site layouts for the MCA, TCA, LEEIE, and associated development sites;
- information from ground investigations, including groundwater levels and infiltration rates;
- watercourse connectivity; and
- refinement of the design parameters such as the design return period.

1.1.7 This report identifies WMZs and covers the MCA, the TCA, the Accommodation Campus and the LEEIE. In addition, the report considers the outline drainage strategy of associated development sites consisting of road and rail schemes, park and ride sites and a freight management facility, to ensure a consistent approach across all areas is maintained.

1.1.8 Within this strategy, there is a move from generic infiltration and detention techniques, to flexible Sustainable Drainage System (SuDS) structures and contaminant management.

1.1.9 All general arrangement layouts shown in this document are indicative and subject to further consideration.

## 1.2 Background

### a) Proposed development

1.2.1 Sizewell C is a proposed power station located immediately to the north of the existing Sizewell B power station. The new nuclear power station would represent the Nationally Significant Infrastructure Project (NSIP) component of the proposed development.

1.2.2 The main development site is located 2km east of the town of Leiston. The main development site, as shown on **Figure 2A.1**, comprises predominantly undeveloped land with no significant development. The proposed development is within and adjacent to the Sizewell Marshes SSSI and is to the south of Minsmere to Walberswick Heaths and Marshes SSSI, Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site.[1] Careful consideration will therefore be given within the outline drainage strategy to mitigate any potential impact on all of the surrounding designated areas.

[1] https://www.rspb.org.uk/reserves-and-events/reserves-a-z/minsmere/

1.2.3 The main development site, as shown in **Figure 1.2** of **Volume 2** of the **Environmental Statement** (Book 6), comprises five components, which are described below:

- main platform / MCA: the area that would become the power station itself;
- Sizewell B relocated facilities and National Grid land: the area that certain Sizewell B facilities would be moved to in order to release Sizewell B land for the proposed development and the area required for the National Grid transmission network;
- offshore works area: the area where offshore cooling water infrastructure and other marine works would be located;
- TCA: the area located primarily to the north and west of the proposed Sizewell Marshes SSSI crossing, which would be used to support construction activity on the main platform; and
- Land East of Eastlands Industrial Estate (LEEIE): the area would be used to support construction on the main platform and TCA, with a new rail head being constructed.

1.2.4 Following completion of construction, the main development site will consist of permanent development as set out in **Chapter 2, Volume 2** of the **Environmental Statement** .

1.2.5 There are additional off-site developments associated with the construction on the main development site. These includes areas of habitat creation for fen meadow at Benhall and Halesworth, marsh harrier habitat improvement area at Westleton and the off-site sports facilities in Leiston. Further information on these works is provided within **Chapters 2** [APP-180] and **3** of **Volume 2** of the **Environmental Statement** [APP-184]. This strategy considers the requirements for drainage at the off-site sports facilities in Leiston. Habitat creation areas have not been specifically considered further within this strategy, as these works would be subject to site specific change in land and water management practices. Nevertheless, any surface water drainage required would follow the general principles set out within this strategy. And construction of these sites would require mitigation measures to manage stormwater and pollutants (e.g. suspended solids).

1.2.6 In addition, there are temporary and permanent Associated Development sites consisting of road and rail schemes, park and ride sites and freight management. The associated developments include the following:

- temporary park and ride facilities, including the northern park and ride at Darsham and southern park and ride at Wickham Market;
- temporary freight management facility at Seven Hills;
- permanent road infrastructure, including the two village bypass, Sizewell link road, a new roundabout at Yoxford and other highway improvements; and
- rail proposals, including the temporary rail extension route and permanent improvements to the existing Saxmundham to Leiston branch line.

1.2.7 **Chapter 2** of **Volumes 3** to **9** of the **Environmental Statement** (Book 6) provide further information on the associated developments.

### b) Sizewell B relocated facilities works

1.2.8 A hybrid planning application for the relocation, demolition and replacement of a number of existing Sizewell B facilities (known as the Sizewell B relocated facilities works) was submitted to East Suffolk Council (ESC) in April 2019 (application ref. DC/19/1637/FUL) and planning permission for these works was granted on 13 November 2019. The Drainage Strategy and Drainage Strategy Addendum submitted with this application is provided in **Annexes 2A.1** and **2A.2** of this document.

1.2.9 As the Sizewell B relocated facilities works are critical elements to facilitate the construction of Sizewell C, the proposals for these facilities are also included in the application for development consent and have been considered to form part of the Sizewell C Project in this document.

1.2.10 The Sizewell B relocated facilities works included within the DCO are the same as consented by ESC under the Town and Country Planning Act 1990. However, since the preparation of the Sizewell B relocated facilities ES, two changes to the design proposals have been made and are included within the DCO, as these formed planning conditions to the permission granted by ESC:

- A footpath between the proposed outage car park at Pillbox Field and Coronation Wood development area has been removed from the design to prevent loss of land within the Sizewell Marshes SSSI, which would have been required for the construction of the footpath.

- An alternative junction arrangement for outage car park access and Sizewell Gap road has been developed to minimise effects on road safety.

1.2.11 Sizewell B lies to the south of Sizewell C. A number of existing Sizewell B power station ancillary buildings need to be relocated from the area of land that is nominated as a potentially suitable site for the development of the Sizewell C new nuclear power station – the Sizewell B relocated facilities. Full details of the drainage strategy can be found in **Annexes 2A.1** and **2A.2**.

1.2.12 The Sizewell B relocated facilities have a broad range of functions including industrial, workplace, education, cultural and infrastructure; some of which need upgrading to comply with current standards and requirements.

1.2.13 The Sizewell B relocated facilities drainage strategy is consistent with that of Sizewell C and has also been developed with specific consideration of site issues which would affect the feasibility of specific solutions, such as the congestion of the below ground space on site, availability of existing drainage features, and the nature of the subsoil.

## 1.3 Glossary

| Term / Abbreviation | Definition |
|---|---|
| AD | Associated Development |
| AEP | Annual Exceedance Probability |
| AGP | Artificial Grass Pitch |
| AOD | Above Ordnance Datum |
| CDO | Combined Drainage Outfall |
| CESWI | Civil Engineering Specification for the Water Industry |
| CIRIA | Construction Industry Research and Information Association |
| CKD | Combined Kerb Drain |
| DMRB | Design Manual for Roads and Bridges |
| EDRMS | Electronic Document and Records Management System |
| EP | Environmental Permit |

| Term / Abbreviation | Definition |
|---|---|
| ESIDB | East Suffolk Internal Drainage Board |
| FEH | Flood Estimation Handbook |
| FRA | Flood Risk Assessment |
| FSR | Flood Studies Report |
| HAJ | Construction Sewage Treatment Plant (TBC) |
| HPC | Hinkley Point C |
| HXE | Permanent Sewage Treatment Plant |
| LEEIE | Land East of Eastlands Industrial Estate |
| LLFA | Lead Local Flood Authority |
| MCA | Main Construction Area |
| MCERT | EA Monitoring Certification Scheme |
| MCHW | Manual of Contract Documents for Highway Works |
| MUGA | Multi Use Games Area |
| NPPF | National Planning Policy Framework |
| ONR | Office for Nuclear Regulation |
| OS | Ordnance Survey |
| SfA | Sewers for Adoption |
| SSSI | Site of Special Scientific Interest |
| SuDS | Sustainable Drainage System |
| SZA | Sizewell A power station |
| SZB | Sizewell B power station |
| SZC | Sizewell C power station |
| TCA | Temporary Construction Area |
| TMO | Temporary Marine Outfall |
| WIMES | Water Industry Mechanical and Electrical Specification |
| WMZs | Water Management Zones |
| 0SEH | Permanent Local Oily Water Drain |
| 0SEO-EP | Permanent Surface Water Drain |

| Term / Abbreviation | Definition |
|---|---|
| 0SEO-EU/EV | Permanent Foul Water Drain |

# 2. STRATEGY APPROACH

## 2.1 Summary of strategy

2.1.1 This outline drainage strategy has been developed in such a way that it will not adversely affect the hydraulic performance of the existing environment. The approach proposed will mitigate adverse impacts on overland flow paths.

2.1.2 The main drainage principle is to mimic the existing environmental runoff patterns where possible. This outline drainage strategy has been developed in line with industry standards, guidance and best practice regarding the safe and sustainable management of surface water run-off.

2.1.3 The overarching surface water drainage philosophy provides conventional SuDS through the steps / hierarchy presented below, moving from each stage to the next only when the current stage is deemed not practicable within the Sizewell C Project:

- store rainwater for later use (e.g. rainwater harvesting);
- use infiltration techniques (e.g. porous surfaces);
- attenuate rainwater in ponds or open water features for gradual release;
- attenuate rainwater by storing in tanks for gradual release through an outlet; and
- discharge rainwater direct into watercourse or sea.

2.1.4 It is proposed that rainwater harvesting forms part of a holistic approach to integrated water management, particularly in areas that will have a high-water demand such as the accommodation campus. The viability of rainwater harvesting will be assessed at the detailed design stage as part of the design process in order to maximize the economic benefit without compromising the sustainability of ecosystems.

## 2.2 Aim of the outline drainage strategy

2.2.1 The principal aim of this outline drainage strategy is to set out the guiding principles for functional drainage systems which will satisfy the legislative and policy requirements of regulators and relevant organisations including the Highways Authority, Lead Local Flood Authority, the Environment Agency and the Internal Drainage Board.

2.2.2 In addition, the approach will seek to satisfy the following criteria as detailed in Construction Industry Research and Information Association (CIRIA) 753, where reasonably practicable:

- control run-off at or close to where it hits the ground;
- reduce the rate of run-off leaving any part of the site and discharging to nearby watercourses (ditches, streams, rivers, sea etc.) to greenfield rates;
- use at, or near-surface drainage features wherever practicable, slowing the rate of run-off entering into below ground drainage attenuation;
- provide stages of water treatment;
- select and combine appropriate drainage features or SuDS components to suit site constraints;
- encourage habitats for wildlife in developed areas and opportunities for biodiversity enhancement; and
- contribute to the ecology and aesthetic value of developed areas.

2.2.3 This strategy demonstrates the variety of SuDS components and design options available allow the Designer to consider local land use, land take, and future management scenarios.

2.2.4 Active design decisions can be taken to balance the interests of different stakeholders and the risks associated with each design option through consultation, and engagement.

## 2.3 Surface water flood risk design parameters

2.3.1 The surface water drainage networks for all proposed works will be designed to the following high level requirements, as set out in **Table 2.1.**

### Table 2.1: Design parameters

| Requirement | Description |
|---|---|
| **Design Storm** | Proposed designs to be based on Summer/Winter storm events from 15 minutes to 1440 minute duration. |
| **Return Period** | All return periods will have a climate change allowance applied, in accordance with the Environment Agency Guidance, to allow for anticipated changes in the peak rainfall intensity. |
| **Level of Protection** | Any flooding under extreme storm conditions will be directed to locations that avoid damage to critical structures or buildings. To identify these routes a detailed analysis of the digital terrain model needs to be combined with flow path analysis. |

#### a) Environment Agency requirements

2.3.2 As indicated in **Plate 2.1**, the Sizewell C site partially lies within Flood Zone 3, equating to land having a 1 in 100 or greater annual probability of river flooding; or land having a 1 in 200 or greater annual probability of sea flooding.

### Plate 2.1: Environment Agency flood map (rivers and sea)

2.3.3 Where the site is within Flood Zone 3, flood resilience measures are required, and the design of the development should keep water out as much as possible. The platform drainage on the MCA has taken this into consideration. The WMZs also provide compensatory area into which exceedance events may flow in a controlled manner. Drainage features should be located outside of fluvial floodplains where possible.

### b) Climate change allowance

2.3.4 In accordance with current Environment Agency guidance as shown in **Plate 2.2**, it is currently proposed that a 40% climate change allowance will be accommodated within the design of permanent works.

2.3.5 Infiltration basins within the TCA will be designed to cater for a 100 years flood event plus a 20% allowance for climate change. Flood relief basins will be designed to cater for a 100 years flood event plus a 40% allowance for climate change.

2.3.6 Car parking areas, access roads, Sizewell link road and the two village bypass will be designed in accordance with the Design Manual for Roads and Bridges (DMRB), British Standards and best practice guidance at the time of the design, including allowance for climate change.

**Plate 2.2: Peak rainfall intensity allowance in small and urban catchments (Environment Agency)[2]**

| Applies across all of England | Total potential change anticipated for the '2020s' (2015 to 2039) | Total potential change anticipated for the '2050s' (2040 to 2069) | Total potential change anticipated for the '2080s' (2070 to 2115) |
|---|---|---|---|
| Upper end | 10% | 20% | 40% |
| Central | 5% | 10% | 20% |

2 https://www.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386&extent=588430.6725%2C236967.2324%2C699555.8948%2C2

### c) The Environment Agency and Office for Nuclear Regulation Joint Advice Note

2.3.7 The Environment Agency and Office for Nuclear Regulation (ONR) have published a Joint Advice Note "Principles for Flood and Coastal Erosion Risk Management". The Advice Note sets out the requirements for the protection against flooding at nuclear power stations. Note that this applies only to the main development site, not the associated development sites.

2.3.8 In addition to a "fit for purpose assessment of flood risk", the Environment Agency and ONR require a FRA to include information on the potential for flooding due to pluvial, surface water, groundwater, high tides, storm surges and tsunamis; and the probability of failure of flood risk management measures, for example, blocked drainage channels, or the breach / over-topping of flood defences, and the associated consequences.

2.3.9 The design criteria for more typical events are included in **Table 2.2** below.

**Table 2.2: Surface water drainage parameters**

| Return Period (years) | Drainage Criteria | Description |
|---|---|---|
| 1 | No surcharging above outfall soffits | The highest probability event to be specifically considered to ensure that flows to the watercourse are tightly controlled for frequent events. This criterion aims to ensure the morphological conditions in the stream remain the same. |
| 30 | No surface flooding | A useful intermediary event for which to assess on-site system performance, because of its relevance for industry standard design. Surface water will be accommodated within SuDS structures. However, it will be ensured that the surface water level within the structure remains 0.3m below the top of the structure. |
| 100 | Controlled flooding to sacrificial external areas | Represents the boundary between high and medium risks of fluvial flooding defined in the NPPF. This limit recognises that it is not practicable to fully limit flows for most exceedance |

| Return Period (years) | Drainage Criteria | Description |
|---|---|---|
| | | events. Overland flow will be managed through existing and proposed surface topography to ensure that flood flows are directed away from critical site infrastructure. |
| >100 | Exceedance event | When the capacity of the surface water drainage network is exceeded, surface water runoff will cumulate on the surface and be removed by overland flow to lower areas. |

### d) National Planning Policy Framework and guidance

2.3.10 The NPPF sets out the Government's planning policies for England. The NPPF seeks to ensure that flood risk is considered at all stages of the planning and development process, to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk of flooding. Where there are no reasonably available sites in Flood Zone 1, the local planning authority can consider reasonably available sites in Flood Zone 2. Only when there are no reasonably available sites for development in Flood Zones 1 and 2 should the suitability of sites in Flood Zone 3 be considered.

2.3.11 In addition, the NPPF states that "*the development should be made safe for its lifetime without increasing flood risk elsewhere*". For a development to be considered acceptable with regards to flood risk, the Sequential Test requirements must be satisfied, along with demonstrating the development:

- within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
- is appropriately flood resistant and resilient;
- it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
- any residual risk can be safely managed; and
- safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

### e) Storm water management

2.3.12 Proposed drainage systems utilising various SuDS techniques will be designed to accommodate the predicted flows for all rainfall return periods listed above.

2.3.13 Industry standard WinDes 'Microdrainage' or similar will be used to assist the design of SuDS and any below ground pipework. Following the Flood Studies Report (FSR) method, using Sizewell, Suffolk as the location, an M5-60 and 'r' ratio of 18.2 mm and 0.4 respectively will be used to predict the various storms in which the drainage infrastructure will be subject to, including varying storm intensities and return periods.

2.3.14 During the Detailed Design Process the Hydrology for both FSR and the Flood Estimation Handbook (FEH) methods are used. FSR predominantly for detailed design and FEH13 for checking for exceedance and identifying flood channel routes.

### f) Attenuation

2.3.15 Where required, a simple model will be used to assess the preliminary attenuation storage and run-off volumes required. The proposal will be designed to cater for the 100-year critical event, with an additional allowance for allow for climate change. This is in accordance with current guidance from the Environment Agency.

2.3.16 The rate of discharge to any watercourse or drain will be limited to the equivalent greenfield run-off rate for the site, as appropriate to the existing undeveloped conditions, via the provision of storage and/or flow restrictors (e.g. hydro-brakes or similar). The flow control will constrain the rate of discharge, and attenuation storage will be employed when the rate of inflow from the storm runoff is greater than the subgrade infiltration rate or greenfield runoff rate.

### g) SuDS and infiltration structures

2.3.17 SuDS will be designed in accordance with CIRIA SuDS Manual (C753).

2.3.18 A factor of safety will be applied to the observed/assumed infiltration coefficient to account for any loss of efficiency over the design life of the soakaway

2.3.19 In accordance with CIRIA C753 the following factors will be used to account for possible loss of infiltration capacity through the design life of the system.

The following figures are not based on actual observations of performance loss.

2.3.20 Where an infiltration structure is proposed, a factor of safety dependent upon the consequence of failure, as indicated in **Table 2.3** will be assessed.

**Table 2.3: Factor of safety for infiltration systems**

| Size of area to be drained. | Consequences of failure. | | |
|---|---|---|---|
| | No damage or inconvenience. | Minor inconvenience (e.g. surface on car parking). | Damage to buildings or structures, or major inconvenience (e.g. flooding of roads). |
| < 100m2 | 1.5 | 2 | 10 |
| 100 – 1000 m2 | 1.5 | 3 | 10 |
| > 1000 m2 | 1.5 | 5 | 10 |

2.3.21 The Factor of Safety (FoS) is applied to the infiltration rate / permeability of the ground, to mimic any potential loss of performance over time. For example, a FoS of 1.5 applied to the assumed and conservative infiltration rate of 1 x 10-5 m/s, results in the following infiltration rate being used in calculations: (1 x 10-5) / 1.5 = 6.7 x 10-6 m/s.

2.3.22 To ensure the system's readiness to deal with a rainfall event, the infiltration rate from the system should be sufficient, so that the storage becomes half-empty within 24 hours. Where practicable, soakaways will be placed to ensure that the seasonally high groundwater table is at least 1m below the base of the soakaway. Infiltration systems will also be installed a minimum of 5m away from any foundations, including other underground structures.

## 2.4 SuDS maintenance

2.4.1 The types of construction recommended e.g. porous car-parks, infiltration structures etc. normally have a refurbishment requirement of between 20-30 years. The lifetime of the temporary associated development sites is 9-12 years and well within this timeframe. For operations at the main development site, the likely use of these structures is fairly light with a lot of roof drainage with sediment traps and thus the refurbishment in this case is likely to be of longer increment than usual.

2.4.2 Sufficient inspection and maintenance will be undertaken during the life of the SuDS features to ensure the condition of the permeable pavements, tree pits, infiltration trenches and/or other drainage or SuDS features remain viable. An allowance for maintenance and minor refurbishment should be programmed within the detailed designed process.

2.4.3 A SuDS Maintenance Plan will be compiled and completed in accordance with the SuDS Manual C753.

2.4.4 A Maintenance Plan ensures that all those involved in the maintenance and operation of the SuDS understand the functionality and maintenance requirements to support long-term performance to the design criteria to which they are designed.

2.4.5 Maintenance ensures efficient operation and prevents failure. As SuDS structures are on or near the surface, most can be managed using landscape maintenance techniques.

2.4.6 SuDS structures such as permeable paving and modular geocellular storage should be maintained in accordance with the advice from the manufacturer. This should include routine and long-term actions that can be incorporated into a maintenance plan.

2.4.7 **Table 2.4** is taken from CIRIA and provides a breakdown of typical maintenance requirements. This should include an overview of the design concepts and a maintenance schedule for the scheme to ensure that it continues to function as intended. Further information on maintenance can be found in The SUDS manual (CIRIA publication C753).

**Table 2.4: SuDS maintenance requirements**

| Maintenance Type | Indicative frequency. | Typical tasks. |
|---|---|---|
| Routine/regular maintenance. | Monthly (for normal care of SuDS). | litter picking.<br>grass cutting.<br>inspection of inlets, outlets and control structures. |
| Occasional maintenance. | Annually (dependent on the design). | silt control and removal around components.<br>vegetation management around components. |

| Maintenance Type | Indicative frequency. | Typical tasks. |
|---|---|---|
| | | suction sweeping of permeable paving.<br>silt removal from catch pits, soakaways and cellular storage. |
| Remedial maintenance. | As required (tasks to repair problems due to damage or vandalism). | inlet/outlet repair.<br>erosion repairs.<br>reinstatement of edgings.<br>reinstatement following pollution.<br>removal of silt build up. |

## 2.5 Contaminant management

### a) Contaminant management in runoff

2.5.1 Managing the quality of surface water runoff so that receiving waters and/or groundwaters are protected is intrinsically linked to the hydraulic control of runoff. SuDS treatment and pollution removal can work alongside conveyance, attenuation and infiltration, particularly within vegetated surface-based systems.

2.5.2 Any SuDS component will be designed according to the guidance set out in the technical component chapters of the CIRIA SuDS Manual to ensure that treatment processes are effective.

### b) Protecting surface water

2.5.3 The CIRIA SuDS Manual specifies that when discharging runoff from the site to surface waters, SuDS should be designed to intercept runoff (and the associated pollutants) for most rainfall events up to approximately 5 mm in depth.

2.5.4 When runoff does occur, treatment within SuDS components is essential for frequent rainfall events, for example up to a 1 in 1-year return period event, where contaminants are being mobilised and washed off impermeable surfaces, and the aggregated contribution to the total pollutant load to the receiving surface water body could be greater.

2.5.5 For rainfall events greater than the 1 in 1-year event, where larger volumes of surface water are generated it is likely that the dilution available in receiving surface waters will be increased, and environmental risks will be reduced, however the treatment train processes recommended in the CIRIA manual will still be applied to runoff.

### c) Protecting groundwater

2.5.6 Groundwater pollution risk management will be considered for all runoff events for both storing runoff in the upper soil layers of SuDS components from where small amounts of water may infiltrate, and infiltrating significant volumes of runoff into the ground.

2.5.7 Advice on groundwater protection for England and Wales is provided in the Groundwater Protection Position Statements Guidance (Ref. 1.7) covering: requirements, permissions, risk assessments and controls (previously covered in Groundwater Protection: Principles and Practice[3]).

2.5.8 The CIRIA SuDS Manual advises that the risk posed by surface water runoff to groundwater is often low because of the protection afforded by the layers of unsaturated soils that lie between the infiltration surface and the groundwater receptor.

2.5.9 The effectiveness of the protection will depend on the depth of the groundwater, the predominant flow type, and the soil characteristics.

2.5.10 A greater depth of unsaturated soil, intergranular flow, and soils with significant clay mineral and organic content have been demonstrated to offer increased potential for beneficial contaminant attenuation.

2.5.11 Where the risks to groundwater are considered to be unacceptable, upstream (lined) SuDS components can be used to reduce pollutant levels. If the risk is still considered unacceptable, infiltration should be prevented.

2.5.12 This report assesses groundwater at the main development site in greater detail.

### d) Treatment

2.5.13 There are a range of water quality treatment processes that can be utilised within the design of SuDS: sedimentation, infiltration and biofiltration, separation, adsorption, biodegradation, volatilisation, precipitation, hydrolysis, oxidation, reduction and substitution, plant uptake and photolysis.

[3] https://www.gov.uk/government/publications/groundwater-protection-principles-and-practice-gp3

2.5.14 The effectiveness of each treatment is linked to the control of runoff both in the velocity of flow and in the retention time. Controlling velocity affects sediment deposition, filtration and other similar processes occurring at low flow velocities during regular rainfall events up to the 1 in 1-year event.

2.5.15 Contaminant removal occurs through settling, adsorption and other similar processes occurring over in the time that the runoff is in contact with the SuDS such as a swale, a bioretention system, or held within a basin/pond. It is also dependent on the qualities of any materials through which the runoff is filtered.

2.5.16 The proposed SuDS to be constructed across the Sizewell C sites are indicated inthis report. The detail for each WMZ and associated development site will be developed at the detailed design stage.

### 2.6 Foul water management

2.6.1 The outline foul drainage strategy provides conventional drainage through the steps / hierarchy presented below, moving from each stage to the next only when the current stage is deemed not practicable within the Sizewell C Project:

- Transfer flows to Treatment Works.
- Introduce package plant.
- Specialist low flow package plant.
- Tankering to works (Cess Pits).

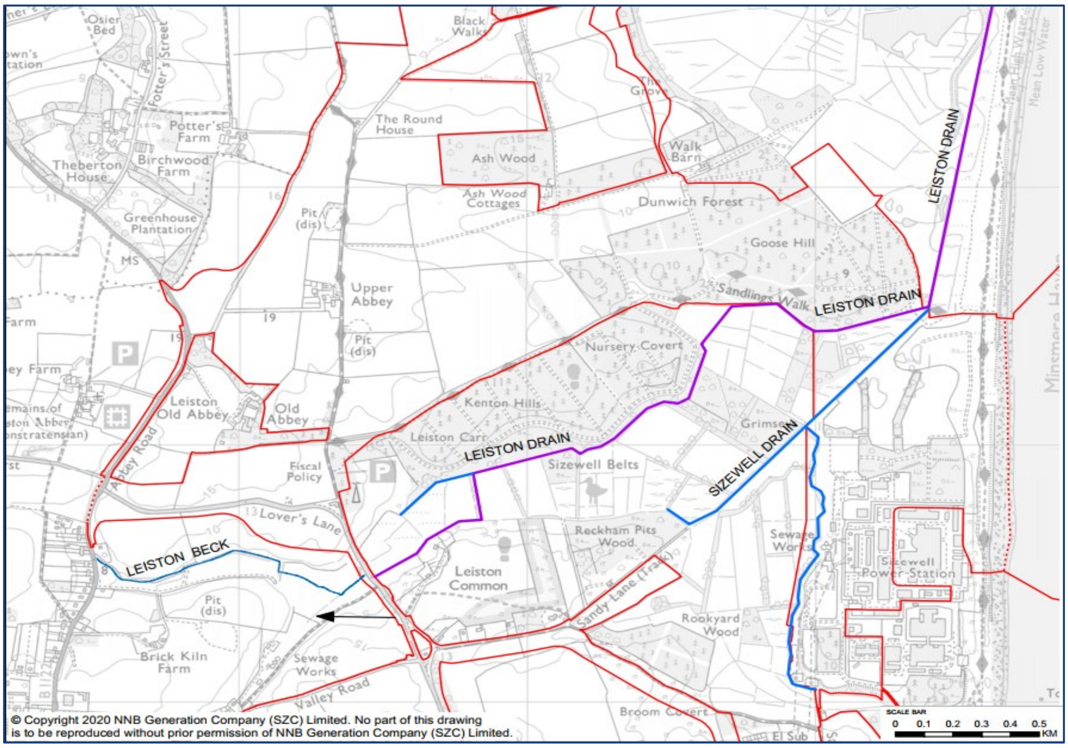
# 3. MAIN DEVELOPMENT SITE

### 3.1 Overview of current local drainage

3.1.1 With the exception of the part of the MCA which is currently occupied by ancillary Sizewell B buildings, the land within the construction site boundary is currently undeveloped and as a result has natural, greenfield drainage. Some rainfall will percolate into the ground contributing to groundwater recharge and some will discharge to natural watercourses, via surface water overland flow.

3.1.2 The surface land drainage features shown on the ordnance survey (OS) 1:25,000 scale mapping in **Plate 3.1** shows that within the site boundary is a small length of Leiston Drain which passes through the gap between the MCA and TCA, and Sizewell Drain which passes through the footprint of the MCA. The Leiston Drain (Main River) and Ordinary Watercourses are indicated in **Plate 3.1**.

**Plate 3.1: Existing drainage features**



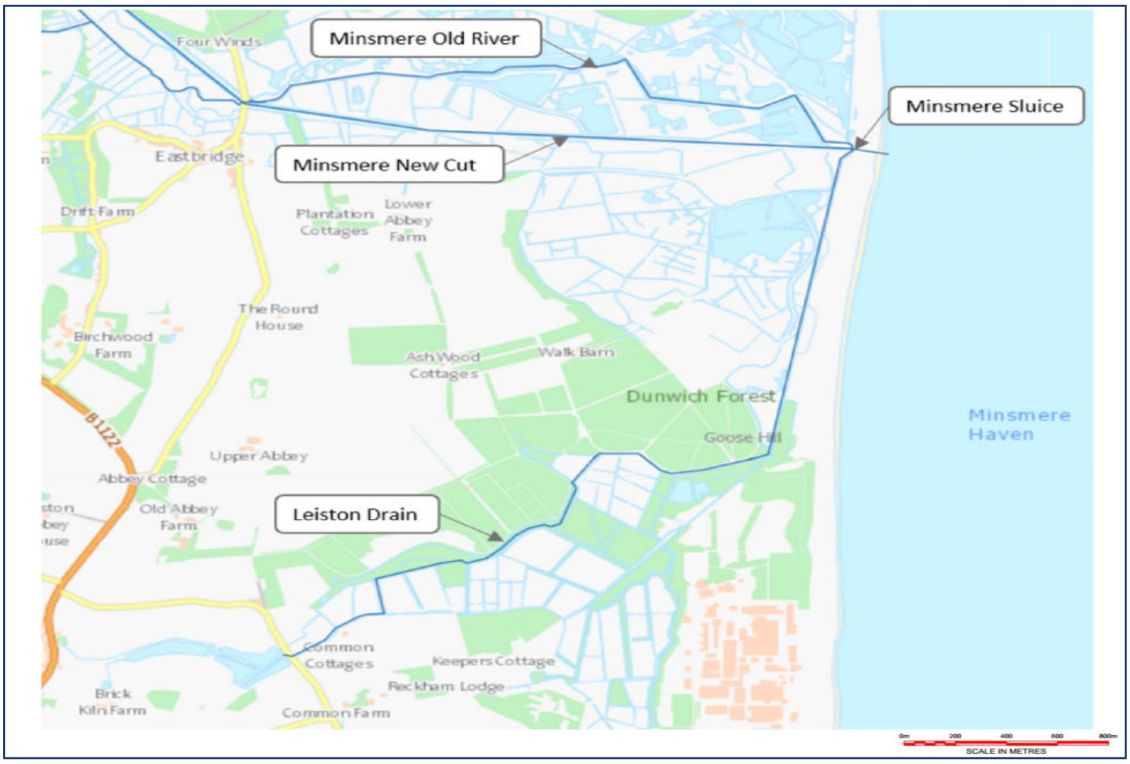

3.1.3 Indicative directions of the surface water overland flow paths, based on general topography and ground levels, are shown in **Figure 2A.2**.

3.1.4 The low-lying areas, forming Sizewell Marshes SSSI and part of the MCA footprint, are part of the floodplain for Leiston Drain and Sizewell Drain. Flood maps produced by the Environment Agency show the extent of land adjacent to watercourses that is flooded due to river flooding during a 1 in 100-year return period rainfall event or 1 in 200 (undefended) coastal flooding events. This extent is known as Flood Zone 3.

3.1.5 The Minsmere River is to the north of and outside of the site boundary. This discharges to sea via the Minsmere Sluice which controls outflow from watercourses to sea whilst preventing large scale backflow from the sea.

3.1.6 **Plate 3.2** indicates the statutory Main Rivers, showing the locations of the Minsmere Old River, the Minsmere New Cut and the Leiston Drain.

**Plate 3.2: Statutory Main River map taken from Environment Agency mapping – ARC GIS Service[4]**




## a) Minsmere River and Minsmere Sluice

3.1.7 Minsmere River discharges to sea via the Minsmere Sluice. The sluice is divided into two chambers, each with its own gravity outlet culvert. The northern chamber receives flows from the Minsmere New Cut, while the southern chamber receives flows from Leiston Drain and Scott's Hall Drain (Ordinary Watercourse). When river levels exceed sea levels, water flows from river to sea. When sea levels exceed river levels, flow will cease, and water is stored upstream of the sluice. Some ingress of seawater into the freshwater system has been factored into the operation.

3.1.8 No part of the TCA is currently drained to Minsmere River and under normal operation of Minsmere Sluice, there should be no flow from the main

4 https://www.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386&extent=588430.6725%2C236967.2324%2C699555.8948%2C295506.412%2C27700

development site / TCA catchments via Leiston Drain into Minsmere River. As a result, Minsmere River is not considered further as part of this strategy.

3.1.9 Any overland flow towards Minsmere River would be intercepted by ditches which connect to Leiston Drain in proximity to Minsmere Sluice. The FRA indicates that the impact of the development is low. It is also noted that due to changes of topography to create the construction platforms and the use of infiltration for removal of surface water runoff, it is not intended that there will be any future direct surface water discharge from the site during construction, north to ditches or to Minsmere River.

### b) Leiston Drain

3.1.10 Minsmere Sluice is the convergence point of Leiston Drain, Minsmere New Cut and Minsmere River. The source of Leiston Drain is located at the side of the B1122 (Abbey Road) adjacent to the site of Leiston Abbey. This local watercourse runs alongside the west side of the road before passing into a culvert at the entrance to Leiston.

3.1.11 Leiston Drain issues from the culvert downstream of Abbey Road and runs through the Aldhurst Farm area to the north of Leiston before passing under Lover's Lane in a culvert to discharge into the Sizewell Marshes SSSI. The Leiston Sewage Treatment Works discharges treated final effluent into Leiston Drain via a ditch, upstream of Lover's Lane. During dry weather, the treated final effluent flows form a significant proportion of base flow. The urban areas of Leiston also discharge surface water into Leiston Drain via the public surface water sewer network.

3.1.12 Downstream of Lover's Lane, Leiston Drain splits into two separate channels. The northern channel is the main channel, classified as Main River by the Environment Agency. The southern channel is classified as a ditch.

3.1.13 The area between the two channels is a flat low-lying wetland area forming Sizewell Marshes SSSI and maintained by Suffolk Wildlife Trust on behalf of SZC Co. The OS 1:25,000 scale mapping in **Plate 3.1** shows a complex series of ditches within this area. However, these ditches not only drain the area but are used to control groundwater levels required to maintain the ecology of the SSSI. At the eastern end of Sizewell Marshes SSSI the two channels re-join before passing through a narrow gap between the proposed MCA platform to the south and Goose Hill (proposed TCA platform) to the north. Leiston Drain then turns north running through a wide low flood plain, parallel to the sea defence bund outfalling to Minsmere Sluice. Under normal operation there is no direct interconnection between Minsmere River and Leiston Drain at the sluice. Leiston Drain discharges to sea via a separate outfall independently from Minsmere River. However, the Leiston Drain outfall is shared by the Scotts Hall Drain which connects from the north. This drains to the RSPB Minsmere Nature Reserve (SSSI, Special Area of Conservation, Special Protection Area and Ramsar).

3.1.14 It is intended that by implementing this outline drainage strategy, through removal of surface water runoff by a combination of limiting flow to greenfield runoff rates and infiltration to ground, and subsequent permanent detailed drainage strategy, that no adverse changes due to development will be observed at Minsmere Sluice/Scotts Hall Drain. The drainage system will include flexible design measures whereby water movement can be influenced if required.

3.1.15 Much of the TCA and the entire MCA are located within the Leiston Drain catchment. A surface water drainage system will drain the TCA and surface water will either infiltrate into the ground or discharge to Leiston Drain at greenfield runoff rates after any contaminant removal treatment has taken place. A surface water drainage network will drain the MCA but will discharge to sea via the Combined Drainage Outfall (CDO).

3.1.16 There is a separate construction site known as Land to the East of Eastlands Industrial Estate (LEEIE) at Leiston. This falls within the Leiston Drain catchment.

### c) Sizewell Drain

3.1.17 Sizewell Drain is a tributary of the Leiston Drain connecting to it at the narrow gap between the proposed MCA site platform to the south and Goose Hill (proposed TCA) to the north. In **Figure 2A.3**, the MCA site is to the east of Sizewell Drain and south of Leiston Drain. This currently discharges runoff to Sizewell Drain but will not do so when construction takes place. It is classified as an East Suffolk Internal Drainage Board (ESIDB) ditch reference DRN163G0202.

3.1.18 OS 1:25,000 scale mapping in **Figure 2A.3** shows it as issuing immediately to the north of the Sizewell Gap road and then running in a defined watercourse along the western boundary with Sizewell A and Sizewell B. However, as part of a scoping investigation for the development of the FRA hydraulic model, it was found that the Sizewell Drain's source is much further north and runs through a wetland such that the channel is not fully defined. At its northern extent there is a complex series of ditches which link in with those connecting to the Leiston Drain.

## 3.2 Impact of development on local drainage

### a) Flood Zones

3.2.1 The extent of area subject to flood risk is shown on the Environment Agency flood map, an extract of which is shown on **Plate 3.3** below[5].

**Plate 3.3: Environment Agency flood map extract**


3.2.2 The flood risk extent, categorised as Flood Zone 3, has been determined by Environment Agency hydraulic modelling. The area shown shaded light blue is at risk of flooding due to either a 0.5% Annual Exceedance Probability (AEP) (commonly referred to as a 1 in 200-year return period) coastal flooding event or a 1.0 % AEP (commonly referred to as a 1 in 100-year return period) fluvial (river) flooding event. For the purpose of development flood risk, it is irrelevant as to whether flooding is due to coastal or fluvial events, so the map does not distinguish source.

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5 "https://www.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386&extent=588430.6725%2C236967.2324%2C6

b) Main development site and flood risk

3.2.3 From a comparison of the extent of the construction site (shown in **Figure 2A.1**) and the currently assumed Flood Zone 3 (shown in **Plate 2.1** in this report), it is apparent that there is a potential intrusion on the Flood Zone which would imply risk of flooding and potentially a constraint to surface and stormwater management.

3.2.4 The National Planning Policy Framework (NPPF) provides that inappropriate development in areas at the greatest risk of flooding should be avoided. Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere. The **Main Development Site Flood Risk Assessment** [APP-093] provides further details on flood risk.

c) LEIEE and flood risk

3.2.5 The risk of flooding to areas adjacent to the site will be mitigated by provision of surface water management measures which will attenuate runoff from the site. The **Main Development Site Flood Risk Assessment** [APP-093] provides further details on flood risk.

d) SSSI crossing

3.2.6 The main access to Sizewell C will be via a permanent road from a roundabout junction with Abbey Road (B1122). This road would run west to east through the TCA and cross Leiston Drain and its adjacent floodplain on the SSSI crossing to access the MCA. Given the importance of early access to the main platform area, the SSSI crossing would be installed early in the construction programme.

e) Sizewell Drain diversion

3.2.7 Sizewell Drain will be diverted north. At its northern extent, it would discharge to the Leiston Drain upstream of the SSSI crossing. In addition, revised water level management may be required for the drainage units and watercourses adjacent to the construction site. This would require the inclusion of water level control structures along the realigned Sizewell Drain and the revised operation of other existing structures. see **Chapter 19, Volume 2** of this **ES** [APP-297] for further details.

## 3.3 Strategic water management

### a) Strategic design criteria

3.3.1 The drainage criteria are as follows:

#### i. Volume criteria

- Drainage facilities to provide no surface flooding from a 1 in 30-year return period rainfall event, in accordance with accepted guidelines, combining a range of techniques e.g. Infiltration systems, permeable paving and surface drainage structures to remove water from paved or semi-paved surfaces (e.g. storage areas) with no ponding for a 1 in 30-year rainfall event.
- Store or safely convey the run-off from exceedance storm events greater than 1 in 30-year return period, without putting public or property at risk.
- Reduce if possible, or at least not increase, the pre-development risk of flooding.
- Determine the impact and store on site the volume of water generated from a 1 in 100-year rainfall event to prevent escape into adjacent areas.

#### ii. Water quality criteria

- Remove / treat any contaminants within surface water runoff before discharge.

#### iii. Amenity and ecology criteria

- Provide amenity and ecological enhancement, if practicable.

#### iv. Sustainability criteria

- Protect the environment, minimise the use of finite natural resources and energy and provide value to those involved in its design, construction and operation.

3.3.2 A key design requirement of SuDS and drainage design for external paved areas is ‘interception’ – the capture and retention of the first 5mm of every rainfall event.

3.3.3 Rainfall run-off from external paved surfaces, such as car parks, laydown areas, material storage areas and roads, can contain a range of pollutants. The highest concentration of these pollutants tends to be found in run-off from the earliest part of a rain storm.

3.3.4 Intercepting the first 5mm of every rain storm has positive benefits for water quality and quantity, as such, interception will be implemented into the drainage approach wherever practicable.

3.3.5 Where necessary, appropriate oil/fuel controls, such as formal oil separators or through utilising effective SuDS principles, such as permeable paving, swales, etc., will be implemented into the surface water drainage networks. However, it is anticipated that these types of pollutant loads will be managed through physical interventions such as petrol, oil, diesel interceptors.

3.3.6 Groundwater levels, infiltration rates and ground conditions at the various proposed sites will be determined in order to propose a suitable drainage design. This drainage philosophy will make assumptions for these conditions and list them where applicable. Where practicable, the drainage system will emulate the current greenfield run-off characteristics.

3.3.7 For facilities that would be served by a direct drainage connection into the existing network, there will be no increase in flow rates or volumes compared to the existing conditions at the site. This will require formal confirmation with respect to the viability (condition and performance) of the existing drainage network. Assurance will be required that there is sufficient capacity to accommodate the anticipated surface water such that there is no increased risk of surface flooding. Affected existing pipework may need to be locally upgraded / upsized to accommodate any increased run-off volume, although no such network reinforcement is currently envisaged to satisfy this outline drainage strategy.

3.3.8 Flow controls will be incorporated where the surface water is proposed to be discharged into the existing site drainage network, to limit the discharge rate to the equivalent greenfield run-off rate up to a 1 in 1-year event.

### b) Construction drainage

3.3.9 The TCA has been divided into 10 WMZ catchments for the purpose of storm water management and disposal, and nine of these zones have been aggregated into three groups:

- Group 1 - WMZ-1, 2, 3 and 6 that discharge to both surface and groundwater.

- Group 2 – WMZ-4, 5 and 10 that discharge to groundwater only.
- Group 3 – WMZ-7, 8 and 9 that discharge to surface and tidal waters (MCA).

3.3.10 WMZ-9 is the MCA Deep Excavation.

3.3.11 All areas in Groups 1 and 2 would be returned to their former use upon completion of the construction phase.

3.3.12 On completion of construction, WMZ-7, 8 and 9 form part of the permanent site and these will be served by traditional piped systems.

3.3.13 The layout of these WMZs is shown in **Figure 2A.4**.

3.3.14 Each of these WMZs has been assessed and the recommended methods of surface water management for each WMZ consider the type of use in each sub-area of the construction site as well as considering its impact on the surrounding environment.

3.3.15 As well as managing runoff volume the strategy also considers pollutant loadings and these will be dependent on what the area is being used for.

3.3.16 In addition to managing the 30-year event the strategy considers the site resilience to extreme rainfall such as 100-year event and where the runoff will end up ensuring that the surrounding Sizewell Marshes SSSI and Minsmere Nature Reserve are not adversely affected.

3.3.17 Similarly, LEEIE has been assessed and the recommended methods of Surface Water Management for the LEIEE considers the type of use in each of the areas.

3.3.18 Each of the WMZs and the additional locations are appraised individually in this outline strategy, where the drainage principles and mitigation required in the design stage both during construction and for the permanent development are detailed.

3.3.19 There is variety of SuDS techniques proposed across the main development site. This is based on infiltration testing that shows the permeability has different features as you move further inland. The strategy allows for different types of approach to cater for these variations

3.3.20 The Site Entrance Hub will follow the same guidelines as laid out in this outline drainage strategy.

3.3.21 The Water Resource Storage Area is primarily an area for site water storage for a number of different uses, e.g. dust suppression, washdown areas, etc. This does not have direct links to the outline drainage strategy methods as it is predominantly water storage. Further details for the Water Resource Storage Area can be found in **Chapter 3 Volume 2** of the **Environmental Statement** [APP-184].

### c) Infiltration testing

3.3.22 Infiltration testing on the main development site has been carried out as part of previous investigations in 2014 and 2017, through both trial pits and boreholes. The approximate locations and indicative infiltration rates of these locations are shown in **Figure 2A.5**.

## 3.4 Water Management Zone assessment

3.4.1 The MCA and TCA have been divided into 10 WMZs (catchments for the purpose of storm water management and disposal). The WMZs have been further grouped according to their required drainage strategies.

3.4.2 This section outlines the specific drainage strategies to be applied to each of the proposed WMZ groups.

### a) Water Management Zones 1, 2 ,3 and 6 (Group 1)

3.4.3 These WMZs, which discharge by both controlled greenfield rate and infiltration, are shown in **Figure 2A.4.**

3.4.4 Prior to completion of the CDO, a Temporary Marine Outfall (TMO) will be required to allow surface water from the main construction area to discharge to the sea. The TMO would also provide redundancy for WMZs 1 and 2.

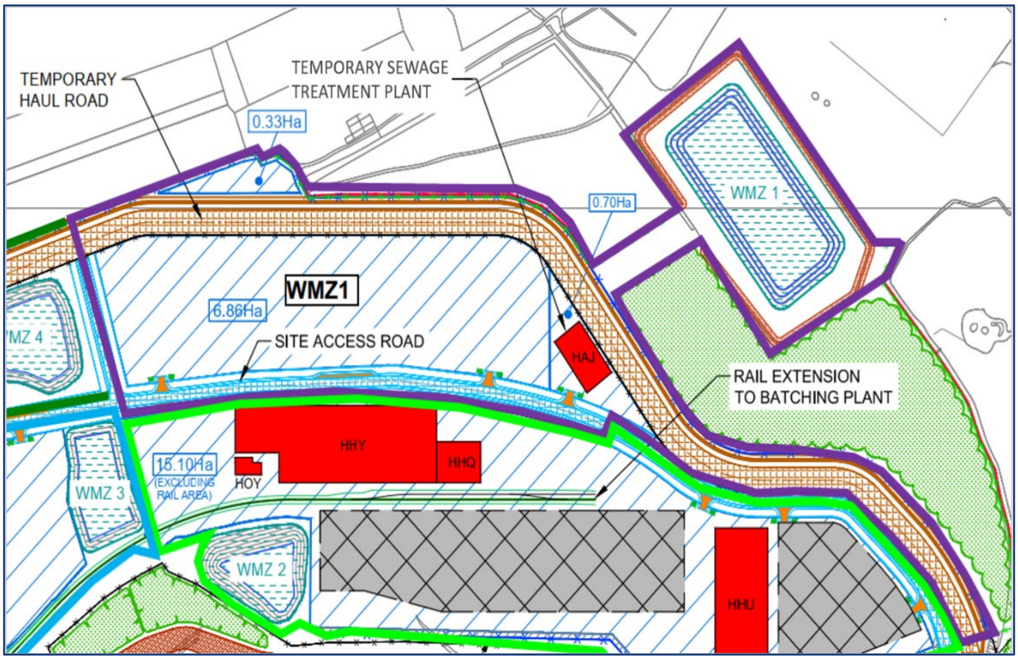
3.4.5 Surface water from the TCA would be collected, attenuated and discharged to ground or local watercourses under normal conditions. However, whilst the CDO is under construction, if the site is subject to an extreme storm or the receiving watercourses locally are inundated with surface water due to external factors, the TMO could be used to discharge surface water to sea. This offers additional protection to the Sizewell Marshes SSSI and Minsmere South Levels from excess volumes. Further details of the TMO can be found at paragraph 3.4.66.

3.4.6 The use of the outfall would not have a significant impact on the input for surface water into the Sizewell Marshes SSSI as it would be used only when there was excess water in the SSSI.

### i. Water Management Zone 1

3.4.7 WMZ-1, shown in **Plate 3.4**, indicatively serves the proposed temporary haul road during construction as well as part of the site access road. WMZ-1 also indicatively includes the Temporary Sewage Treatment Plant.

**Plate 3.4: Water Management Zone 1 (edged in purple)**




3.4.8 The proposed strategy is to drain the surface water run-off through infiltration techniques by directing the road surface run-off into suitably located gullies, which will subsequently convey the surface water into a detention basin which will allow infiltration.

3.4.9 It is proposed that surface water runoff in WMZ-1 be primarily managed via a roadside infiltration trench and/or swale. This will ensure that surface water is treated close to source.

3.4.10 Strategically located infiltration trenches within the WMZ would also be used to collect, convey and infiltrate surface water where appropriate, to avoid large volumes of overland flow.

3.4.11 The infiltration trenches will create temporary subsurface storage of stormwater runoff, thereby enhancing the natural capacity of the ground to store and drain water. Water will exfiltrate into the surrounding soils from the bottom and sides of the trench.

3.4.12 The detention basin that forms part of the design would be retained for exceedance storms and balancing excess volume that exceeds infiltration capacity, however ecological surveys indicate that the proposed location for the basin may encroach on a wildlife habitat. A change in its size/shape to avoid the habitat may be required at detailed design stage. A reduction in capacity would be compensated in swales and infiltration trenches that serve the WMZ, if required.

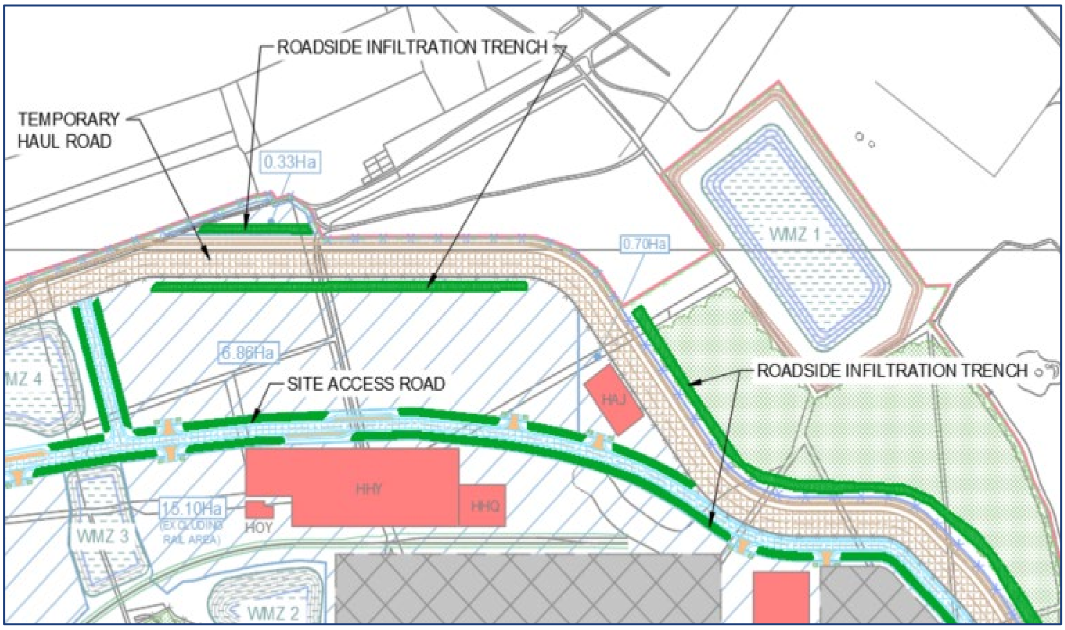
3.4.13 The site access road, where constructed to highways standards using impermeable surfacing, may drain via surface water gullies to the infiltration trenches/swales alongside the road, allowing storage and infiltration.

3.4.14 During construction, storm water runoff may have a high concentration of silts from fine particles contained within the soil or present on the surface of substrata. Over time this can blind the surface of the basin/pond or the faces or base of other structures such as porous surfaces or trenches. This can make them inoperable depending on the degree of silt contained in the runoff, therefore strategically positioned filters, semi-permeable barriers and settling forebays can be provided in the bigger structures. These can be cleaned out periodically thereby protecting the SuDS structures and runoff to watercourses.

3.4.15 Hydrocarbon loading from haul and access roads are common. Pollutant loads are managed within SuDS structures. Almost all the pollutant load is held within the fine particles in the runoff, removal of these fine particles may be carried out using proprietary measures should further treatment be necessary.

3.4.16 **Plate 3.5** indicates proposed techniques in WMZ-1 and **Table 3.1** sets out the surface water hierarchy for WMZ-1.

**Plate 3.5: Proposed techniques in Water Management Zone 1**




3.4.17 Some examples of infiltration trenches are shown below:

**Table 3.1: Surface water drainage hierarchy WMZ-1**

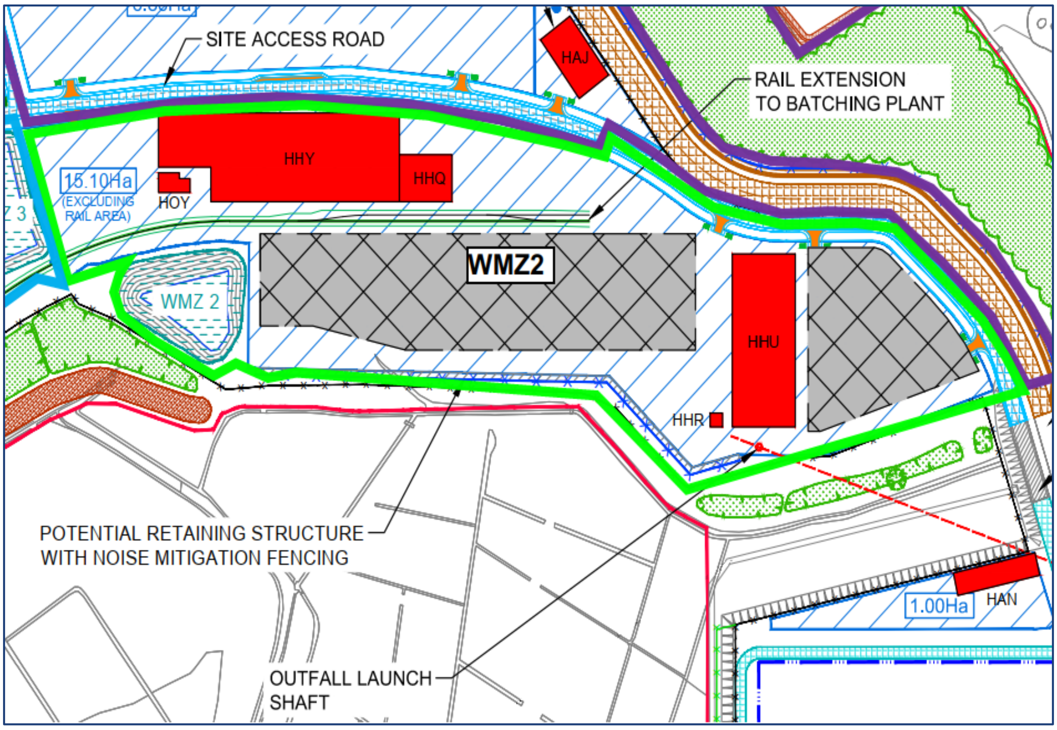
| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | X | No permanent occupancy therefore deemed to be not viable. |
| 2. Infiltration | ✓ | Surface water will infiltrate into the ground at source where possible through permeable surfacing. Additional run-off from the access road surface will be conveyed into infiltration trenches located alongside the proposed access and/or haul roads. Where required, silt interception systems will be in place due to the close proximity of the Sizewell Marshes SSSI. |
| 3. Attenuation (ponds, swales). | ✓ | Swales etc. would be incorporated along the boundary of the access road within the soft landscaping to provide support drainage for overflows. These would be used to collect, convey, infiltrate and attenuate run-off. Treated surface water that cannot infiltrate may runoff into local watercourses. |
| 4. Attenuation (tanks). | ✓ | A below ground attenuation tank with a volume sufficient to attenuate run-off and discharge into the site drainage network. These however will not generally be implemented as conventional infiltration is expected to provide an adequate solution. |
| 5. Discharge – watercourse. | ✓ | The Sizewell Marshes SSSI runs close to the site boundary, therefore direct discharge into any watercourses is deemed undesirable, due to strict |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| | | restrictions on the water quality of the run-off discharging into it.<br>If soakaways are deemed unviable following detailed design calculations, the surface water may be indirectly discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of hydrocarbons. |
| 6. Discharge – Surface Water drain. | **X** | Discounted - there are no known surface water drains in the vicinity. |
| 7. Discharge – Combined Sewer. | **X** | Discounted - there are no known combined sewers in the vicinity. |

### ii. Water Management Zone 2

3.4.18 During construction it is proposed that WMZ-2 will serve the Raw Water Storage, the Containment Liner Prefabrication Facility, the Concrete Batching Plant and the Common User Facilities Area. During construction, and upon completion, WMZ-2 would also indicatively serve part of the Site Access Road. It is proposed that the MCA car park would also be constructed within WMZ-2. WMZ-2 is indicated on **Plate 3.6**.

**Plate 3.6: Water Management Zone 2 (edged in green)**




3.4.19 The proposed strategy is to drain the surface water run-off through infiltration techniques by directing the road surface run-off into gullies, which will subsequently convey the surface water into a detention basin which will allow infiltration.

3.4.20 Other impermeable surfaces within WMZ-2 are also proposed to drain to infiltration structures located within the WMZ, as appropriate.

3.4.21 The car park that is to be constructed within the TCA, and remain following the construction phase for use when the site is operational, would be constructed using permeable surfacing where possible. To allow for infiltration, storage would need to be located beneath the car parking areas.

3.4.22 The ground investigation reports indicate that infiltration rates vary across the site and infiltration is possible in the vicinity of the car park. The underground storage systems will infiltrate to the ground at a rate depending on the characteristics of the underlining soil. Further ground investigations will indicate the expected infiltration rates and therefore the volumes of storage required.

3.4.23 It is proposed that the site access road, where constructed to highways standards using impermeable surfacing, may drain via surface water gullies to infiltration trenches/swales alongside the road, allowing storage and infiltration close to source.

3.4.24 The detention basin that forms part of the design would be retained for exceedance storms and balancing excess volume that exceeds infiltration capacity.

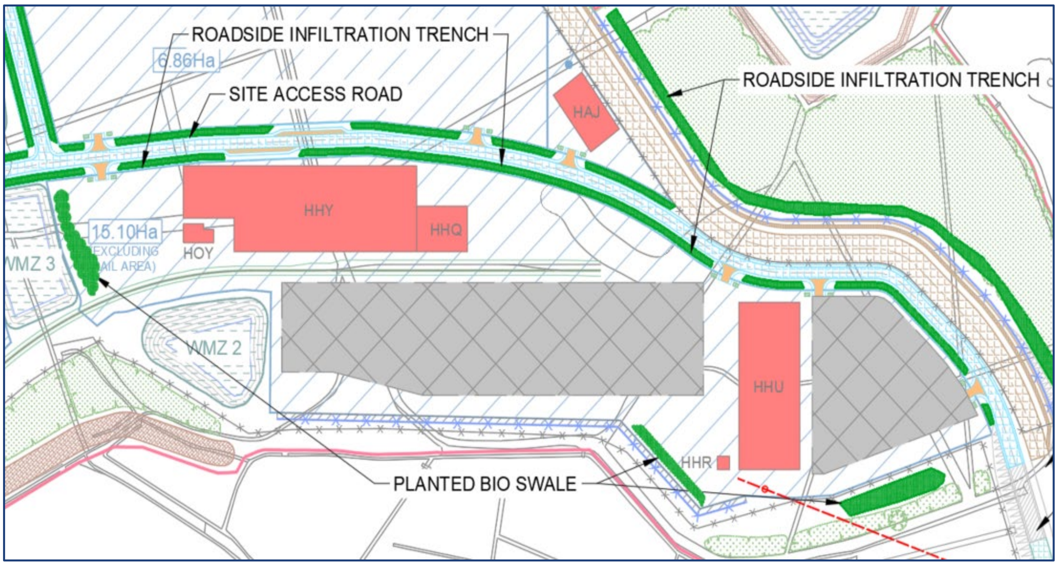
3.4.25 During construction, storm water runoff may have a high concentration of silts from fine particles contained within the soil or present on the surface of exposed substrata. Over time this can blind the surface of the basin/pond or the faces or base of other structures such as porous surfaces or trenches. This can make them inoperable depending on the degree of silt contained in the runoff.

3.4.26 The Concrete Batching Plant and the Containment Liner Prefabrication Facility will have a greater propensity for sulphate loading from concrete related activity.

3.4.27 It is recommended that any treatment is carried out as close to the potential pollution area as possible. SuDS features such as filter strips or planted/bio-swales may be used where appropriate, however where pollutant load is high, strategically positioned filters, semi-permeable barriers and settling forebays can be provided in the bigger structures which can be cleaned out periodically thereby protecting the SuDS structures or where discharge to watercourses are proposed.

3.4.28 Proposed techniques for WMZ-2 are indicated in **Plate 3.7** and the surface water drainage hierarchy is presented in **Table 3.2**.

### Plate 3.7: Proposed techniques in Water Management Zone 2




3.4.29 Some examples of planted swales are shown below:

### Plate 3.8: Examples of planted swales

### Table 3.2: Surface water drainage hierarchy WMZ-2

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | ✓ | No permanent occupancy, however viability would be assessed as part of the design process. |
| 2. Infiltration | ✓ | Surface water will infiltrate into the ground as close to the source as possible. |

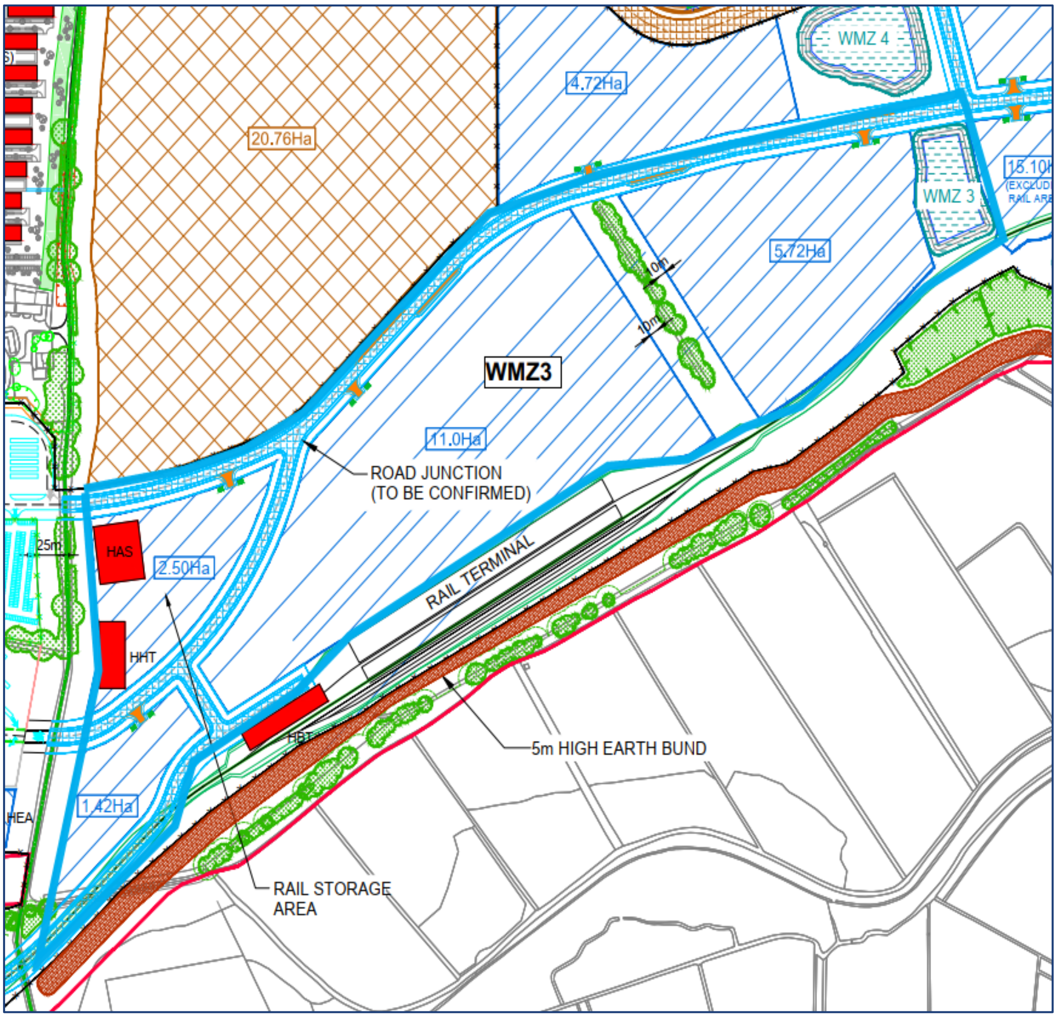
| Drainage Principle | Feasibility | Reason |
|---|---|---|
| | | Run-off from the access road surface will be conveyed into infiltration trenches located alongside the proposed access and/or haul roads. Where required, silt interception systems will be in place. The run-off from the Containment Liner Prefabrication Facility and the Concrete Batching Plant will be conveyed into planted or bioswales. Filtration and silt interception systems will be in place where required due to the close proximity. |
| 3. Attenuation (ponds, swales). | ✓ | Swales etc. would be incorporated along the boundary of the access road within the soft landscaping to provide support drainage for overflows. These will be used to collect, convey, infiltrate or attenuate run-off. |
| 4. Attenuation (tanks). | ✓ | Any below ground attenuation tank may need to be lined with an impermeable membrane to prevent groundwater ingress. Storage below car parking areas should have sufficient capacity to allow for the infiltration rates that are found at this location. |
| 5. Discharge – watercourse. | ✓ | The Sizewell Marshes SSSI runs close to the site boundary, therefore direct |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| | | discharge into any watercourses is deemed undesirable, due to strict restrictions on the water quality of the run-off discharging into it. Direct discharge into an open ditch or watercourse is not appropriate in this WMZ due to potential silt and contaminant load.<br>Surface water may be indirectly discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of silt and contaminant load. |
| 6. Discharge – Surface Water drain. | **X** | Discounted - there are no known surface water drains in the vicinity. |
| 7. Discharge – Combined drain.. | **X** | Discounted - there are no known combined sewers in the vicinity. |

### iii. Water Management Zone 3

3.4.30 WMZ-3 indicatively serves the proposed Site Access Road, the Temporary Works Construction Contractor's Areas and Main Forward TCA Site Office, as well as Railhead Facilities and a Rail Storage Facility, as shown on **Plate 3.9.**

**Plate 3.9: Water Management Zone 3 (edged in blue)**




3.4.31 The proposed strategy is to drain the surface water run-off through infiltration techniques by directing the road surface run-off into gullies, which will subsequently convey the surface water into a detention basin which will allow infiltration.

3.4.32 Other impermeable surfaces within WMZ-3 are also proposed to drain to the detention basin. Infiltration structures may be located within the WMZ as appropriate.

3.4.33 It is proposed that the site access road, where constructed to highways standards using impermeable surfacing, may drain via surface water gullies to infiltration trenches/swales alongside the road, allowing storage and infiltration close to source.

3.4.34 The detention basin that forms part of the design would be retained for exceedance storms and balancing excess volume that exceeds infiltration capacity.

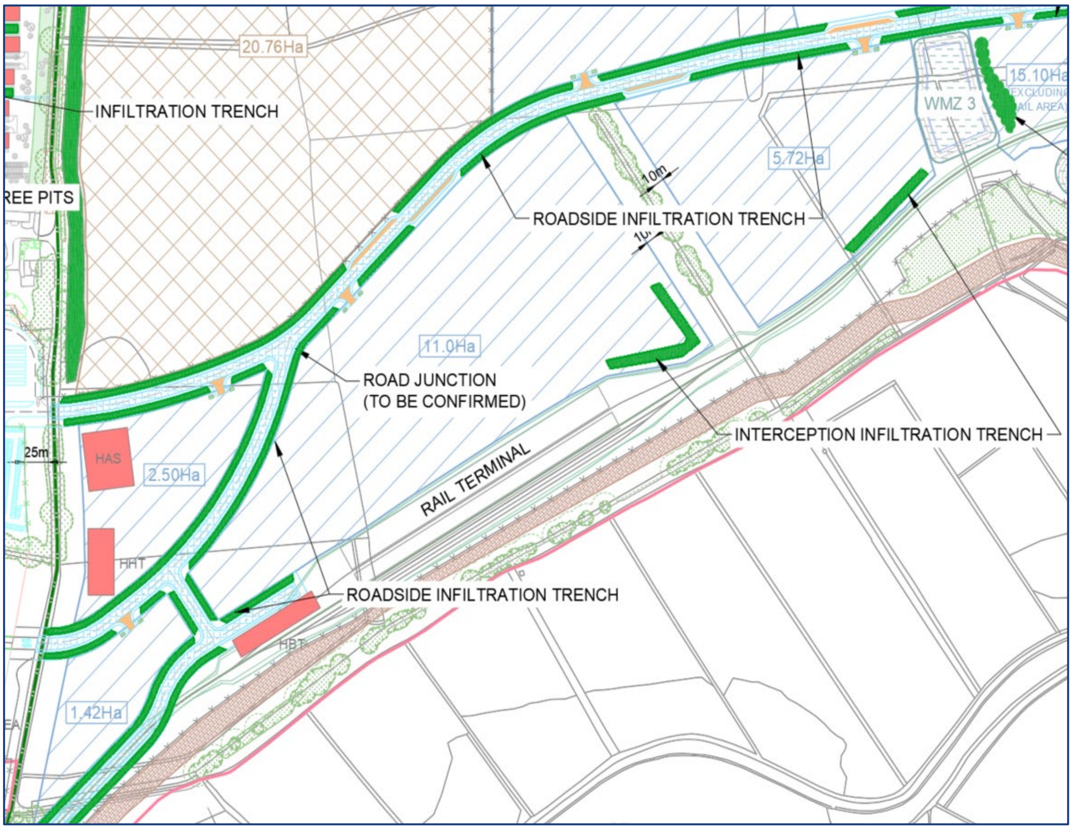
3.4.35 During construction, storm water runoff may have a high concentration of silts from fine particles contained within the soil or present on the surface of exposed substrata. Over time this can blind the surface of the basin/pond or the faces or base of other structures such as porous surfaces or trenches. This can make them inoperable depending on the degree of silt contained in the runoff.

3.4.36 Runoff from the Temporary Works Construction Contractors Areas and Main Forward TCA Site Office, during construction may again be drained via infiltration trenches, and where site use causes greater sediment load and/or pollutant load, filer strips and planted bio swales may be preferred.

3.4.37 Again, it is recommended that any treatment is carried out as close to the potential pollution area as possible. SuDS features such as filter strips or planted/bio-swales may be used where appropriate, however where pollutant load is high, strategically positioned filters, semi-permeable barriers and settling forebays can be provided in the bigger structures which can be cleaned out periodically thereby protecting the SuDS structures or runoff to watercourses are proposed.

3.4.38 Where the pollutant loads are managed within SuDS structures and the pollutant load is held within the fine particles in the runoff, removal of these fine particles may be carried out via Siltbuster or other similar treatment as required. Proposed techniques for WMZ-3 are indicated in **Plate 3.10** and the surface water drainage hierarchy is presented in **Table 3.3**.

### Plate 3.10: Proposed techniques in Water Management Zone 3




### Table 3.3: Surface water drainage hierarchy WMZ-3

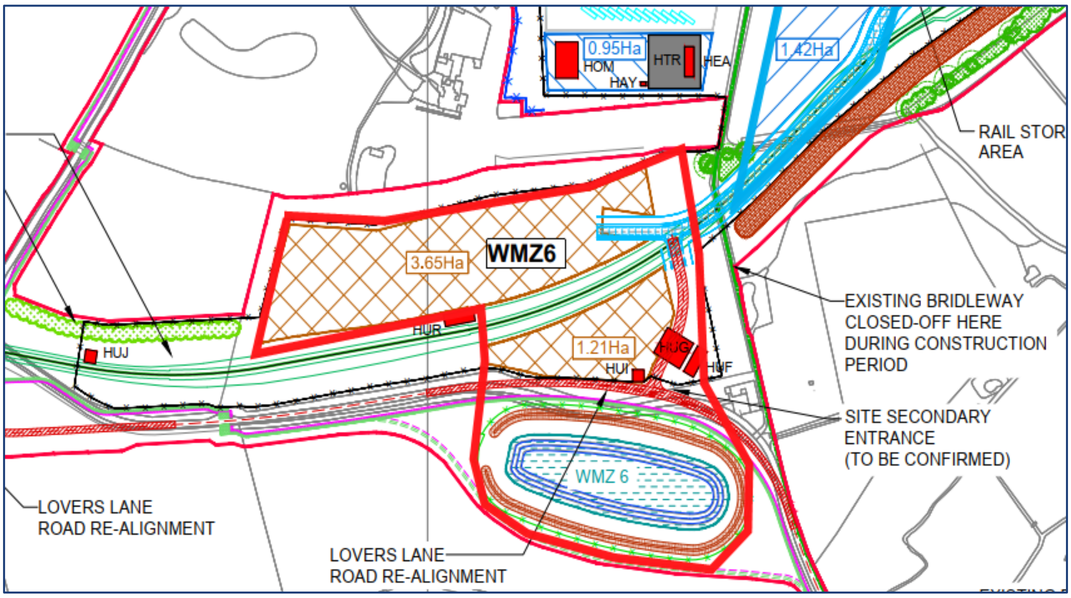
| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | ✓ | No permanent occupancy, however viability would be assessed as part of the design process. |
| 2. Infiltration | ✓ | Surface water will infiltrate into the ground as close to the source as possible. Run-off from the access road surface will be conveyed into infiltration trenches located alongside the proposed access and/or haul roads. Where required, silt interception systems will be in place due to the close proximity of Sizewell Marshes SSSI.<br>The run-off from the Temporary Works Construction Contractors Areas and Main Forward TCA Site |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| | | Office will be conveyed into filter strips and planted or bioswales where required. Filtration and silt interception systems will be in place where required. |
| 3. Attenuation (ponds, swales). | ✓ | Swales etc. would be incorporated along the eastern boundary of the access road within the soft landscaping to provide support drainage for overflows. These will be used to collect, convey, infiltrate or attenuate run-off. |
| 4. Attenuation (tanks). | ✓ | A below ground attenuation tank with a volume sufficient to attenuate run-off and discharge into the site drainage network. These however will not generally be implemented as conventional infiltration is expected to provide an adequate solution. |
| 5. Discharge – watercourse. | ✓ | A SSSI runs close to the site boundary, therefore direct discharge into any watercourses is deemed undesirable, due to strict restrictions on the water quality of the run-off discharging into it. Direct discharge into an open ditch or watercourse is not appropriate in this WMZ due to potential silt and contaminant load.<br>Surface water may be indirectly discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of silt and contaminant load. |
| 6. Discharge – Surface Water drain. | X | Discounted - there are no known surface water drains in the vicinity. |
| 7. Discharge – Combined drain. | X | Discounted - there are no known combined sewers in the vicinity. |

### iv. Water Management Zone 6

3.4.39 WMZ-6 indicatively serves the proposed Materials Storage Area, Security Cabin and Visual Inspection Cabin during construction, a shown on **Plate 3.11**.

**Plate 3.11: Water Management Zone 6 (edged in red)**




3.4.40 The proposed strategy is to drain the surface water run-off through infiltration techniques conveying surface water into a detention basin which will allow infiltration, as well as draining to local watercourses.

3.4.41 It was established that the access road drains to the ditch which runs parallel to Lover's Lane. This eventually connects with the Leiston Drain.

3.4.42 Impermeable surfaces within WMZ-6 are proposed to drain to the infiltration structures.

3.4.43 The Materials Storage Area would employ trench infiltration or swales to capture runoff locally and maximise the source control, allowing storage and infiltration close to source. These features may be sited strategically at the boundary of the Materials Storage Area so as not to reduce the space available. It is also possible to drain the impermeable surfaces of the Security Cabin and Visual Inspection Cabin to these same infiltration trenches.

3.4.44 The detention basin that forms part of the design would be retained for exceedance storms and balancing excess volume that exceeds infiltration capacity.

3.4.45 Where surface water cannot be conveyed to the infiltration structures, for example, south of the detention basin where the ground level is lower, it is proposed that the highway drains to the ditch system. The detention basin may also discharge to the ditch should infiltration rates be particularly poor. Proposed techniques for WMZ-6 are indicated in **Plate 3.12** and the surface water drainage hierarchy is presented in **Table 3.4.**

**Plate 3.12: Proposed techniques in Water Management Zone 6**

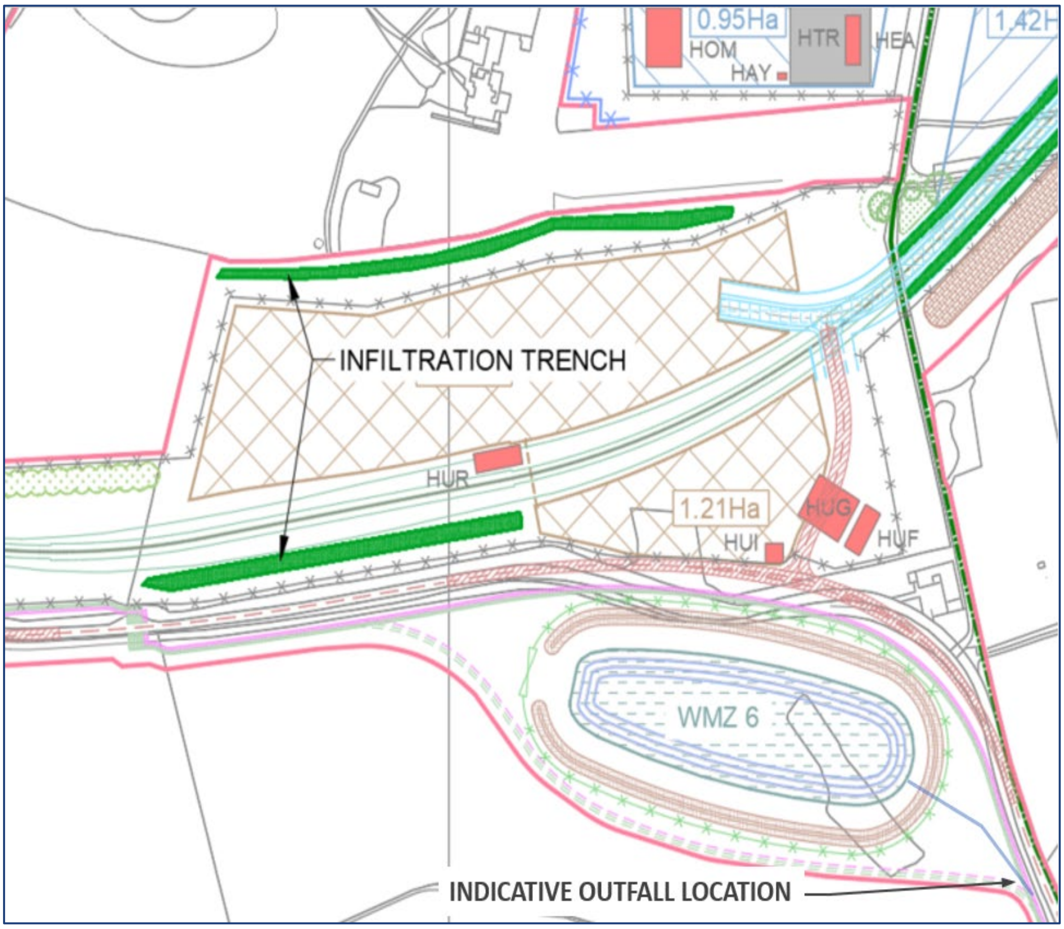



**Table 3.4: Surface water drainage hierarchy WMZ-6**

| Drainage Principle. | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | X | No permanent occupancy therefore deemed to be not viable. |

| Drainage Principle. | Feasibility | Reason |
|---|---|---|
| 2. Infiltration | ✓ | Surface water will infiltrate into the ground as close to the source as possible. Run-off from the access lane and the materials storage area will be conveyed into infiltration trenches located within the WMZ. Where required, filtration and silt interception systems will be in place.<br>Surface water run-off from high intensity events on the road surface will be conveyed via road gullies and below ground pipework to WMZ-6 located alongside the proposed access road. Oil / hydrocarbon / silt interception systems (I.e. SuDS treatment or formal oil separator) will be in place due to the close proximity of Sizewell Marshes SSSI. |
| 3. Attenuation (ponds, swales). | ✓ | Swales etc. would be incorporated along the boundary of the haul road and materials storage area within the soft landscaping to provide support drainage for overflows. These will be used to collect, convey, infiltrate or attenuate run-off. |
| 4. Attenuation (tanks). | ✓ | A below ground attenuation tank with a volume required to attenuate run-off and discharge into the site drainage network. This will not be adopted if conventional infiltration provides an adequate solution. |
| 5. Discharge – watercourse. | ✓ | Direct discharge into an open ditch or watercourse is not preferred due to potential silt and contaminant load, however |

| Drainage Principle. | Feasibility | Reason |
|---|---|---|
| | | it has been established that the road drains to the ditch which runs parallel to Lover's Lane. This eventually connects with the Leiston Drain<br>Surface water may be discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of silt and contaminant load. |
| 6. Discharge – Surface Water sewer. | X | Discounted - there are no known surface water drains in the vicinity |
| 7. Discharge – Combined sewer. | X | Discounted - there are no known combined sewers in the vicinity. |

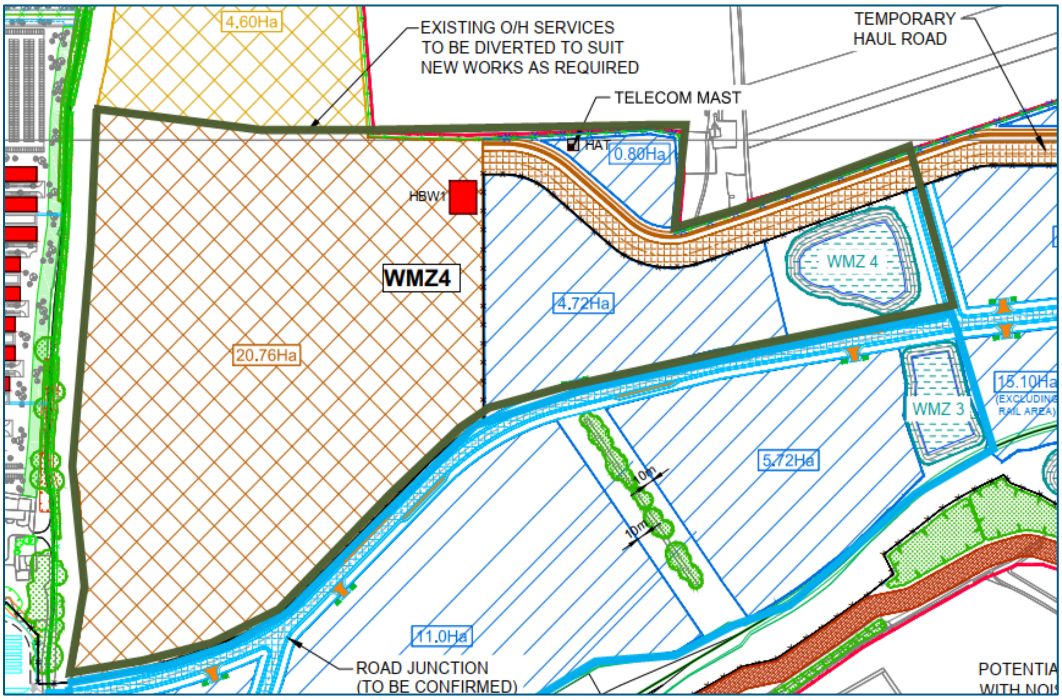
### b) Water Management Zones 4 and 5 (Group 2)

3.4.46 These WMZs are intended to discharge by infiltration only.

#### v. Water Management Zone 4

3.4.47 WMZ-4 indicatively serves the proposed temporary Haul Road and a Materials Storage Area during construction which is indicated on **Plate 3.13**. Proposed techniques for WMZ-4 are indicated in **Plate 3.14** and the surface water drainage hierarchy is presented in **Table 3.5**.

### Plate 3.13: Water Management Zone 4 (edged in green)



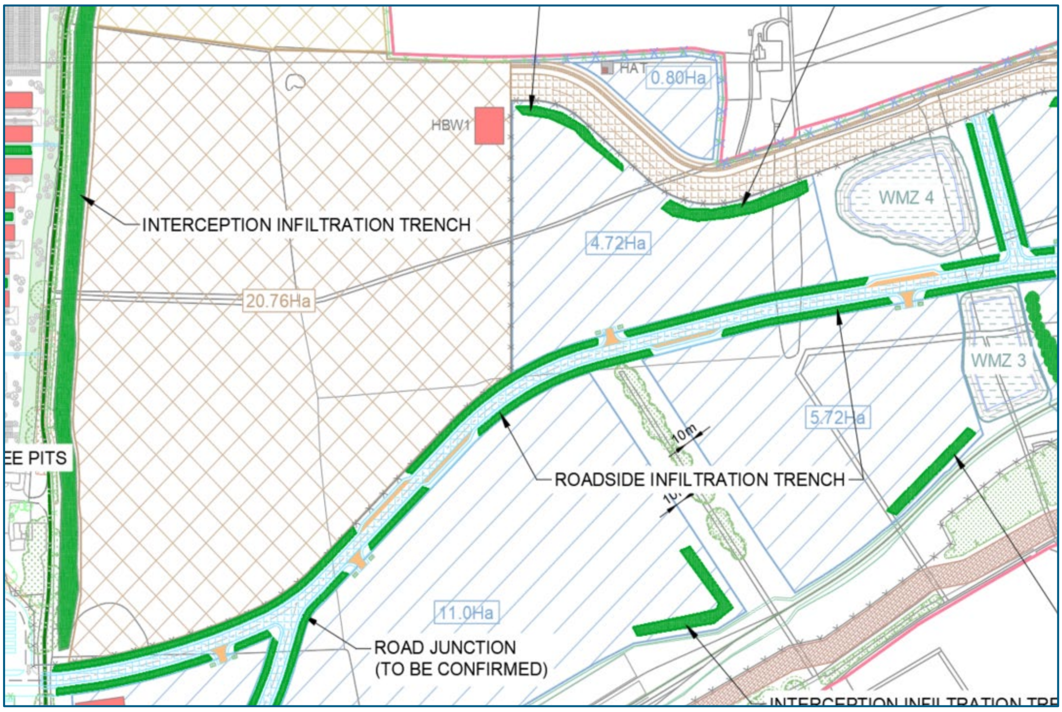

3.4.48 The strategy is to drain the surface water run-off through infiltration techniques.

3.4.49 Where the runoff for materials storage and are located the surface water would be managed by providing trench infiltration or swales to capture runoff locally and maximise the source control philosophy.

3.4.50 Surveys to date have indicated that infiltration is possible in this area and therefore conventional infiltration type drainage is expected to provide an adequate solution.

3.4.51 The detention basin that forms part of the design would be retained for exceedance storms and balancing excess volume that exceeds infiltration capacity.

### Plate 3.14: Proposed techniques in Water Management Zone 4




### Table 3.5: Surface water drainage hierarchy WMZ-4

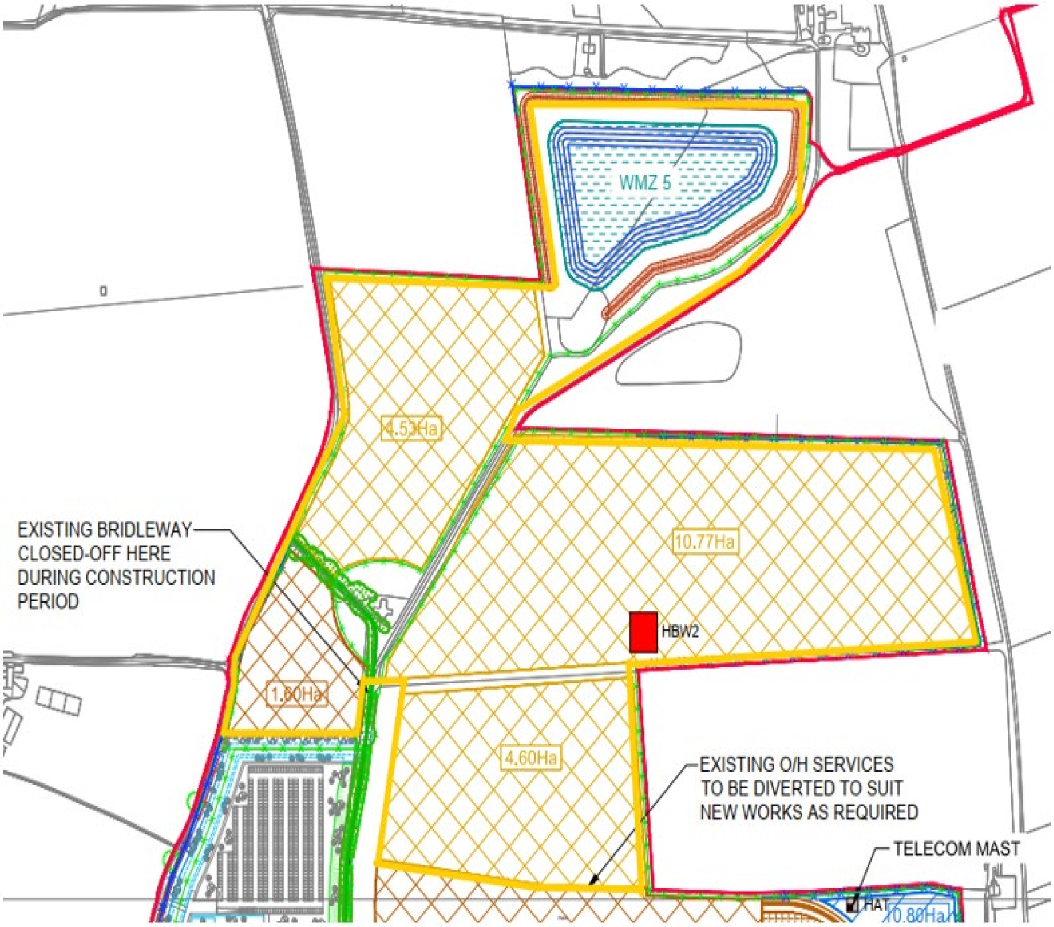
| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | X | No permanent occupancy therefore deemed to be not viable. |
| 2. Infiltration | ✓ | Surface water will infiltrate into the ground as close to the source as possible. Run-off from the access road and the materials storage area will be conveyed into roadside infiltration trenches located within the WMZ. Where required, filtration and silt interception systems will be in place. |
| 3. Attenuation (ponds, swales). | ✓ | Swales etc. would be incorporated along the boundary of the access road within the soft landscaping to provide support drainage for |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| | | excess flow. These can be used to collect, convey, infiltrate or attenuate run-off. |
| 4. Attenuation (tanks). | ✓ | A below ground attenuation tank of sufficient volume would be required to attenuate run-off and discharge into the ground. This is not expected as conventional infiltration is expected to provide an adequate solution. |
| 5. Discharge – watercourse. | X | Discounted - as conventional infiltration is expected to provide an adequate solution, a discharge into a watercourse is not deemed to be necessary. Direct discharge into an open ditch or watercourse is therefore not appropriate in this WMZ. |
| 6. Discharge – Surface Water sewer. | X | Discounted - there are no known surface water drains in the vicinity |
| 7. Discharge – Combined sewer. | X | Discounted - there are no known combined sewers in the vicinity. |

### vi. Water Management Zone 5

3.4.52 WMZ-5 indicatively serves the proposed borrow pit area and the temporary Site Welfare Facilities during construction as indicated on **Plate 3.15**.

**Plate 3.15: Water Management Zone 5 (edged in yellow)**

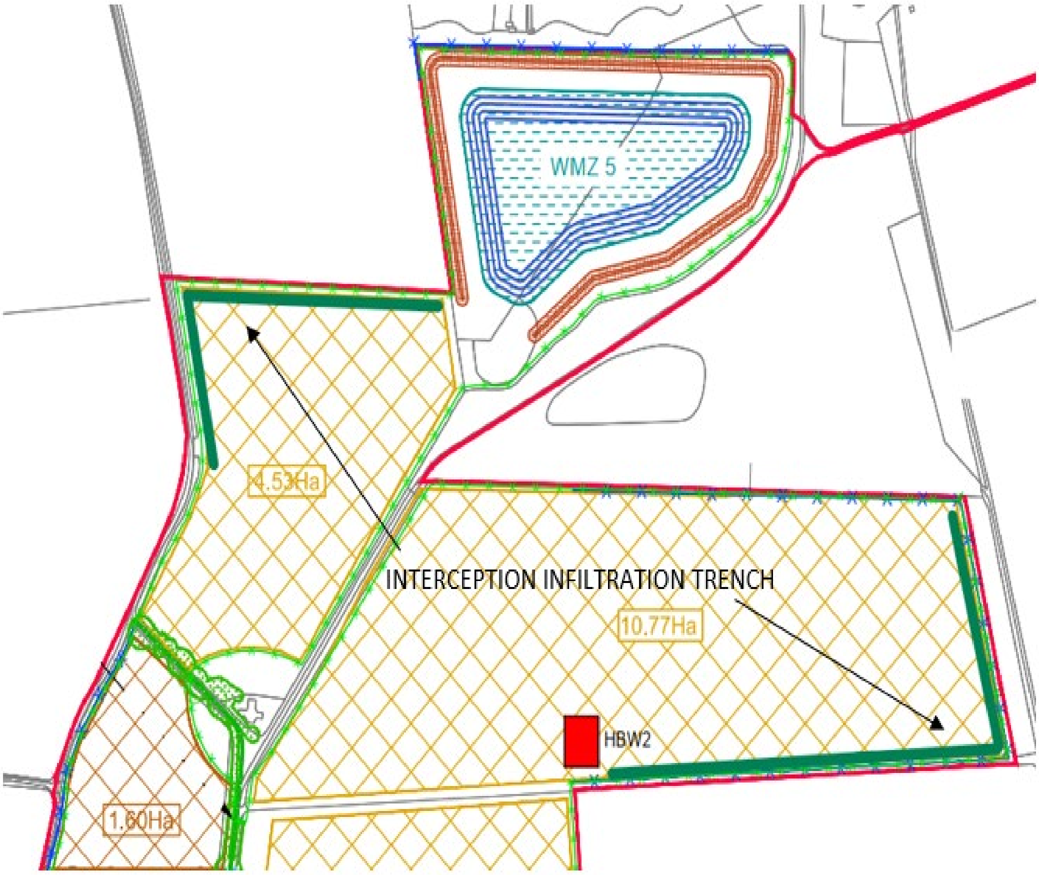



3.4.53 The proposed strategy is to drain the surface water run-off through infiltration techniques.

3.4.54 Where the runoff for material storage areas are located the surface water should be managed by providing trench infiltration or swales to capture runoff locally and maximise the source control philosophy.

3.4.55 In addition to infiltration trenches and swales, the detention basin that forms part of the design would be retained for exceedance storms and balancing excess volume that exceeds infiltration capacity. Proposed techniques for WMZ-5 are indicated in **Plate 3.16** and the surface water drainage hierarchy is presented in **Table 3.6.**

### Plate 3.16: Proposed techniques in Water Management Zone 5




### Table 3.6: Surface water drainage hierarchy WMZ-5

| Drainage Principle. | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | ✓ | No permanent occupancy however viability would be assessed as part of the design process. |
| 2. Infiltration | ✓ | Surface water will infiltrate into the ground as close to the source as possible. Run-off from the borrow pit area will be intercepted and conveyed into infiltration trenches located within the WMZ. Where required, filtration and |

| Drainage Principle. | Feasibility | Reason |
|---|---|---|
| | | silt interception systems will be in place. |
| 3. Attenuation (ponds, swales). | ✓ | Swales etc. would be incorporated along the boundary of the access road within the soft landscaping to provide support drainage for overflows. These can be used to collect, convey, infiltrate or attenuate run-off. |
| 4. Attenuation (tanks). | X | Not expected to be suitable in this area |
| 5. Discharge – watercourse. | X | Discounted - as conventional infiltration is expected to provide an adequate solution, a discharge into a watercourse is not deemed to be necessary. Direct discharge into an open ditch or watercourse is therefore not appropriate in this WMZ. |
| 6. Discharge – Surface Water drain. | X | Discounted - there are no known surface water drains in the vicinity |
| 7. Discharge – Combined drain. | X | Discounted - there are no known combined sewers in the vicinity. |

### c) Water Management Zones 7, 8 and 9 (Group 3)

3.4.56 The discharge from WMZs 7,8 and 9 would be directly to the sea via the Combined Drainage Outfall (CDO) during the construction phase, and discharge from the plant when it becomes operational will be via the cooling water tunnel.

3.4.57 In **Plate 3.17**, WMZ-7 is shown edged in yellow, WMZ-8 is shown edged in orange, and WMZ-9 is the platform area in the centre of these.

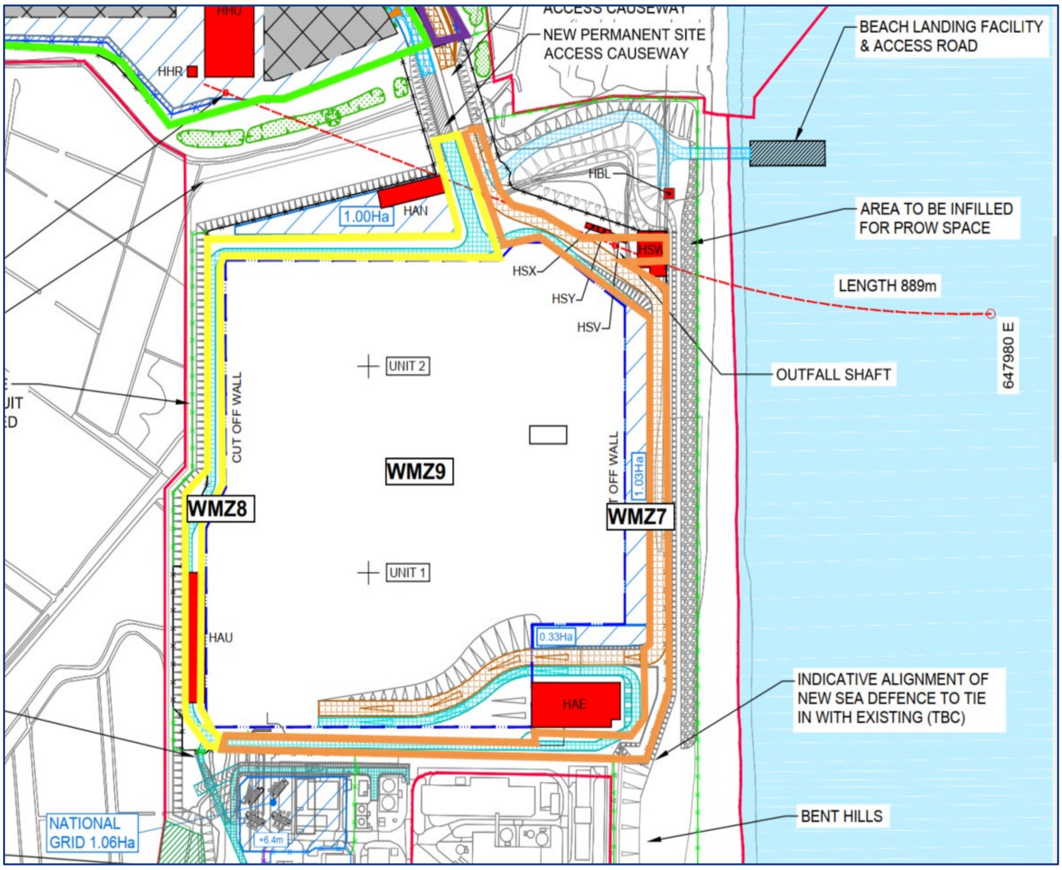
3.4.58 The collection of surface water across WMZs 7, 8 and 9 would be designed to suit the sequence of construction events. Surface water will be collected and held in temporary attenuation ponds within WMZs 7,8 and 9, before being treated using proprietary devices if required.

3.4.59 Prior to completion of the CDO, a Temporary Marine Outfall (TMO) would be required to allow surface water from the main construction area to discharge to the sea.

3.4.60 The proposed large capacity of the CDO means that storage will not be required for exceedance events up to the 1 in 100-year event, where all treated surface water can be discharged to sea. Exceedance events greater than the 1 in 100-year event could be managed by discharging surface water via the CDO or to the foreshore via the TMO before completion of the CDO. All surface water from up to the 1 in 100-year event shall be treated prior to discharge, and surface water from events greater than 1 in 100-year event shall be treated where practicable.

3.4.61 WMZ-9 is the MCA Deep Excavation. As WMZ-9 is at low level, storm water draining to the lower levels will need to be pumped up to platform level and the outfall arrangements set in place for WMZ-7 and 8 where the surface water will discharge to the sea via the CDO. Parts of the area of WMZ-8 drain naturally to the marshes and this will be managed to help the existing water balance of the natural environment. Again, consideration would be given to harvesting surface water for re-use on site.

**Plate 3.17: Water Management Zones 7,8 & 9**




## i. Combined Drainage Outfall (CDO)

3.4.62 The CDO is required in order to dispose various sources of water to sea during construction operations. The sources include:

- Treated final effluent originating from the construction phase sewage treatment plant.
- Treated surface water runoff from the deep excavation within the MCA.
- Groundwater, treated if required, from dewatering within the MCA cut-off wall.
- Treated plant cold commissioning waters.
- Treated concrete wash water.
- Treated water originating from tunnel construction.

3.4.63 On completion of cold comissioning the CDO would be discontinued. The discharge of surface water from the Platform when it becomes operational will be via the cooling water tunnel. The cooling water tunnel would also be used for the disposal of:

- Treated final effluent originating from the permanent sewage treatment plant.
- Exceedance runoff from the main platform area (WMZ-9).

3.4.64 Although it is not intended to discharge surface water runoff from the TCA into the CDO, this would be possible if problems arose during the construction phase to reduce flood risk and allow operations to continue.

3.4.65 An access shaft would be constructed on the tunnel within the MCA. This would provide a connection point for disposal of treated surface water runoff from the MCA, groundwater, treated if required, from dewatering within the MCA cut off wall, treated plant cold waters and treated decommissioning waters, as well as treated sewage effluent. This shaft will be located within the permanent site security fence.

#### ii. Temporary Marine Outfall (TMO)

3.4.66 The TMO is required in order to allow excess surface water runoff from the main construction area to be discharged to the sea during construction operations prior to the completion of the CDO.

3.4.67 As previously described in section 3.4 a), the TMO also offers redundancy in the surface water management for WMZs 1 and 2.

3.4.68 The TMO is proposed to be installed early in the construction programme. It is anticipated that the TMO would remain in place for a period of 15 months.

3.4.69 Surface water would be temporarily pumped from the main construction site over the temporary sea defences and into a chamber before discharging through a gravity pipe towards the shoreline, above the mean high water mark.

3.4.70 The temporary outfall would be located south of both the permanent and new, temporary Beach Landing Facilities. The TMO would allow excess surface water runoff to be discharged to sea via the TMO.

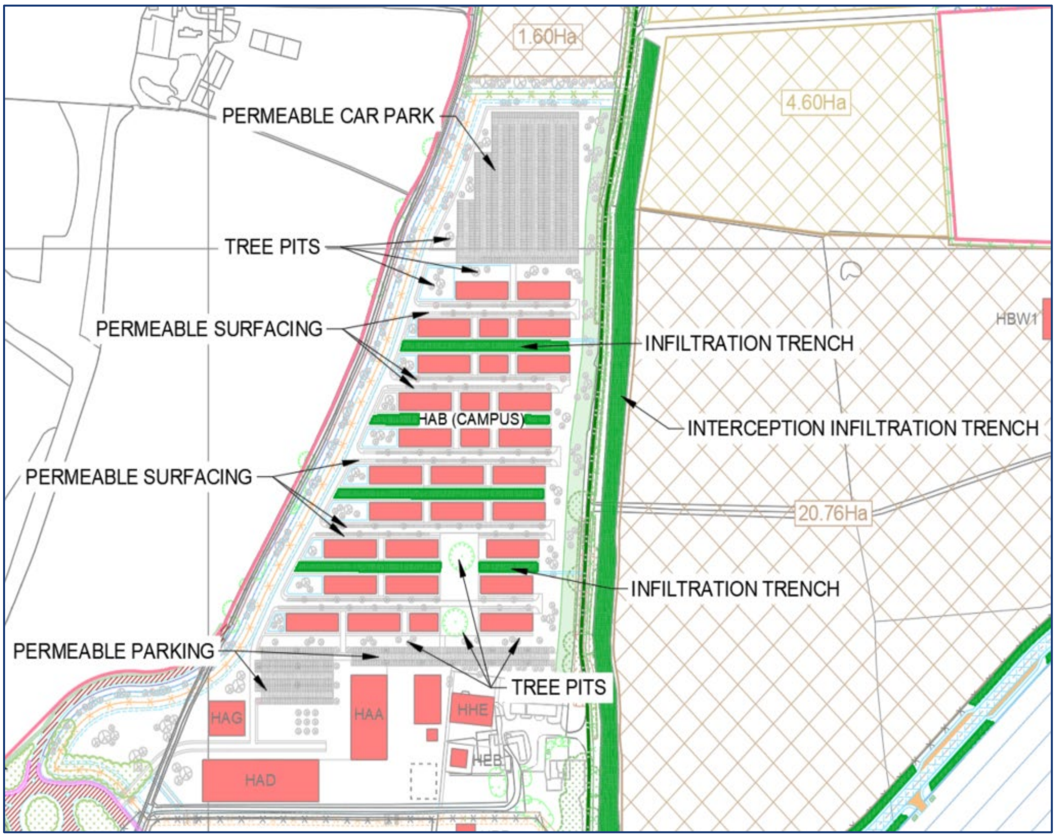
3.4.71 The temporary outfall will be controlled through conditions set by the Environment Agency through discharge permit applications.

3.4.72 On completion of the CDO, the TMO will no longer be required, and will be removed.

### d) Water Management Zone 10

3.4.73 WMZ-10 will indicatively provide attenuation and infiltration for the proposed Accommodation Campus Site during construction. Proposed techniques for WMZ-10 are indicated on **Plate 3.18** and the surface water drainage hierarchy is presented in **Table 3.7**.

**Plate 3.18: Proposed techniques in Water Management Zone 10**




3.4.74 The Campus is an area designated for accommodation and facilities for the development at Sizewell C with an operational life of approximately 9 to 12 years. The site would be returned to its former use upon completion of construction.

3.4.75 The Campus is located in the western end of the TCA. No watercourses are available in the vicinity of the Campus to facilitate a suitable connection for surface water discharge. Therefore, it would be necessary to store rainfall runoff below ground and allow gradual infiltration.

3.4.76 The necessary storage would need to be located beneath the car park areas within the campus site

3.4.77 The underground storage systems will infiltrate to the ground and each car park area will infiltrate at different rate depending on the characteristics of the underlining soil. The ground investigation reports indicate that infiltration rates vary across the site.

3.4.78 Given the depth to groundwater is considerable, there is opportunity to utilise other methods of surface water management including rainwater harvesting and treating surface water at source through detention and infiltration.

3.4.79 The accommodation blocks should be designed in a manner that allows for the collection and re-use of roof water where possible. Rainwater harvesting systems may be integrated into the design to avoid retro-fit. The harvested rainwater can be used for toilets, washing machines and other non-potable use, giving significant reductions in water usage.

3.4.80 Rainwater harvesting will likely involve the use of below ground tanks to ensure no space is taken up and the appearance of the building is not altered. As the collected rainwater will have no light affecting it, the water will stay cool and make bacterial growth improbable, thus keeping the quality of the water high. Below ground tanking also means that the tanks are frost protected.

3.4.81 Where there are large car parking areas proposed, it is proposed that these areas use permeable surfacing. The surfacing would be robustly constructed, emulating the current drainage characteristics, whilst providing suitable treatment of any incidental oil spills.

3.4.82 Grasscrete, Tarmac Ultra Porous, Marshall's Priora or similar may be used to ensure runoff from the car parks is controlled at source.

3.4.83 In addition, the access ways between the buildings and other non-heavily tracked areas within the campus may also employ permeable surfacing to allow infiltration at source. Where reasonably practicable, the run-off conveyed from the roof of the buildings within the campus will also be incorporated within the permeable surfacing sub-base.

3.4.84 Trees will be planted throughout the campus, and it is proposed that where there is a large amount of impermeable roof area tree pits may be utilised to provide storage and infiltration into the ground as close to source as possible.

3.4.85 Shallow infiltration trenches along the perimeter of the campus and in the green space between the blocks may also provide additional storage and infiltration opportunities for exceedance events.

3.4.86 Some examples of permeable surfacing are shown below:

**Plate 3.19: Examples of permeable surfacing**

3.4.87 Some examples of tree pits are shown below:

**Plate 3.20: Examples of tree pits**

**Table 3.7: Surface water drainage hierarchy WMZ-10 (Campus)**

| Drainage Principle | Feasibility | Reason |
| --- | --- | --- |
| 1. Rainwater Harvesting. | ✓ | Occupancy of the Campus is expected for 9 to 12 years therefore deemed to be a viable mitigation measure. Due to the relatively short life expectancy of |

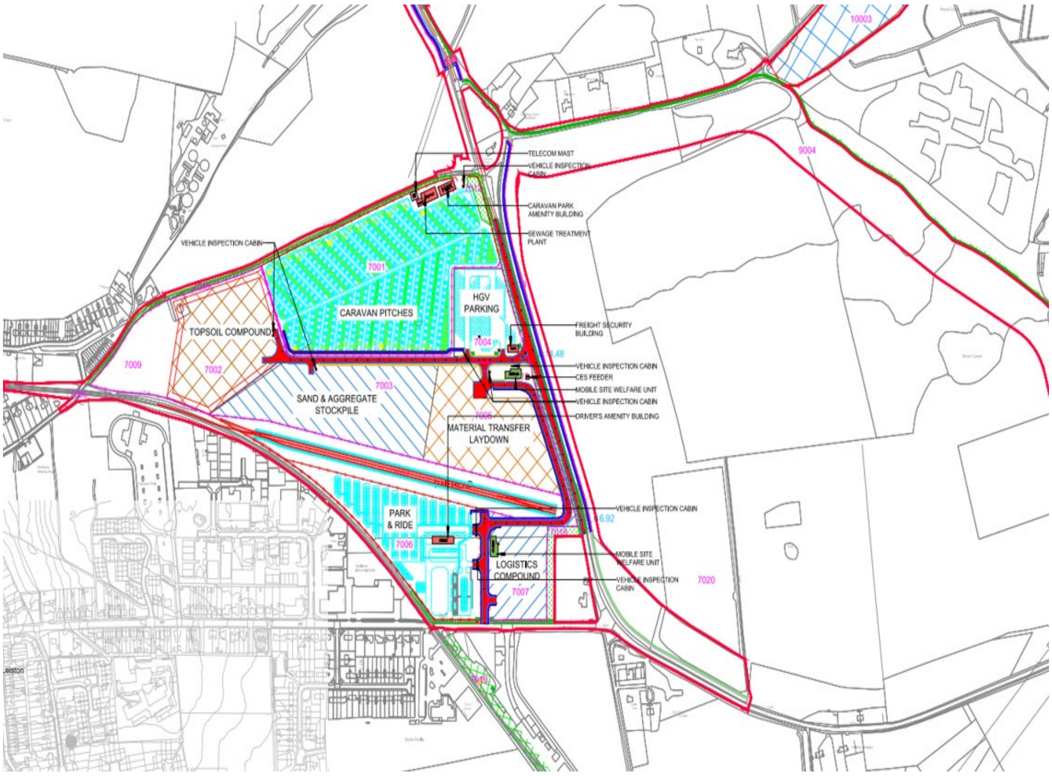
| Drainage Principle | Feasibility | Reason |
|---|---|---|
| | | the campus it should be investigated whether this will be a cost-effective investment. |
| 2. Infiltration | ✓ | Permeable paving is proposed to enable surface water to infiltrate directly into the ground. The run-off from the car park and other hard standing areas around the buildings may also utilise permeable surfacing. Additional run-off from the campus building roofs will be conveyed into shallow infiltration trenches located alongside the perimeter of the campus and in the green space between the blocks. Tree pits allow for storage and infiltration of surface water. Strategically placed tree pits will add increased infiltration capabilities. |
| 3. Attenuation (ponds, swales). | ✓ | Swales, or similar features, would be incorporated along the boundary of the car parking areas and within the soft landscaping, to provide support drainage for overflows. These can be used to collect, convey, infiltrate or attenuate run-off. These however will not be adopted as conventional infiltration is expected to provide an adequate solution. |
| 4. Attenuation (tanks). | ✓ | A below ground attenuation tank with sufficient volume would be required to attenuate run-off and discharge into the site drainage network. These however will not be adopted as conventional infiltration is expected to provide an adequate solution. |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 5. Discharge – watercourse. | ✓ | A direct discharge from a parking area into a watercourse is deemed undesirable due to strict restrictions on the water quality of the run-off discharging into it. Direct discharge into an open ditch or watercourse is not appropriate in this WMZ due to potential silt and contaminant load.<br>Surface water may be indirectly discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of silt and contaminant load. |
| 6. Discharge – Surface Water drain. | ✓ | If soakaways or discharge to a watercourse are not viable, then attenuation and discharge into the existing surface water drainage network will be progressed. An existing surface water chamber is located to the north of proposed facility. |
| 7. Discharge – Combined drain. | **X** | Discounted - there are no known combined sewers in the vicinity. |

### e) Land East of Eastlands Industrial Estate

3.4.88 LEEIE would serve a variety of uses including topsoil and aggregate storage, a park and ride facility and a caravan park as set out in **Chapter 3 Volume 2** of the **Environmental Statement**. The overarching strategy for the surface water run-off associated with the LEEIE is storage with infiltration where possible. The indicative layout of construction activity at LEEIE is shown in **Plate 3.21**.

### Plate 3.21: Proposed site layout at the Land East of Eastlands Industrial Estate




3.4.89 Infiltration is unlikely to be an effective technique for this area. The philosophy proposed for the LEEIE is to convey run-off from impermeable areas into storage areas located within the LEEIE area, with outfalls to Leiston Drain at greenfield rates. However, the site boundary means that space for open SuDS attenuation features may be limited. Utilising swales at boundaries and along the roadside of the re-aligned lane may not provide enough storage for surface water generated in this area.

3.4.90 Underground geocellular storage is therefore proposed as part of the attenuation storage techniques in the LEEIE. The most appropriate locations for the geocellular storage are below the indicative caravan pitches at the north of the LEEIE, and under the indicative Park and Ride area, south of the Alternative Rail Head.

3.4.91 It is suggested that the caravan pitches be based on permeable surfacing where possible, to allow for infiltration into the storage units below ground and reduce runoff. Oil interceptors would be provided as necessary.

3.4.92 In order to accommodate the larger volumes of runoff from longer return period storms the land to the east of the LEIEE would be used. This area would store surface water in extreme events. The route to this area will indicatively be across Lover's Lane and through the services area which has natural falls. The excess volume temporarily stored in the attenuation area will be managed through a combination of natural infiltration and low flow greenfield runoff to the area in which it would have originally discharged.

3.4.93 Where the large car parking area for the park and ride facility is indicatively located, it is proposed that permeable surfacing again be utilised allow for infiltration into the storage units below ground. The surfacing would be robustly constructed, emulating the current drainage characteristics, whilst providing suitable treatment of any incidental oil spills.

3.4.94 Grasscrete, Tarmac Ultra Porous, Marshall's Priora or similar may be used to ensure runoff from the car parking area is controlled at source.

3.4.95 Surface water within the indicative earth material storage area should be managed by providing trenches or swales to capture runoff locally and maximise the source control philosophy. While earthworks such as topsoil storage will allow for infiltration, it is likely that silt will be generated from the stored topsoil. With infiltration being unlikely to be an effective technique for heavy or prolonged events, storage and conveyance, with outfall rates reduced to greenfield would likely be the most appropriate. Where runoff is conveyed to an underground attenuation feature, a treatment stage will be required to remove silt from the runoff.

3.4.96 Any pollutant runoff from laydown or storage areas will be managed using SuDS techniques or proprietary products.

3.4.97 The site would be returned to its former use upon completion of the construction phase. **Table 3.8** sets out the surface water drainage hierarchy for the LEEIE.

**Table 3.8: Surface water drainage hierarchy LEEIE**

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | ✓ | Occupancy of the Caravan pitches is expected for more than 10 years, being available in the early years before the campus is established and retained throughout construction as an option for workers. It is unclear how surface |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| | | water may be collected efficiently due to the small roof area of individual caravans. This is therefore not deemed to be a viable mitigation measure. |
| 2. Infiltration | ✓ | Permeable surfacing is proposed to enable surface water to infiltrate both into the ground and into additional mitigation measures. The caravan pitches would be located on permeable surfacing to allow for some infiltration, and the car parking areas in the Park and Ride facility would have permeable surfacing on top of storage structures. Permeable surfacing alone is unlikely to be an adequate measure for this area. |
| 3. Attenuation (ponds, swales). | ✓ | Swales, or similar features, would be incorporated into the topsoil compound to manage surface water by providing trenches or swales to capture runoff locally and maximise the source control philosophy. There is unlikely to be sufficient space to allow for storage of all surface water. Swales would be used to collect, convey, infiltrate or attenuate run-off, and provide a treatment stage. |
| 4. Attenuation (tanks). | ✓ | Below ground attenuation tanks with sufficient volume are required to attenuate run-off and discharge into the site drainage network. The most appropriate locations for the geocellular storage are below the caravan pitches at the north of the LEEIE, and under the Park and Ride area, south of the Alternative Rail Head. |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 5. Discharge – watercourse. | ✓ | A direct discharge into a watercourse is deemed undesirable due to strict restrictions on the water quality of the run-off discharging into it.<br>Surface water may be indirectly discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of silt and contaminant load. |
| 6. Discharge – Surface Water drain. | X | Discounted - there are no known surface water sewers in the vicinity. |
| 7. Discharge – Combined drain. | X | Discounted - there are no known combined sewers in the vicinity. |

## 3.5 Groundwater at the main development site

### a) Introduction

3.5.1 The construction of the main development site will increase impermeable surface area and hence reduce the amount of rainwater that infiltrates to groundwater aquifers and potentially have an effect on groundwater levels.

3.5.2 Surface water drainage will act to manage and control discharge of surface water to groundwater at an acceptable rate.

3.5.3 The mitigation measures to protect groundwater have been identified through the Environmental Impact Assessment process and have been incorporated into the design and construction planning of the proposed development.

3.5.4 The predevelopment groundwater levels within and adjacent to Sizewell C are normally in the range 0.0 – 1.0 m AOD. The maximum water level varies to an extent due to tidal interaction. Most of the Sizewell C footprint is at a level well above natural groundwater level so is not at current risk of groundwater flooding.

b) Treatment

3.5.5 As discussed in above, managing the quality of surface water runoff so that groundwater is protected, is linked to the hydraulic control of runoff where SuDS treatment and pollution removal can work alongside conveyance, attenuation and infiltration, particularly within vegetated surface-based systems.

c) Cut-off wall

3.5.6 In order to separate the wider groundwater environment from the SZC excavation footprint, a low permeability cut-off wall will be constructed around the deep excavation. The cut-off wall will extend down into the impermeable London Clay, which sits below the permeable Norwich Crag. Once complete there will be limited groundwater movement from outside of the cut-off wall into the excavation.

d) Dewatering

3.5.7 With the cut-off wall in place, groundwater can be pumped out of the area inside the wall. Construction and backfilling will then take place in dry working conditions. Groundwater pumped from within this area would be appropriately treated prior to being discharged to sea via the CDO.

e) Permanent groundwater arrangements

3.5.8 Given the nature and depth of the cut-off wall it is intended to leave it in place following construction. There will be nominal groundwater leakage into the area enclosed by the cut-off wall from outside. There will be groundwater recharge through rainwater infiltrating into the ground in the unpaved permeable areas of the site.

3.5.9 As part of the environmental impact assessment significant ground investigation has taken place with boreholes and groundwater level monitoring undertaken.

3.5.10 The results of this investigation and monitoring have been incorporated in a numerical groundwater model which replicates groundwater movement within the area of the main development site. This model will be used to establish the impact of the installation of the cut-off wall on groundwater movement and levels to demonstrate that there will be no significant adverse impact to adjacent areas.

## 3.6 Foul water management

### a) Main development site

3.6.1 Over a 9-12-year construction period, an Accommodation Campus will provide accommodation for up to 2,400 personnel. Welfare facilities including canteens, toilets and showers will be in use throughout the construction phase. These facilities will require a foul network and sewage treatment. The workforce numbers do not exceed 10,000 therefore the site will not be required to comply with the Urban Waste Water Directive (Ref. 1.8).

3.6.2 There will be a considerable requirement for foul water treatment and disposal throughout construction. This requirement will fluctuate considerably through the course of the contract and it is therefore imperative that a flexible approach is applied.

3.6.3 The construction phase sewage treatment plants will be located close to sources of effluent and will receive and treat all domestic foul water generated during construction.

3.6.4 Lessons learned from Hinkley Point C have been taken into account where excavating and re-siting of buried rising mains posed issues during the construction phase. The siting of any pumped network at Sizewell C, particularly in the vicinity of the TCA would be carefully considered. Where the rising main is temporary, consideration can be made for alternative routes that maximise the flexibility for construction phasing.

3.6.5 Disposal to sea following treatment has been selected, as the receiving waters are less sensitive and dilution of the treated effluent is much greater than for a watercourse.

3.6.6 The construction phase sewage treatment plants will receive and treat all domestic foul water generated during construction. It will be possible to pump sewage to the treatment plant from the Campus Area, however during construction of the temporary treatment plant, interim arrangements will be required.

3.6.7 A plan of an indicative drainage network to be provided for the collection and removal of domestic foul water flows from the TCA and MCA during construction is shown in **Figure 2A. 6**.

3.6.8 Treated foul sewage effluent has to meet permitted quality limits prior to any dilution. The treated effluent will be pumped to the CDO during construction phase, from where it is disposed to sea.

3.6.9 Typical approaches during construction would usually range from packaged treatment plants to holding septic tanks or cess pits with tanker provisions, however the network approach illustrated above allows for the efficient treatment of wastewater during the construction phase, and removes a significant requirement for a number of package plants that would otherwise have been required across the TCA.

3.6.10 The permanent sewage treatment plant would receive and treat all domestic foul water generated within the power station site and Off-Site Delivery Checkpoint Building which will remain after the construction stage.

3.6.11 The construction phase Sewage Treatment Plants would be required until such time as the permanent Sewage Treatment Plant is complete.

3.6.12 In the operational phase, treated effluent from the permanent sewage treatment plant would be discharged to the cooling water tunnel outfall.

#### b) Land East of Eastlands Industrial Estate

3.6.13 There will be requirements for foul water disposal and treatment at the LEEIE for the temporary caravan pitches and park and ride facility. Being removed from the MCA and the TCA, a different strategy is more appropriate.

3.6.14 A package treatment plant is preferred to serve the mobile welfare units which are currently proposed to serve the caravan pitches. The feasibility of this requires further investigation.

3.6.15 The preferred approach is for foul water to be conveyed to the Anglian Water Services Leiston Water Recycling Centre should capacity be available. If no capacity is available, foul water could potentially be treated in or close to the LEEIE with an outfall connected with Leiston Drain (since infiltration of treated foul water is not a viable solution due to poor infiltration). If this is not possible, the next option in the hierarchy should be considered, which in this instance is cess pits with tankering to the TCA where foul water may be treated and disposed of via the CDO.

# 4. ASSOCIATED DEVELOPMENT SITES

## 4.1 Water Management Zone assessment

4.1.1 The following sections set out the outline drainage strategy for each of the associated development sites. Further reference can be made to the Associated Development Design Principles (Doc Ref. 8.3).

### a) Northern park and ride

4.1.2 A site walkover was undertaken during March 2019 to gain further information on the site setting and study area, to consider the context of the site. The site is currently open fields and farmed agricultural land, with Darsham service station 30m to the south-east and Darsham railway station located adjacent to the southern site boundary. A pond was identified within the site, adjacent to the boundary with Moate Hall. No groundwater emergences were identified.

4.1.3 Light Detection and Ranging data show that the highest ground levels, above 32m Above Ordnance Datum (AOD), are located in the north-east corner of the site. Ground levels are lower in the south and west of the site, with the lowest ground levels slightly below 22m AOD at the south-west edge.

4.1.4 Online BGS mapping shows that the superficial geology underlying the majority of the site is the Lowestoft Formation, specifically diamicton (boulder clay). The Lowestoft Formation is formed of a sheet of chalky till, together with outwash sands and gravels, silts, and clays. A thin strip of land along the western site boundary is underlain by Head (windblown) deposits, comprising clay, silt, sand and gravel deposits. Although not shown on the online BGS mapping, Made Ground is expected to be present along the East Suffolk line which is adjacent to the south-west and north-west sections of the site.

4.1.5 Online BGS mapping shows that the bedrock geology beneath the site comprises the Crag Group. The Crag Group is made up of shallow water marine and estuarine sands, gravels, silts and clays. Beneath the Crag Group is the London Clay Formation and the Chalk Group.

4.1.6 There are no BGS borehole scans or trial pits within the inner study area. Within the outer study area, the closest borehole scan (ref. TM37SE18) is located at National Grid Reference (NGR) 639750E 270780N which is approximately 750m to the north-west of the site boundary. This borehole shows a thickness of Lowestoft Formation (diamicton) of approximately 20m, underlain by approximately 30m of Crag Group.

4.1.7 Full details on surface water, groundwater, geology, hydrogeology and findings from the site visit are provided in **Volume 3, Chapter 12** of the **ES** [APP-376].

4.1.8 The strategy for the surface water run-off associated with the Northern Park and Ride is storage and infiltration SuDS techniques.

4.1.9 The proposed strategy for these facilities is to drain the surface water run-off through infiltration techniques, such as heavy-duty permeable block paving, infiltration trenches and/or catchpit soakaways, with the pond and swales proposed remaining in place for exceedance events. This philosophy will ensure no additional impervious areas are added to the existing site wide drainage network.

4.1.10 Where impervious surfacing is necessary, the proposed strategy is to convey run-off from these areas into either the permeable paving systems proposed for the car park and laydown areas, infiltration trenches or into discrete soakaways located alongside the proposed operational car park.

4.1.11 The site would be returned to its former use upon completion of the construction phase. **Table 4.1** sets out the surface water drainage hierarchy for the Northern park and ride site.

**Table 4.1: Surface water drainage hierarchy - Northern Park and Ride site**

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | X | No permanent occupancy therefore deemed to be not viable. |
| 2. Infiltration | ✓ | Permeable surfacing is proposed to enable surface water to infiltrate both into the ground and into additional mitigation measures. The car parking areas would have permeable surfacing on top of storage structures. |
| 3. Attenuation (ponds, swales). | ✓ | Swales, or similar features, would be used to collect, convey, infiltrate or attenuate run-off, and provide a treatment stage. |
| 4. Attenuation (tanks). | ✓ | A below ground attenuation tank with sufficient volume would be required to attenuate run-off and discharge into the site drainage network. These however will not be adopted |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| | | as conventional infiltration is expected to provide an adequate solution. |
| 5. Discharge – watercourse. | ✓ | A direct discharge into a watercourse is deemed undesirable due to strict restrictions on the water quality of the run-off discharging into it.<br>Surface water may be indirectly discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of silt and contaminant load. |
| 6. Discharge – Surface Water drain. | X | Discounted - there are no known surface water sewers in the vicinity. |
| 7. Discharge – Combined drain. | X | Discounted - there are no known combined sewers in the vicinity. |

### b) Southern park and ride

4.1.12 A site walkover was undertaken during March 2019 to gain further information on the site setting and study area, to consider the context of the site, and to support the desk-study mapping and aerial photographs. The site is currently open arable fields, with an overgrown and wooded area located along the western site boundary, in the area identified on available mapping as a disused sand pit. The site is bounded to the south by the A12.

4.1.13 The site is located on the watershed between the River Deben and the River Ore. Light Detection and Ranging data shows that the highest ground levels, slightly above 29m Above Ordnance Datum (AOD), are located in the north-east corner of the site. Ground levels become progressively less through a moderate slope to the south and west of the site, with the lowest ground levels slightly below 25m AOD at the south-west edge.

4.1.14 Although not shown on the online BGS mapping, there is the potential for Made Ground to be encountered in the disused sand pit which is likely to have been infilled, and in the areas associated with the construction of the: B1078 (Main Road); B1078 slip road; and the A12 to the south and south-west of the site.

4.1.15 Online BGS mapping indicates that the superficial geology underlying the south-eastern and north-western areas of the site is the sands and gravels of the Lowestoft Formation, which is formed of a sheet of chalky till, together with outwash sands and gravels, silts and clays whereas the central portion of the site is underlain by diamicton (boulder clay) deposits of the Lowestoft Formation.

4.1.16 The bedrock geology beneath the site comprises the Crag Group. The Crag Group is made up of shallow water marine and estuarine sands, gravels, silts and clays.

4.1.17 BGS borehole logs located along the A12 indicate that sand and gravel deposits are present within the south of the site. Lithological descriptions detailed within the trial pit logs and borehole logs generally include clay, sand and gravel with occasional chalk up to approximately 6m below ground level (m bgl). The underlying material becomes denser and sandier with depth, with bedrock not proven up to a depth of 20m bgl.

4.1.18 Full details on surface water, groundwater, geology, hydrogeology and findings from the site visit are provided in **Volume 4 Chapter 12** of the **ES** [APP-407].

4.1.19 The strategy for the surface water run-off associated with the Southern Park and Ride is SuDS techniques.

4.1.20 The proposed strategy for these facilities is to drain the surface water run-off through infiltration techniques, such as infiltration basins, trenches and/or catch pit soakaways, with basins, swales and geocellular storage in place for exceedance events. This philosophy will ensure no additional impervious areas are added to the existing site wide drainage network.

4.1.21 Where impervious surfacing is necessary, the proposed strategy is to convey run-off from these areas into either the permeable paving systems proposed for the car park and laydown areas, infiltration trenches or into discrete soakaways located alongside the proposed operational car park.

4.1.22 The site would be returned to its former use upon completion of the construction phase. **Table 4.2** sets out the surface water drainage hierarchy for the Southern park and ride site.

### Table 4.2: Surface water drainage hierarchy - Southern Park and Ride site

| Drainage Principle. | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | X | No permanent occupancy therefore deemed to be not viable. |
| 2. Infiltration | ✓ | Permeable surfacing is proposed to enable surface water to infiltrate both into the ground and also into additional mitigation measures. The car parking areas would have permeable surfacing on top of storage structures. |
| 3. Attenuation (ponds, swales). | ✓ | Swales, or similar features, would be used to collect, convey, infiltrate or attenuate run-off, and provide a treatment stage. |
| 4. Attenuation (tanks). | ✓ | A below ground attenuation tank with sufficient volume would be required to attenuate run-off and discharge into the site drainage network. These however will not be adopted as conventional infiltration is expected to provide an adequate solution. |
| 5. Discharge – watercourse. | ✓ | A direct discharge into a watercourse is deemed undesirable due to strict restrictions on the water quality of the run-off discharging into it.<br>Surface water may be indirectly discharged into the surrounding watercourses following appropriate measures to account for the |

| Drainage Principle. | Feasibility | Reason |
|---|---|---|
| | | volume of surface water and the presence of silt and contaminant load. |
| 6. Discharge – Surface Water drain. | X | Discounted - there are no known surface water sewers in the vicinity. |
| 7. Discharge – Combined drain. | X | Discounted - there are no known combined sewers in the vicinity. |

### c) Freight management facility

4.1.23 The proposed freight management facility is to be located at Seven Hills near Ipswich. The facility will serve as a holding area for HGVs, regulating the timing and flow of vehicles to the Sizewell C main development site. Being some distance from the Sizewell site, the land may have very different drainage characteristics. There are large existing soakaways outside the boundary of the site. It is assumed that these relate to runoff from the A14. However, despite soakaways being present close by, the performance of the soakaways and the ground conditions are not currently known, and infiltration testing will be required to establish the viability of infiltration drainage on the site.

4.1.24 A site visit from public roads was undertaken during March 2019 to gain further information on the site setting and study area, to consider the context of the site, and to support the desk study mapping and aerial photographs. Additionally, it was an opportunity to identify potential visual or olfactory contamination present at the site at the time of the visit.

4.1.25 The majority of the site comprises agricultural fields with the remainder being a section of Felixstowe Road. The site is located to the south-east of the A12 and A14 junction south-east of Ipswich and is bounded by the A14 to the north, Felixstowe Road to the south and arable land to the east and west. No hazards or evidence of contamination were observed during the site visit.

4.1.26 The site is located within the catchment of the River Orwell. Based on online mapping, the site is generally flat and sits at approximately 25m Above Ordnance Datum (AoD).

4.1.27 There is the potential for Made Ground to be encountered related to the construction of existing roads, railway, former sand and gravel pits, and farmer's tips.

4.1.28 Online BGS mapping indicates that the site is underlain by superficial deposits of the Kesgrave Catchment Subgroup which fluvial sands and gravels and lacustrine and organic silts, clays and peats of the pre-diversionary River Thames, and the pre-glacial soils developed on such deposits.

4.1.29 The bedrock geology beneath the site is comprised of the Crag Formation which is described as coarse-grained, poorly sorted abundantly shelly sands.

4.1.30 The majority of BGS borehole scans and trial pits within the outer study area are clustered along the A12 and A14. Most were drilled for the construction of the A14 in 1976. There are three BGS boreholes located on-site and five located within the inner study area. A review of the available logs has indicated that the Kesgrave Catchment Group was recorded from approximately 0.9m to 6.7m below ground level (m bgl). The Crag Formation was encountered from approximately 4.3m to 13.1m bgl. London Clay was encountered underlying the Crag Formation, with the depth not proven.

4.1.31 Current groundwater levels at the site are not known. Contours shown on BGS hydrogeological mapping suggest that groundwater levels within the Crag Group may be 15m AoD, approximately 10m bgl at the site. These contours are based on data from 1976 and are only indicative of current levels. However, the hydrogeological regime is not considered likely to have changed substantially in the intervening years. Further ground investigation would be needed to establish current groundwater levels at the site. On-site historical borehole logs available from the BGS report water strikes within the Crag aquifer at approximately 5m bgl.

4.1.32 Full details on surface water, groundwater, geology, hydrogeology and findings from the site visit are provided in **Volume 8 Chapter 12** of the **ES** [APP-536].

4.1.33 The proposed strategy for these facilities is to drain the surface water run-off through infiltration techniques where possible, such as heavy-duty permeable block paving, infiltration trenches and/or catch pit soakaways, with the ponds and swales previously proposed remaining in place for exceedance events. This philosophy will ensure no additional impervious areas are added to the existing drainage network.

4.1.34 Where heavy duty block paving cannot be utilised, surface water runoff from the lorry parking area will need to drain to a bypass separator.

4.1.35 The current proposed earth bunds may be repositioned to provide additional storage ponds like other WMZs.

4.1.36 The site would be returned to its former use upon completion of the construction phase. **Table 4.3** sets out the surface water drainage hierarchy for the freight management facility.

**Table 4.3: Surface water drainage hierarchy - Freight Management Facility**

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | X | No permanent occupancy therefore deemed to be not viable. |
| 2. Infiltration | ✓ | Permeable surfacing is proposed to enable surface water to infiltrate both into the ground and also into additional mitigation measures. The car parking areas would have permeable surfacing on top of storage structures. |
| 3. Attenuation (ponds, swales). | ✓ | Swales, or similar features, would be used to collect, convey, infiltrate or attenuate run-off, and provide a treatment stage. |
| 4. Attenuation (tanks). | ✓ | A below ground attenuation tank with sufficient volume would be required to attenuate run-off and discharge into the site drainage network. These however will not be adopted as conventional infiltration is expected to provide an adequate solution. |
| 5. Discharge – watercourse. | ✓ | A direct discharge into a watercourse is deemed undesirable due to strict restrictions on the water quality |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| | | of the run-off discharging into it.<br>Surface water may be indirectly discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of silt and contaminant load. |
| 6. Discharge – Surface Water drain. | X | Discounted - a discharge into a surface water sewer is undesirable where infiltration is expected to provide an adequate solution. |
| 7. Discharge – Combined drain. | X | Discounted – a discharge into a combined sewer is undesirable. Infiltration is expected to provide an adequate solution |

### d) Sizewell link road

4.1.37 A site visit from public roads and footpaths was undertaken during March 2019 to gain further information on the site setting, to consider the context of the proposed development, and to confirm the current desk study mapping and aerial photographs. Additionally, it was an opportunity to identify potential visual or olfactory contamination present at the site at the time of the walkover.

4.1.38 The site predominantly comprises agricultural land. The site includes several local roads, existing watercourses and woods, and is also in close proximity to farms and residential properties. The East Suffolk line crosses the site in the west. The areas surrounding the site are predominantly agricultural land with isolated farms and residential properties nearby.

4.1.39 The site is located within the Minsmere Old River watershed. Light Detection and Ranging data (LiDAR) show that the highest ground levels are located in the north-west area of the site at approximately 40m Above Ordnance Datum (AOD). The topography across the site varies between approximately 10m AOD and 35m AOD. The topography is gently rolling.

4.1.40 There is the potential for Made Ground to be encountered in the areas adjacent to the railway line and the existing roads. In addition, due to the nature of the site and surrounding area, there is the potential for fly tipping as well as the potential for farmers tips, the contents of which will be unknown.

4.1.41 BGS records indicate that the site is largely underlain by superficial Diamicton deposits of the Lowestoft Formation, and sand and gravel deposits of the Lowestoft Formation, which comprise an extensive sheet of chalky till as well as outwash sands and gravels, silts and clays.

4.1.42 Head (windblown) deposits are shown on the map where the site crosses Fordley Road and Hawthorne Road. These deposits comprise clay, silt, sand and gravel. Head deposits, comprising gravel, sand and clay deposits are also present in two small areas in the north-east of the site.

4.1.43 The bedrock geology beneath the site comprises sand of the Crag Group. Crag is made up of shallow water marine and estuarine sands, gravels, silts and clays.

4.1.44 A review of online BGS mapping indicates that there are several borehole or trial pit scans within the inner study area. Boreholes within 500m of the site show, variously, near surface geology as glacial drift, boulder clay or Crag Group.

4.1.45 Full details on surface water, groundwater, geology, hydrogeology and findings from the site visit are provided in **Volume 6, Chapter 12** of the **ES** [APP-476].

4.1.46 The strategy for the surface water run-off associated with the Sizewell Link Road is infiltration.

4.1.47 The proposed strategy is to convey run-off from impermeable highway surfaces into swales and infiltration features located adjacent to the route of the proposed Sizewell link road.

4.1.48 These features would form part of the permanent drainage of the link road, and a management and maintenance plan shall be required to ensure that the drainage performs as intended for the life of the link road. **Table 4.4** sets out the surface water drainage hierarchy for the link road.

**Table 4.4: Surface water drainage hierarchy – Sizewell link road**

| Drainage Principle. | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | X | No permanent occupancy therefore deemed to be not viable. |
| 2. Infiltration | ✓ | Although the link road will not be constructed with permeable surfacing, surface water conveyed into swales and infiltration features would infiltrate into the ground. |
| 3. Attenuation (ponds, swales). | ✓ | Swales, or similar features, would be used to collect, convey, infiltrate or attenuate run-off, and provide a treatment stage. |
| 4. Attenuation (tanks). | X | Below ground attenuation tanks will not be adopted as conventional conveyance and infiltration is expected to provide an adequate solution. |
| 5. Discharge – watercourse. | ✓ | A direct discharge into a watercourse is deemed undesirable due to strict restrictions on the water quality of the run-off discharging into it.<br>Surface water may be indirectly discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of silt and contaminant load. |
| 6. Discharge – Surface Water drain. | X | Discounted - a discharge into a surface water sewer is undesirable where infiltration is expected to provide an adequate solution |
| 7. Discharge – Combined drain. | X | Discounted - a discharge into a combined sewer is undesirable. |

| Drainage Principle. | Feasibility | Reason |
|---|---|---|
| | | Infiltration is expected to provide an adequate solution. |

e) Yoxford roundabout

4.1.49 A site walkover was undertaken during March 2019 to gain further information on the site setting and study area, to consider the context of the site, and to support the desk study mapping and aerial photographs. Additionally, it was an opportunity to identify potential visual or olfactory contamination present at the site at the time of the walkover.

4.1.50 The site was noted to comprise the existing A12 and B1122 roads and an area of agricultural land. No hazards or evidence of contamination were observed during the site walkover.

4.1.51 The proposed Yoxford roundabout site is located in the River Yox catchment. Light detection and ranging data show that the highest ground levels are located in the south of the site, at approximately 16m Above Ordnance Datum (AOD). Ground levels drop to the west and east of the site, with the lowest ground levels at approximately 10m AOD at the south west edge.

4.1.52 Made Ground is not shown on the BGS online mapping, however the areas adjacent to the existing roads have the potential to include Made Ground. Due to the nature of the site there is the potential for fly tipping as well as the potential for farmers' tips, the constituents of which will be unknown.

4.1.53 Online BGS mapping indicates that the majority of the site is not underlain by superficial deposits. Part of the northern section of the site is underlain by the Head Formation which is made up of clay, silt, sand and gravel.

4.1.54 Off-site, alluvial deposits associated with the River Yox are present to the north, with diamicton deposits and sands and gravels deposits of the Lowestoft Formation also present within the study area.

4.1.55 The bedrock geology beneath the site comprises of the Crag Group which is made up of shallow water marine and estuarine sands, gravels, silts and clays.

4.1.56 BGS borehole scan reference TM46NW27 located at national grid reference (NGR) 640130 268680 (10m from the site) suggests that the Crag aquifer is likely to extend at least 31m below ground level (bgl). BGS scans of shallow boreholes adjacent to the northern extent of the site indicate made ground is present to 0.5 – 1m bgl. This is underlain by varying thicknesses and sequences of clay, sand and silt. Bedrock was not encountered in any of these nearby boreholes.

4.1.57 Full details on surface water, groundwater, geology, hydrogeology and findings from the site visit are provided in **Volume 7 Chapter 12** of the **ES** [APP-507].

4.1.58 The strategy for the surface water run-off associated with Yoxford Roundabout is infiltration.

4.1.59 The proposed strategy is to convey run-off from impermeable highway surfaces into swales and infiltration features located adjacent to the proposed roundabout.

4.1.60 These features would form part of the permanent drainage of the roundabout, and a management and maintenance plan would be required to ensure that the drainage performs as intended for the life of the roundabout. **Table 4.5** sets out the surface water drainage hierarchy for the Yoxford roundabout works.

**Table 4.5: Surface water drainage hierarchy – Yoxford Roundabout**

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | X | No permanent occupancy therefore deemed to be not viable. |
| 2. Infiltration | ✓ | Although the roundabout will not be constructed with permeable surfacing, surface water conveyed into the detention basin, swales and infiltration features would infiltrate into the ground. |
| 3. Attenuation (ponds, swales). | ✓ | A detention basin, swales, or similar features, would be used to collect, convey, infiltrate or attenuate run-off, and provide a treatment stage. |
| 4. Attenuation (tanks). | X | Below ground attenuation tanks will not be adopted as conventional conveyance and |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| | | infiltration is expected to provide an adequate solution. |
| 5. Discharge – watercourse. | ✓ | A direct discharge into a watercourse is deemed undesirable due to strict restrictions on the water quality of the run-off discharging into it.<br>Surface water may be indirectly discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of silt and contaminant load. |
| 6. Discharge – Surface Water drain. | X | Discounted - a discharge into a surface water sewer is undesirable where infiltration is expected to provide an adequate solution |
| 7. Discharge – Combined drain. | X | Discounted - a discharge into a combined sewer is undesirable. Infiltration is expected to provide an adequate solution. |

### f) Two village bypass

4.1.61 Site walkovers of the River Alde floodplain, and from public roads and tracks, were undertaken in March 2019 and May 2019 to gain further information on the site setting, to consider the context of the proposed development, and to confirm the current desk study mapping and aerial photographs. Additionally, these walkovers provided opportunities to identify potential visual or olfactory contamination present at the site at the time of the walkover. Alongside the second walkover survey, the river corridor survey methodology was used to characterise the River Alde and the floodplain drainage network. Details of the dominant riparian vegetation and physical structures of the watercourses were recorded in the form of a map using a set of standard symbols and abbreviations.

4.1.62 The site comprises agricultural land with associated access tracks and local roads. The western and eastern site boundaries are formed by the existing A12. The site's northern and southern boundaries are formed by agricultural land.

4.1.63 The site is located on the floodplain of the River Alde before rising onto the watershed between the Rivers Alde and Fromus. Light Detection and Ranging data show that the highest ground levels, slightly above 26m Above Ordnance Datum (AoD), are located in the central section (Pond Wood to north of Farnham Hall) of the site. The lowest ground levels, slightly below 4m AoD are located in the western end (River Alde floodplain) of the western section (A12/Tinker Brook to Pond Wood) of the site.

4.1.64 There is potential for Made Ground to be encountered in the areas associated with the construction of the A12 and other minor roads. In addition, there is potential for fly tipping in the area, as well as farmers tips, the contents of which will be unknown.

4.1.65 Available BGS records indicate that the superficial geology underlying the site comprises Lowestoft Formation (diamicton) described as poorly-sorted matrix-supported deposits in the western and eastern sections of the site, in the vicinity of the junctions with the A12. The River Alde and the associated network of drains that intersect the site are underlain by alluvium. Superficial deposits are recorded absent in some areas in the east of the site.

4.1.66 The bedrock geology beneath the site comprises of three different bedrock strata. The Chillesford Church Sand Member underlies the majority of the site. This is described as shallow-water marine and estuarine sands, gravels, silts and clay. The Red Crag Formation outcrops in the west of the site, underlying the River Alde and comprises sands. The Crag Group underlies the north-east of the site and is described as shallow water marine and estuarine sands, gravel, silts and clays.

4.1.67 BGS borehole scans and trials pits within 1km of the site boundary are limited in number and located sporadically. Borehole reference TM36SE84 is located to the north of the site at national grid reference (NGR) 636390 260750 and shows that sand and gravel of either the Lowestoft Formation or Crag Group extends at least 30m below ground level (mbgl). Borehole records TM35NE53 and TM35NE32 are located within the western part of the site at NGR 636230 259910 and 635430 259740, respectively. These describe shallow deposits and also indicate that the shallow geology of the site comprises predominately poorly sorted sands interbedded with gravel, clays and silts.

4.1.68 The site does not lie within or adjacent to a groundwater Source Protection Zone (SPZ). A Total Catchment Zone (Zone 3) of a groundwater SPZ is located approximately 720m north of the western boundary of the proposed development.

4.1.69 Current groundwater levels at the site are unknown. Contours shown on BGS hydrogeological mapping suggest that groundwater levels within the Crag Group are around 5m AoD (approximately 0-15 mbgl across the site). These contours are based on data from 1976, and are only indicative of current levels, however the hydrogeological regime is considered unlikely to have changed significantly in the intervening years. Further GI would establish current groundwater levels at the site.

4.1.70 The site is located within the River Alde and the River Fromus catchments. The western end of the site crosses the River Alde and floodplain. The study area includes a network of drains on the River Alde floodplain. There are also 25 ponds within the inner study area. Several ponds are located on the northern side of the A12 and are considered hydrologically isolated from the site.

4.1.71 Full details on surface water, groundwater, geology, hydrogeology and findings from the site visit are provided in **Volume 5 Chapter 12** of the **ES** [APP-441].

4.1.72 The strategy for the surface water run-off associated with Two Village Bypass is infiltration.

4.1.73 The proposed strategy is to convey run-off from impermeable highway surfaces into swales and infiltration features located adjacent to the proposed bypass.

4.1.74 These features would form part of the permanent drainage of the bypass, and a management and maintenance plan would be required to ensure that the drainage performs as intended for the life of the bypass. **Table 4.6** sets out the surface water drainage hierarchy for the Two Village Bypass.

**Table 4.6: Surface water drainage hierarchy – Two Village Bypass**

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | X | No permanent occupancy therefore deemed to be not viable. |
| 2. Infiltration | ✓ | Although the bypass will not be constructed with |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| | | permeable surfacing, surface water conveyed into swales and infiltration features would infiltrate into the ground. |
| 3. Attenuation (ponds, swales). | ✓ | Swales, or similar features, would be used to collect, convey, infiltrate or attenuate run-off, and provide a treatment stage. |
| 4. Attenuation (tanks). | X | Below ground attenuation tanks will not be adopted as conventional conveyance and infiltration is expected to provide an adequate solution. |
| 5. Discharge – watercourse. | ✓ | A direct discharge into a watercourse is deemed undesirable due to strict restrictions on the water quality of the run-off discharging into it.<br>Surface water may be indirectly discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of silt and contaminant load. |
| 6. Discharge – Surface Water drain. | X | Discounted - there are no known surface water sewers in the vicinity. |
| 7. Discharge – Combined drain. | X | Discounted - there are no known combined sewers in the vicinity. |

### g) Rail proposals

4.1.75 The construction of Sizewell C Project would require the delivery of substantial amounts of construction materials by rail.

4.1.76 A temporary rail route would be constructed from Saxmundham Road to the main development site (rail extension route) and improvements to the Saxmundham to Leiston branch line (branch line), including upgrades to various level crossings will be made.

4.1.77 A site visit from public roads was undertaken during March 2019 to gain further information on the site setting and study area, to consider the context of the site, and to support the desk study mapping and aerial photographs.

4.1.78 The site comprises agricultural fields, with the existing Saxmundham to Leiston branch line present within the south-western edge of the site. Buckleswood Road is also present in the south of the site, crossing the proposed rail extension route from north-west to south-east.

4.1.79 Light Detection and Ranging data for the site shows that the highest ground levels, slightly above 23m Above Ordnance Datum (AOD), are located in the southern extent of the site. Ground levels become progressively lower to the north of the site, with the lowest ground levels slightly below 7m AOD at the north-east edge.

4.1.80 There is the potential for Made Ground to be present associated with the existing railway line, roads crossing the site, small scale structures and the old sand pits located in the vicinity of the site.

4.1.81 Online BGS mapping indicates that the superficial geology underlying the majority of the site is the diamicton (boulder clay) deposits of the Lowestoft Formation. The north-eastern area of the site is underlain by the sands and gravels of the Lowestoft Formation, which is formed of a sheet of chalky till, together with outwash sands and gravels, silts and clays.

4.1.82 The bedrock geology beneath the site comprises Crag Group. The Crag Group is made up of shallow water marine and estuarine sands, gravels, silts and clays.

4.1.83 A ground investigation encompassing a section of the rail extension route was undertaken in 2014. Eight exploratory holes were drilled in the vicinity of the site. The ground investigations report states that ground conditions encountered are consistent with those indicated by published geological records, with the boreholes within the site confirming the presence of the

Crag bedrock, overlain by superficial deposits of the Lowestoft Formation (diamicton).

4.1.84 The boundary between the Crag Group and the Lowestoft Formation (diamicton) was found to be indistinct in places. The thickness of superficial deposits was generally found to increase with distance from the coast, with a maximum thickness of 7.3m of Lowestoft Formation (diamicton).

4.1.85 The Environment Agency classifies the sand and gravel of the Lowestoft Formation as a Secondary A Aquifer and the Lowestoft Formation (diamicton) as a Secondary Aquifer (undifferentiated). The Environment Agency classifies the Crag Group bedrock underlying the site as a Principal Aquifer.

4.1.86 The eastern and northern section of the site does not lie within a groundwater Source Protection Zone (SPZ). The south-western section of the site lies within the Outer Zone (Zone 2), or Total Catchment (Zone 3) of an SPZ. The inner protection zone (Zone 1) is approximately 1km south of the site.

4.1.87 As part of the ground investigation undertaken within the site, groundwater levels were monitored. These showed groundwater levels ranging from 2.75 to 17.60m below ground level (bgl).

4.1.88 Full details on surface water, groundwater, geology, hydrogeology and findings from the site visit are provided in **Volume 9 Chapter 12** of the **ES** [APP-570].

4.1.89 The strategy for the surface water run-off associated with the rail improvements is infiltration.

4.1.90 Rail track drainage systems would comply with the Network Rail - NR/L3/CIV/005/1 Railway Drainage Systems Manual. This Network Rail standard includes mandatory requirements for track drainage design.

4.1.91 Where collector drains and carrier drains are used to convey surface water away from the rail, the surface water would be treated in swales and infiltration trenches adjacent to the track. **Table 4.7** sets out the surface water drainage hierarchy for the rail improvements.

**Table 4.7: Surface water drainage hierarchy – Rail Improvements**

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 1. Rainwater Harvesting. | X | No permanent occupancy therefore deemed to be not viable. |
| 2. Infiltration | ✓ | Although the railway will be constructed with permeable surfacing, surface water will be collected and conveyed into swales and infiltration trenches and would infiltrate into the ground. |
| 3. Attenuation (ponds, swales). | ✓ | Swales, or similar features, would be used to infiltrate or attenuate run-off, and provide a treatment stage. |
| 4. Attenuation (tanks). | ✓ | Below ground attenuation tanks with sufficient volume would be required to attenuate run-off will not be adopted as conventional conveyance and infiltration is expected to provide an adequate solution. |
| 5. Discharge – watercourse. | ✓ | A direct discharge into a watercourse is possible despite strict restrictions on the water quality of the run-off discharging into it as there will be no pollutant or contaminant load, however flow rates from positive drainage .<br>Surface water may also be indirectly discharged into the surrounding watercourses following appropriate measures to account for the volume of surface water and the presence of silt and contaminant load. |

| Drainage Principle | Feasibility | Reason |
|---|---|---|
| 6. Discharge – Surface Water drain. | X | Discounted - there are no known surface water sewers in the vicinity. |
| 7. Discharge – Combined drain. | X | Discounted - there are no known combined sewers in the vicinity. |

## 4.2 Foul water management

### a) Northern park and ride

4.2.1 The Northern Park and Ride is remote from the MCA and TCA. Due to the remoteness, connection to the TCA's foul system is not an option. The site will have low use and foul disposal demands associated with the Driver's Amenity building. Whilst there is an Anglian Water Services public foul water asset in the vicinity, there appears to be insufficient head differential to drain by gravity, and a pumped solution is not considered feasible.

4.2.2 The preferred approach is to introduce a package plant and to drain the effluent to ground through SuDS infiltration devices. Low flow rates are likely to impact on the functionality of a package treatment plant, and a low flow package treatment plant would be specified. Tankering to works from a cess pit is an alternative option should ground conditions be unfavourable or the flow be insufficient for the low-flow package treatment plant.

4.2.3 Infiltration testing is being carried out to confirm the acceptability of the solution. The specific arrangements require further investigation, and details are to be refined at design stage.

### b) Southern park and ride

4.2.4 The Southern Park and Ride is remote form the MCA and TCA. Due to the remoteness, connection to the TCA's foul system is not an option. The site will have low use and foul disposal demands associated with the Amenity and Welfare building.

4.2.5 The preferred approach is to introduce a package plant and to drain the effluent to ground through SuDS infiltration devices. Low flow rates are likely to impact on the functionality of a package treatment plant, and a low flow package treatment plant would be specified. Tankering to works from a cess pit is an alternative option should ground conditions be unfavourable or the flow be insufficient for the low-flow package treatment plant.

4.2.6 Infiltration testing is being carried out to confirm the acceptability of the solution. The specific arrangements require further investigation, and details are to be refined at design stage.

### c) Freight management facility

4.2.7 The freight management facility is also remote form the MCA and TCA. The site will have low use and foul disposal demands associated with the Amenity and Welfare building.

4.2.8 Due to the remoteness, connection to the TCA's foul system is not an option.

4.2.9 The current proposal is to introduce a package plant and to drain the effluent to ground through SuDS infiltration devices. Low flow rates are likely to impact on the functionality of a package treatment plant, and a low flow package treatment plant would be specified. Tankering to works is an alternative option should the flow be insufficient for the low-flow package treatment plant.

4.2.10 A packaged treatment plant is preferred. Again, the current proposal is to introduce a package plant and to drain the effluent to ground through infiltration devices. Due to the remoteness of the site from the rest of the TCA, connection to the TCA foul system is not a preferred option.

4.2.11 Testing is being carried out to confirm the acceptability of the solution. The specific arrangements require further investigation, and details are to be refined at design stage.

# 5. OTHER SITES

## 5.1 Water management assessment

### a) Leiston off-site sports facilities

5.1.1 Off-site sports facilities for use by the general public and the construction workforce are to be located in Leiston and retained for use after construction. A full-sized artificial grass pitch (AGP) and multi-use games areas (MUGA) are proposed on land between Leiston Leisure Centre and Alde Valley Academy.

5.1.2 The base for an AGP and MUGA is typically a porous engineered construction consisting of two courses of open-textured bituminous macadam laid above a graded stone sub-base, which would allow the AGP and MUGA to be free-draining. Where infiltration is poor, a sub-surface drainage system may be required. The design of subsurface drainage would follow Sport England's Artificial Surfaces for Outdoor Sport Design Guidance Note[6] and employ SuDS techniques to attenuate and limit flow from the site to greenfield runoff rates.

5.1.3 Details are to be refined at design stage.

[6] https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/artificial-surfaces-for-outdoor-sports-2013.pdf?t.3rEH_hWpkMZ.am24nSILAAFDgQ4Lpz

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1.2 Statutory Main River map taken from Environment Agency Mapping – ARC GIS Service

https://www.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386&extent=588430.6725%2C236967.2324%2C699555.8948%2C295506.412%2C27700

1.3 Environment Agency Flood Map

https://www.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386&extent=588430.6725%2C236967.2324%2C6

1.4 Peak Rainfall Intensity Allowance in small and urban catchments (Environment Agency)

https://www.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386&extent=588430.6725%2C236967.2324%2C699555.8948%2C2

1.5 Groundwater protection principles

https://www.gov.uk/government/publications/groundwater-protection-principles-and-practice-gp3

1.6 National Planning Policy Framework

https://www.gov.uk/guidance/flood-risk-and-coastal-change

1.7 Environment Agency’s approach to Groundwater Protection (2018)

1.8 Council Directive 91/271/EEC