The Sizewell C Project

6.3/ 10.14 Volume 2 Main Development Site Chapter 2 Description of the Permanent Development Appendix 2A of the Environmental Statement: Drainage Strategy - Clean Version - Part 2 of 3

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ANNEX 2A.3: MAIN DEVELOPMENT SITE WATER MANAGEMENT ZONE SUMMARY

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1 INTRODUCTION

1.1.1 This document has been prepared to provide further background to the surface water management proposals for Sizewell C (SZC) nuclear power station basic design. The surface water proposals prioritise Sustainable Drainage Systems (SuDS) which are incorporated across the site in the forms of swales, infiltration trenches, permeable pavements and infiltration basins. These have been provisioned for early in the project. This document provides an overview about the Main Development Site water management zone (WMZ) infiltration basins, identifying design parameters and providing assurance that there is adequate storage on site for various storm events throughout the power station construction duration. Infiltration basins are proposed across the site in the Temporary Construction Area (TCA), Ancillary Construction Area (ACA), and the Green Rail route. The ACA is also known as the Land East of Eastlands Industrial Estate (LEEIE). In this document this will be referred to as the ACA.

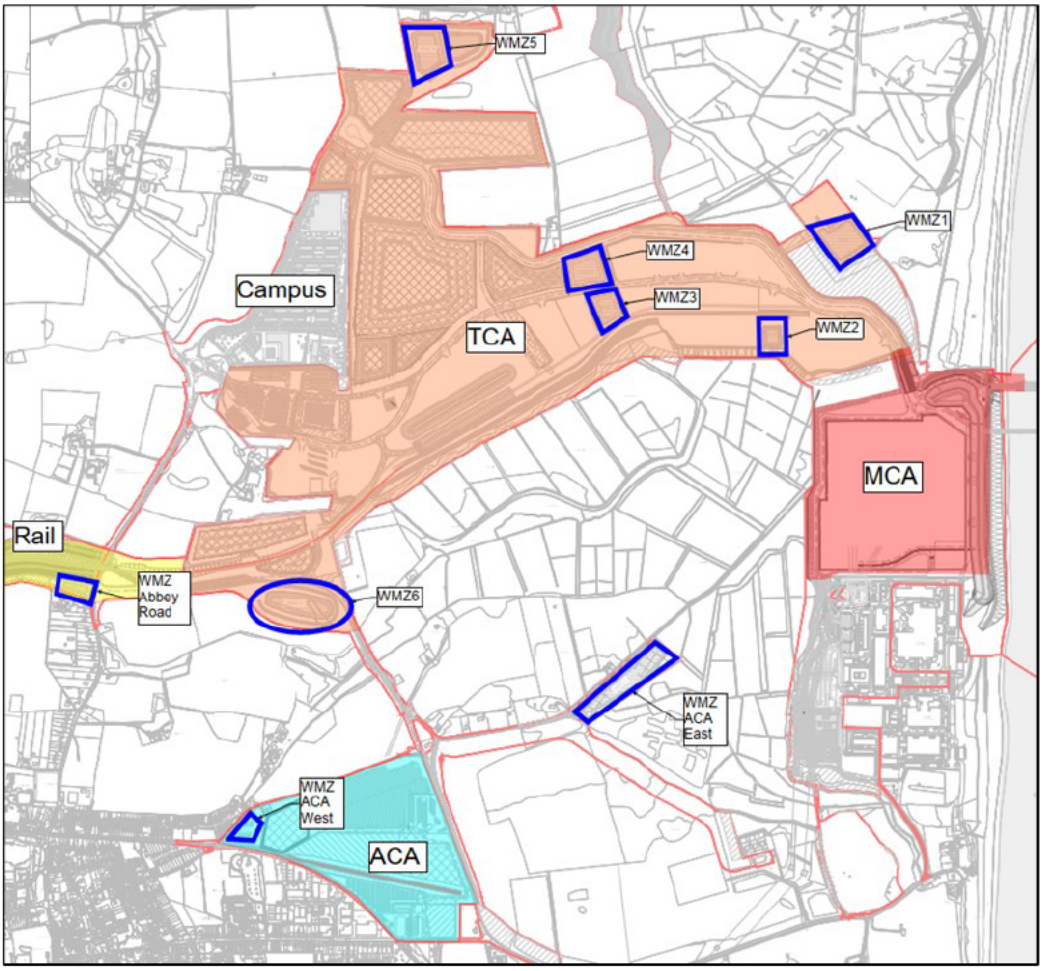
1.1.2 This note provides details of the WMZ infiltration basins for the established site. Temporary surface water control measures such as temporary sediment ponds will be required in areas prior to some of the WMZ infiltration basins are installed. The locations of the temporary surface water controls measures are to comply with the Code of Construction Practice (CoCP) and will be detailed alongside the construction sequencing with the Contractor.

1.1.3 The information presented in this report is in accordance with the overarching drainage principles that are documented in the SZC Development Consent Order (DCO) Outline Drainage Strategy at Volume 2, Chapter 2, Appendix 2A of the Environmental Statement [APP-181].

1.2 Background

1.2.1 The extent of the SZC Main Development Site (MDS) is set by the red line boundary shown in the Construction Site Plot Plan (CSPP). This incorporates the ACA, TCA, Main Construction Area (MCA), and Railway to the west. These areas are approximately outlined in Figure 1-1. Surface water drainage infrastructure will be required for all areas within the red line boundary and to ensure no surface water, other than at controlled greenfield runoff rates, will runoff the site up to a 1:100 year storm including climate change.

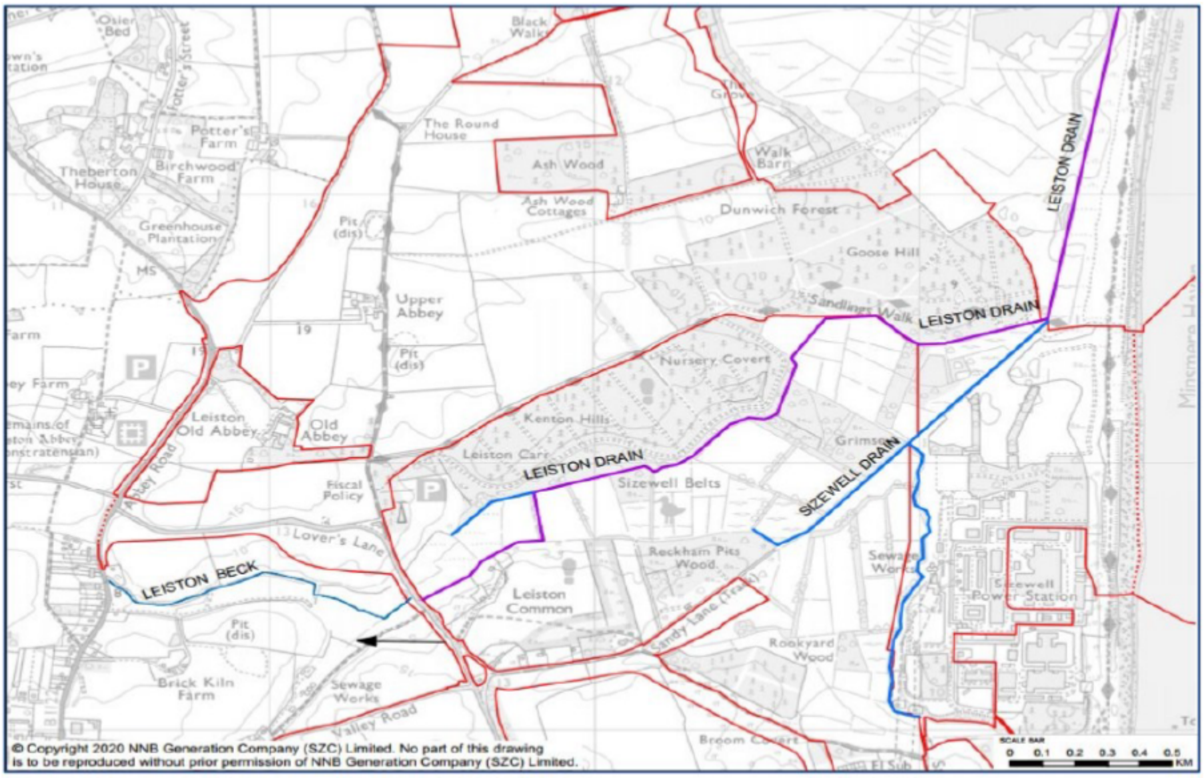
Figure 1-1 - Site plot plan with construction areas



1.2.2 Existing Site

1.2.3 The existing site is largely grassland across the TCA and the ACA. The MCA is also grassland with some ancillary Sizewell B buildings. The land to the south of the TCA is a Site of Special Scientific Interest (SSSI), which contains multiple watercourses, including two formal watercourses: the Leiston Drain and the Sizewell Drain. Surface water on the existing site currently infiltrates to ground and/or enters local watercourses which include the Leiston and Sizewell Drains and other minor tributaries – see Figure 1-2.

Figure 1-2 - Existing Surface Water Drains



1.2.4 Main Development Site Water Management Zones

1.2.5 The surface water drainage design is required to capture all surface water runoff from within the red line boundary, as defined in the Outline Drainage Strategy described in the Development Consent Order (DCO). To ensure that the construction site mimics the existing site surface water management, the runoff will be discharged through infiltration to ground where possible with some outfalls to existing watercourses or to the sea where necessary.

1.2.6 To manage the runoff across the MDS, catchments were identified across the TCA, ACA, MCA and Railway area. The following catchments were defined in the Outline Drainage Strategy:

- TCA – Catchments 1 to 6,
- ACA – Catchment ACA,
- MCA – Catchments 7 to 9,
- Railway

1.2.7 The surface water runoff within each catchment is proposed to infiltrate either directly through a permeable surface, or via a Sustainable Drainage System (SuDS) which will include:

- Swales;
- Infiltrations trenches; and,
- Infiltration basins (Water Management Zones).

1.2.8 Where suitable, the surfaces of the catchments are proposed to be permeable, so surface water will infiltrate to ground in the first instance. Any runoff that does not infiltrate directly will be captured through swales that border each catchment. The swales provide local source control to ensure the management of water returning to the ground to mimic the existing condition. The swales contain an infiltration trench beneath them which will encourage further infiltration, as well as provide additional storage. Any water that does not infiltrate through the infiltration trench into the surrounding ground will be captured by a perforated pipe within the trench, which will convey the flow to a Water Management Zone (WMZ) infiltration basin. This concept is shown in Figure 1-3 below. More frequent storm events will not need to overflow into the WMZ infiltration basins and surface water will be primarily discharged through infiltration at source. In less frequent storm events, the WMZ infiltration basins will be used to attenuate and infiltrate surface water and as such have been sized so they have capacity for a 1:100-year storm event including climate change.

1.2.9 Infiltration basins in catchments 1, 2, 3, and 6 have an outlet to nearby watercourses, restricted to greenfield runoff rates, and to be agreed with external stakeholders Suffolk County Council (SCC), Environment Agency (EA) and/or Internal Drainage Board (IDB) where applicable. As an additional backup measure, the WMZ infiltration basins for catchments 1-4 have an allowance for an overflow into a conventional drainage system (spine network) discharging to the combined drainage outfall (CDO) which discharges to the sea. Hydraulic modelling shows this network is not required; this spine network has only been included at this stage as a precaution.

Figure 1-3 - Surface water runoff capture and discharge process

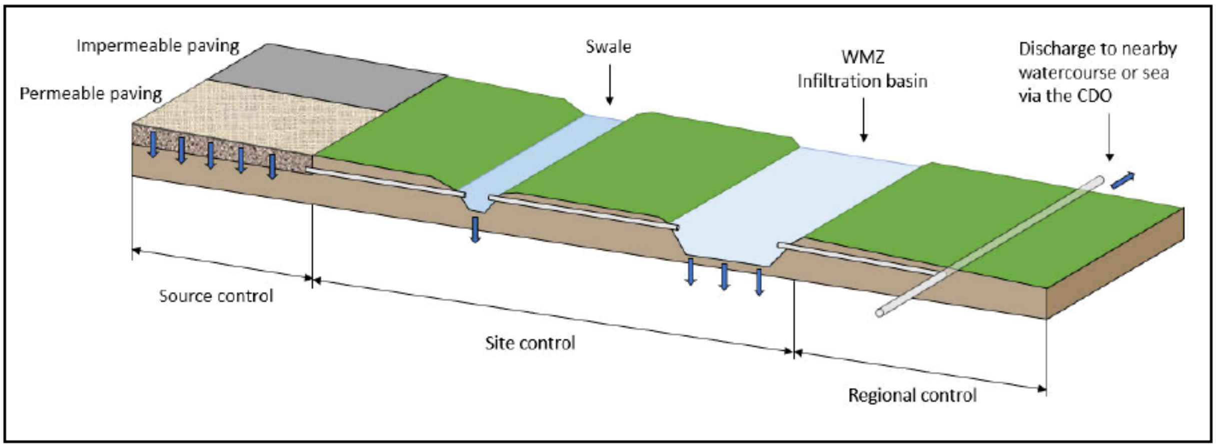
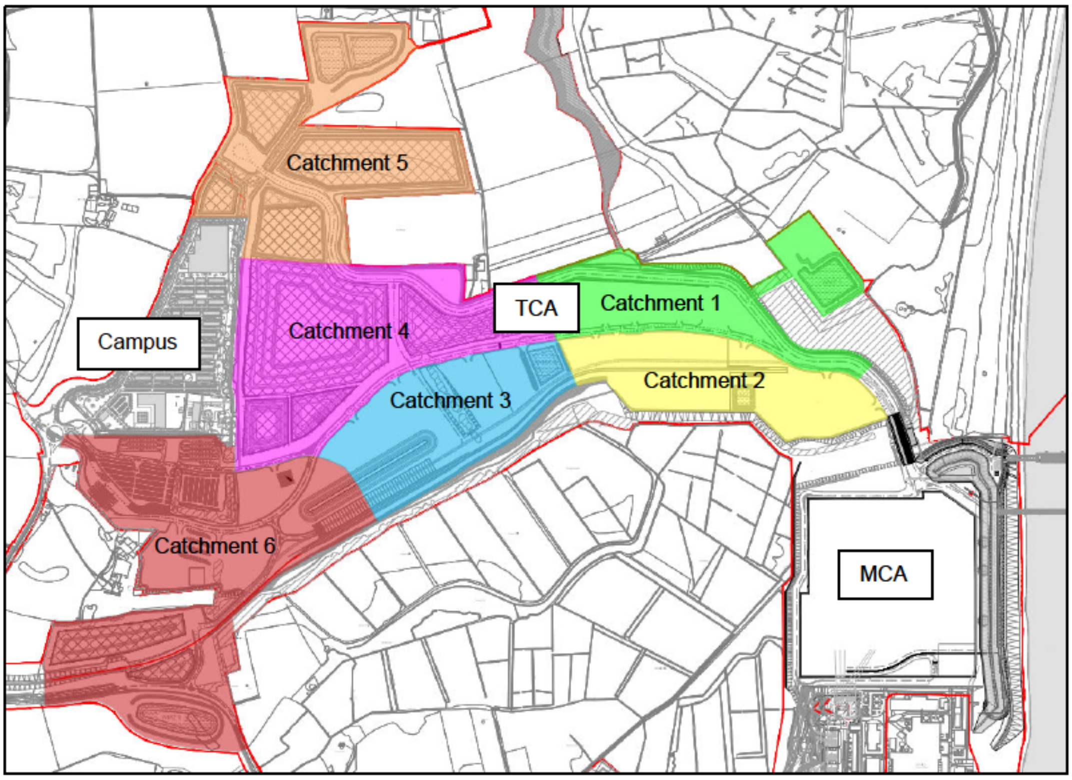


Figure 1-4 - TCA Enabling Works surface water drainage catchments



1.3 Scope

1.3.1 This document provides a summary of infiltration basins that are required to manage surface water runoff during the enabling works, in line with the Enabling Works surface water drainage strategy. The document presents the hydraulic assessment of the WMZs across the TCA, ACA and Railway area.

1.3.2 This document does not address the design of other minor SuDS features such as swales, infiltration trenches, and permeable paving. These features will be further detailed in future proposals, in conjunction with Contractor involvement.

2 DESIGN REQUIREMENTS

2.1.1 In accordance with the Outline Drainage Strategy, all infiltration basins within the MDS are designed to cater for a 100-year flood event plus a 20% allowance for climate change. This section summarises the design parameters used in the hydraulic assessment to determine the size of the WMZ infiltration basins. The volume assessment was conducted using MicroDrainage Source Control using the parameters and assumptions in the following sections. By sizing the infiltration basins using Source Control and not considering additional storage in the upstream network, the storage volumes calculated are conservative and will be able to be reduced in the next design phase.

2.2 General Parameters

2.2.1 The parameters in Table 2-1 were used to determine approximate storage volumes required for critical storm events for 100-year return period for a storm duration of up to 24 hours, including a 20% allowance for climate change in accordance with the Outline Drainage Strategy.

Table 2-1 - Input parameters for MicroDrainage Source Control storage volumes

	Parameter	Notes
Rainfall-Runoff method	Flood Studies Report (FSR), Flood Estimation Handbook (FEH) 1999 and 2013	Sensitivity check using FEH 1999 and 2013
Return Period (years)	100	As per DCO Outline Drainage Strategy [1]
Storm duration (minutes)	15 – 1440	As per DCO Outline Drainage Strategy [1]
Climate Change (%)	20	As per DCO Outline Drainage Strategy [1] and EA guidance [2]
Volumetric Runoff Coefficient	Varies per catchment	Wallingford Procedure Vol 1 Equation 7.3
Freeboard (mm)	300	CIRIA C753 – The SuDS Manual
Factor of Safety	1.5	[3]

[1] Environmental Statement – 6.3 Volume 2 Main Development Site, Chapter 2 Description of the Permanent Development, Appendix 2A Outline Drainage Strategy (EN010012-001802-SZC_Bk6_ES_V2_Ch2_Appx2A)

[2] Environment Agency – Flood risk assessment: climate change allowances - Table 2: peak rainfall intensity allowance in small catchments (less than 5 km^2) or urban drainage catchments (based on a 1961 to 1990 baseline)

[3] Table 25.2 in the CIRIA SuDS manual provides guidance on which Factor of Safety (FoS) to use given a range of areas and consequences of failure. Given this area is a temporary construction site for 10 years with infiltration basins designed for a 1:100 year return period, assuming only infiltration through the sides of the basin, and the selected infiltration rates are the worst case rates from a series of GI campaigns, it is proposed to use a FoS of 1.5 as opposed to 5 or 10. Use of a FoS of 5 or 10 would require even greater oversized infiltration basins which is not deemed necessary, especially where the basins have an overflow to the spine network.

2.2.2 All three rainfall-runoff methods were used to undertake sensitivity checks on the design volumes. It was noted that the FEH 2013 rainfall-runoff method generally provided more conservative values for greater return periods in comparison to FEH 1999 and FSR.

2.2.3 As the Sizewell development site is extensive, two FEH data sets were necessary to undertake the hydraulic modelling and are shown in Table 2-2 below. The rainfall data set used in the ACA drainage modelling was ‘GB 647050, 262950’, whereas all other areas used data set ‘GB 647450, 264900’.

Table 2-2 - FEH 1999 rainfall parameters

FEH Site	C (1km)	D1 (1km)	D2 (1km)	D3 (1km)	E (1km)	F (1km)
GB 647050 262950	-0.019	0.298	0.279	0.207	0.309	2.506
GB 647450 264900	-0.02	0.299	0.272	0.215	0.311	2.506

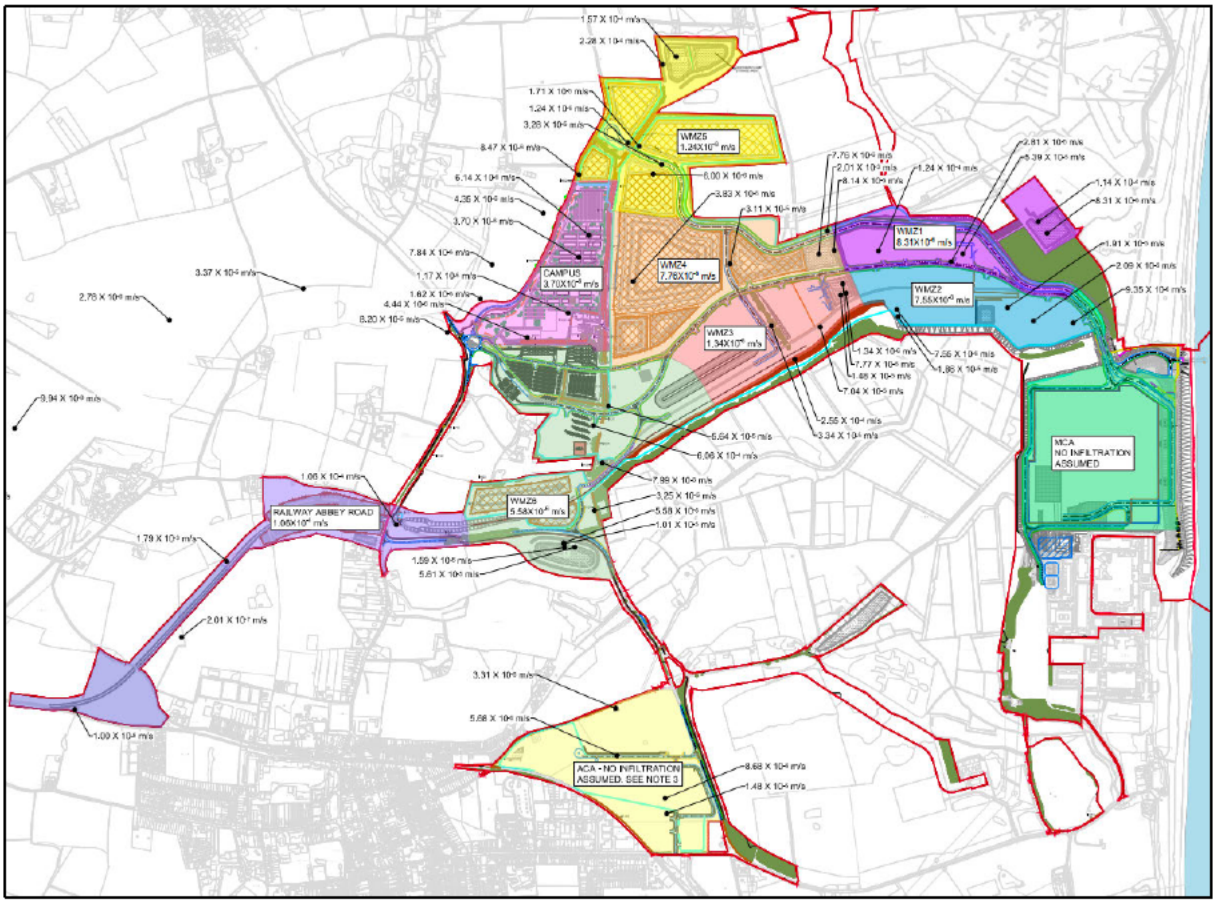
2.2.4 Using FSR, Sizewell, Suffolk was used as the location with M5-60 and 'r' ratio of 18.2 mm and 0.4 taken respectively. Storage estimates using all rainfall-runoff methods are included in this document.

2.2.5 Attenuation structures are modelled in Source Control to have side slopes of 1:3. The infiltration rate has been applied to the side walls of the attenuation structure only. No infiltration is applied to the base of the structure to account for any loss of efficiency over the design life.

2.3 Infiltration rates

2.3.1 Several ground investigation (GI) campaigns have been undertaken across the site to determine the infiltration potential across various catchment areas. The figure below summarises the range of infiltration rates recorded in four separate campaigns in 2014, 2015, 2017 and 2020. The lowest (worst-case) rate for each catchment has been used at this design stage for surface water calculations, specifically to calculate the storage volume required in infiltration basins. Further GI campaigns are planned, and results will be included during the next design stage. The geology across the site is largely sandy which provides confidence that the infiltration rates used in the surface water design are conservative.

Figure 2-1 - Infiltration rates (refer to drawing SZC-EW0320-ATK-XX-000-XXXXXX-DRW-CCD-000001 in Annex A)



2.3.2 In order to calculate the contributing areas to each of the water management zones, they have been assessed based on their land use with their appropriate percentage impermeable (PIMP) value for each area type:

- Roofed buildings: 100%
- Asphalt roads/pavements: 90%
- Gravel areas: 50%
- Road verges: 50%
- Stockpile area: 30%
- Grassed areas: 30%

2.3.3 Using the above PIMP values and known areas within each catchment, a source control model has been run to provide assurance that the design storage is able to be catered for within the WMZ infiltration basins.

2.4 Water Quality

2.4.1 The purpose of this document is to provide clarity around sizing of WMZ infiltration basins, however quality of surface water runoff from the site is also important and therefore is summarised in this section. Surface water discharges to, in order of preference, the ground, nearby watercourses, or the sea.

2.4.2 Discharges to nearby watercourses and the sea will be controlled through permit applications and ongoing monitoring to ensure the quality of the water meets the Environment Agency's (EA) criteria prior to discharge.

2.4.3 There are possible contaminants that need to be considered in surface water treatment design across the site. These are divided into:

- Sediment runoff
- Chemical spills, including concrete batching plant, waste consolidation centre and fuel farm.

2.4.4 Treatment of sediment runoff will be managed through the implementation of SuDS features on site, including:

- Swales
- Infiltration trenches
- Hay bales (around stockpiles)
- Silt fences (where suitable)
- WMZ infiltration basins

2.4.5 The positioning and location of these features will be further defined in the following design phases and will follow overarching principles in the CIRIA SuDS Manual (C753) as well as the Outline Drainage Strategy document.

2.4.6 Treatment of chemical spills will be required at source, by specific treatment systems. For example, around the fuel storage area the pavement will be impermeable to prevent fuel seeping into the groundwater. Any potential oil spills will be captured and treated via an oil interceptor sized and designed suitably for the potentially contaminated spill volumes.

2.4.7 The assessment of water quality risk management for each WMZ will be provided through the simple index approach as outlined in Section 26.7.1 of the CIRIA SuDS Manual (C753). This method will ultimately determine what SuDS measures are required to treat different types of developments across the MDS. The steps are set out as:

Step 1 – Allocate suitable pollution hazard indices for the proposed land use
Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index
Step 3 – Where the discharge is to protected surface waters or groundwater, consider the need for a more precautionary approach

2.4.8 Proposed SuDS features within each catchment will be used to determine a total pollution mitigation index (Table 26.3 CIRIA SuDS Manual). Where additional SuDS features are not considered appropriate at this design stage, proprietary, non-SuDS treatment may be proposed. This assessment will be carried out for each WMZ in the next design phase.

2.5 Discharge Rates

2.5.1 Proposed discharge rates from infiltration basins to nearby watercourses have been defined following the Environment Agency guidance (Report SC030219 – Rainfall runoff management for developments). A Q_{bar} (peak rate of flow from a catchment for the mean annual flood - return period of approximately 1:2.3 years) greenfield runoff rate has been calculated for each catchment using UK SuDS guidance. In some cases (the ACA), this is the proposed restricting flow rate. Across the TCA however, it is noted that Q_{bar} is extremely small, and therefore the Environment Agency guidance is followed, whereby if Q_{bar} is less than 1 l/s/ha, the latter can be proposed as a limiting discharge rate. Where an outfall is proposed from an infiltration basin to nearby watercourses in the TCA and rail catchments, this is the proposed approach.

2.5.2 It is important that the SSSI is neither overwhelmed with additional surface water runoff, nor starved of surface water during the construction and operation of SZC. Maintaining the status quo of how the existing site drains is required to ensure the SSSI retains its current ecological and hydrological features. This has been reinforced by conversations with the EA and other stakeholders and is represented in both the groundwater/surface water modelling and flood risk modelling.

3 WATER MANAGEMENT ZONES

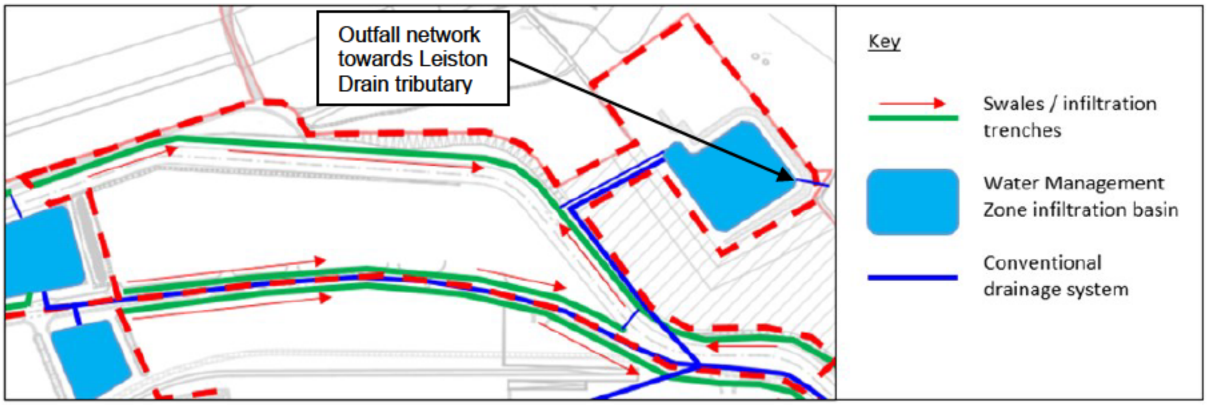
3.1.1 Generally, the surfaces of the catchments are largely permeable, so surface water will infiltrate to ground in the first instance. Any runoff that does not infiltrate directly or captured through swales with infiltration trenches will be captured by a perforated pipe within the trench, that will convey the flow to a Water Management Zone (WMZ) infiltration basin. The WMZs are designed for 100-year return period rainfall events including climate change. In extreme rainfall events the WMZs for catchments 1-4 will overflow into a conventional drainage system (spine network) discharging to the CDO which outflows to the sea.

3.2 Catchment 1

3.2.1 Catchment 1 is located in the north eastern area of proposed TCA. This catchment houses plant and workshops such as joinery/metal workshops, a formwork factory and slurry treatment plants. It also houses the fire and rescue centre, Emergency response facility and fuel farm. The catchment encompasses sections of the site access road to the south, haul roads to north and east, and one of the Contractor's working compounds. Catchment 1 has a total area of 19.4 ha and will drain via combined swale and infiltration trenches with perforated pipes. Two main runs are proposed, north and south of the catchment, both running from the west to WMZ1 which is proposed in the east. An outfall from WMZ1 is proposed to discharge surface water to the Leiston Drain tributary east of WMZ1, at 19.4 l/s (equivalent to 1 l/s/ha). An overflow connection is also proposed from WMZ1 to the Construction Drainage Outfall (CDO).

3.2.2 Due to the nature of the use for this catchment and the risk of potential contamination, most of this area will require control and treatment of surface water runoff prior to discharge. For example, the fuel farm will be concreted, and other areas in the Contractor's compound will be hard standing if there is potential for chemical spills. A 90% PIMP factor is assumed for this catchment. The area of hardstanding may decrease in the future, however for this stage of design, a more conservative value is considered more suitable to space proof the infiltration basin.

Figure 3-1 - Catchment 1 proposed drainage



3.2.3 **WMZ1**

3.2.4 Alongside the general parameters stated in Section 2.2, the parameters in Table 3-1 were used to determine a conservative estimate for the required storage volume for WMZ1. The volume allocated for WMZ1 in the Civil 3D model exceeds this.

3.2.5 WMZ1 is proposed at a low point east of the TCA where the ground levels range between 2 and 3 mAOD. The groundwater contours from Winter 2018 included in the Environmental Statement showed the groundwater level is approximately 0.9 mAOD at the location of WMZ1 (see Annex B). Given the proximity to the groundwater table, infiltration from the basin is not considered feasible and the basin is assumed to be lined.

3.2.6 A more detailed figure showing the proposed arrangement of the WMZ1 basin is provided in Annex C.

Table 3-1 - Water Management Zone 1 - Infiltration Basin Summary

Design Input		**Comment**
Total catchment area	19.430 ha	
Percentage of runoff	90%	To be revised as design progresses
Volumetric runoff coefficient (Cv)	0.684, 0.746	Summer, winter respectively
Infiltration rate	0 m/s	
Overflow allowance to nearby watercourse	19.43 l/s	Assumed at 1 l/s/ha [1]
Overflow to spine network	Yes	Allowance for 200 l/s, not included in model
Sediment forebay	Included	To be detailed in next design phase
Access ramp	Included	To be detailed in next design phase
Groundwater level	0.900 mAOD	Based on Environment Statement groundwater contours (Annex B)
MicroDrainage Source Control Summary		
FSR	10770.1 m^3	1:100 year return period, 1440 winter storm
FEH 1999	13946.6 m^3	1:100 year return period, 1440 winter storm
FEH 2013	**14690.4 m^3**	1:100 year return period, 1440 winter storm
Civil 3D Model Summary		
Invert level of basin	1.200 mAOD	
Bottom of basin area	10579.2 m^2	

Top of basin area (excluding freeboard)	12618.8 m^2	
Freeboard allowance	300mm	
Side slopes	1:3	
Total volume provided	**17328 m^3**	(excluding 300mm freeboard)

[1] Based on Environment Agency guidance - Rainfall runoff management for developments ref. SC030219. Limiting discharge rates for sites should be set to Qbar or 1 l/s/ha, whichever is greater.

3.3 Catchment 2

3.3.1 Catchment 2 is south of catchment 1 and encompasses sections of the site access and haul roads at the point they converge and then cross the SSSI. It will contain Contractor compounds, including concrete batching plant, the railhead, a waste consolidation area, and several laydown areas. The catchment has a total area of approximately 17.4 ha. The majority of this area will be hardstanding and therefore a 90% PIMP factor has been assumed. The area of hardstanding may decrease in the future, however for this stage of design, a more conservative value is considered more suitable to space proof the infiltration basin.

3.3.2 The drainage in this catchment includes road edge swales to the south of the main access road collecting road runoff and runoff from the compound area north of the railhead. A separate network made up of filter drains is proposed at the compound perimeter to cater for the runoff immediately south of the railhead. The network discharges into WMZ2 to the south. An outfall from WMZ2 is proposed to discharge surface water to the Leiston Drain south of WMZ2, at 17.4 l/s (equivalent to 1 l/s/ha). An overflow connection is also proposed from WMZ2 to the Construction Drainage Outfall (CDO) via a spine network as a precaution.

Figure 3-2 - Catchment 2 proposed drainage

3.3.3 WMZ2

3.3.4 The parameters in Table 3-2 were used to determine a conservative estimate of the attenuation volume required to serve TCA Catchment 2.

Table 3-2 - Water Management Zone 2 - Infiltration Basin Summary

Design Input		**Comment**
Total catchment area	17.370 ha	
Percentage of runoff	90%	To be revised as design progresses
Volumetric runoff coefficient (Cv)	0.684, 0.746	Summer, winter respectively
Infiltration rate	7.55E-06 m/s	
Overflow allowance to nearby watercourse	17.37 l/s	Assumed at 1 l/s/ha [1]
Overflow to spine network	Yes	Allowance for 200 l/s, not included in model
Sediment forebay	Included	To be detailed in next design phase
Access ramp	Included	To be detailed in next design phase
Groundwater level	0.800 mAOD	Based on Environment Statement groundwater contours (Annex B)
MicroDrainage Source Control Summary		
FSR	9211.2 m^3	1:100 year return period, 1440 winter storm
FEH 1999	12005.4 m^3	1:100 year return period, 1440 winter storm
FEH 2013	**12663.5 m^3**	1:100 year return period, 1440 winter storm
Civil 3D Model Summary		
Invert level of basin	3.200 mAOD	
Bottom of basin area	3290.1 m^2	
Top of basin area (excluding freeboard)	6274.5 m^2	
Freeboard allowance	300mm	
Side slopes	1:3	
Total volume provided	**17694.5 m^3**	(excluding 300mm freeboard)

[1] Based on Environment Agency guidance - Rainfall runoff management for developments ref. SC030219. Limiting discharge rates for sites should be set to Qbar or 1 l/s/ha, whichever is greater.

3.4 Catchment 3

3.4.1 Catchment 3 is to the west of catchment 2 and is enclosed by roads on three sides and the rail to the south. It encompasses part of the combined site access road, a section of the railway and two Contractor's compounds. The catchment has a total area of approximately 21.0 ha. A 90% percentage of impermeable area has been allowed for in these areas conservatively, should the use of the Contractor compounds require hardstanding surfaces. This will likely be reduced in the future. A 50% PIMP has been applied to the railway sections.

3.4.2 The runoff is divided to drain into the road drainage swales proposed along the roads forming the perimeter drainage. A separate network has been designed to cater for the runoff from the unloading area platform and railway drainage. The perimeter drainage discharges to WMZ3 to the east of the catchment. An outfall from WMZ2 is proposed to discharge surface water to the Leiston Drain south of WMZ3, at 21.0 l/s (equivalent to 1 l/s/ha). An overflow connection is also proposed from WMZ3 to the Construction Drainage Outfall (CDO) via a spine network.

Figure 3-3 - Catchment 3 proposed drainage

3.4.3 **WMZ3**

3.4.4 Table 3-3 summarises the parameters used to determine a conservative estimate of the attenuation volume required and the volume space-proofed for WMZ3.

3.4.5 A more detailed figure showing the proposed arrangement of the WMZ3 basin is provided in Annex C.

Table 3-3 - Water Management Zone 3 - Infiltration Basin Summary

Design Input		**Comment**
Total catchment area	20.960 ha	
Percentage of runoff	90%	
Volumetric runoff coefficient (Cv)	0.684, 0.746	Summer, winter respectively
Infiltration rate	1.34E-06 m/s	
Overflow allowance to nearby watercourse	20.96 l/s	Assumed at 1 l/s/ha [1]
Overflow to spine network	Yes	Allowance for 200 l/s, not included in model
Sediment forebay	Included	To be detailed in next design phase
Access ramp	Included	To be detailed in next design phase
Groundwater level	1.200 mAOD	Based on Environment Statement groundwater contours (Annex B)
MicroDrainage Source Control Summary		
FSR	11458.8 m^3	1:100 year return period, 1440 winter storm
FEH 1999	14887.7 m^3	1:100 year return period, 1440 winter storm
FEH 2013	**15685.8 m^3**	1:100 year return period, 1440 winter storm
Civil 3D Model Summary		
Invert level of basin	5.000 mAOD	
Bottom of basin area	3346.8 m^2	
Top of basin area (excluding freeboard)	7162.9 m^2	
Freeboard allowance	300mm	
Side slopes	1:3	
Total volume provided	**17341.0 m^3**	(excluding 300mm freeboard)

[1] Based on Environment Agency guidance - Rainfall runoff management for developments ref. SC030219. Limiting discharge rates for sites should be set to Qbar or 1 l/s/ha, whichever is greater.

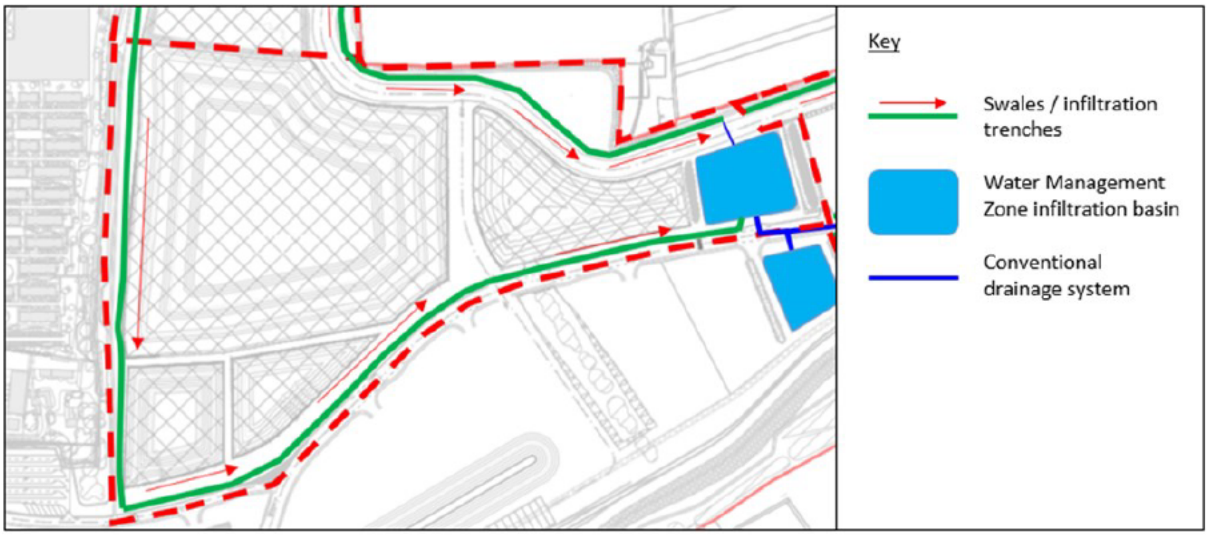
3.5 Catchment 4

3.5.1 Catchment 4 is to the west of catchment 1. It encompasses part of the access and haul road but is predominantly material storage and stockpile area. The catchment has a total area of approximately 33.3 ha. This results in a conservative percentage of impermeable area (PIMP) for the catchment to be 50%. As stockpiles are assigned a 30% PIMP, this figure may be reduced in the future, but for this design phase is considered conservative.

3.5.2 Perimeter road swales have been proposed along the roads to drain the runoff from the catchment. Two such networks, one from the north and the other from the south, discharge to WMZ4 located to the east of the catchment. An overflow connection is also proposed from WMZ4 to the Construction Drainage Outfall (CDO) via a spine network as a precaution.

3.5.3 A more detailed figure showing the proposed arrangement of the WMZ4 basin is provided in Annex C.

Figure 3-4 - Catchment 4 proposed drainage



3.5.4 **WMZ4**

3.5.5 Table 3-4 summarises the parameters used to determine a conservative estimate of the attenuation volume required and the volume space-proofed for WMZ4.

Table 3-4 - Water Management Zone 4 - Infiltration Basin Summary

Design Input		Comment
Total catchment area	33.320 ha	
Percentage of runoff	50%	
Volumetric runoff coefficient (Cv)	0.568, 0.680	Summer, winter respectively
Infiltration rate	7.76E-06 m/s	

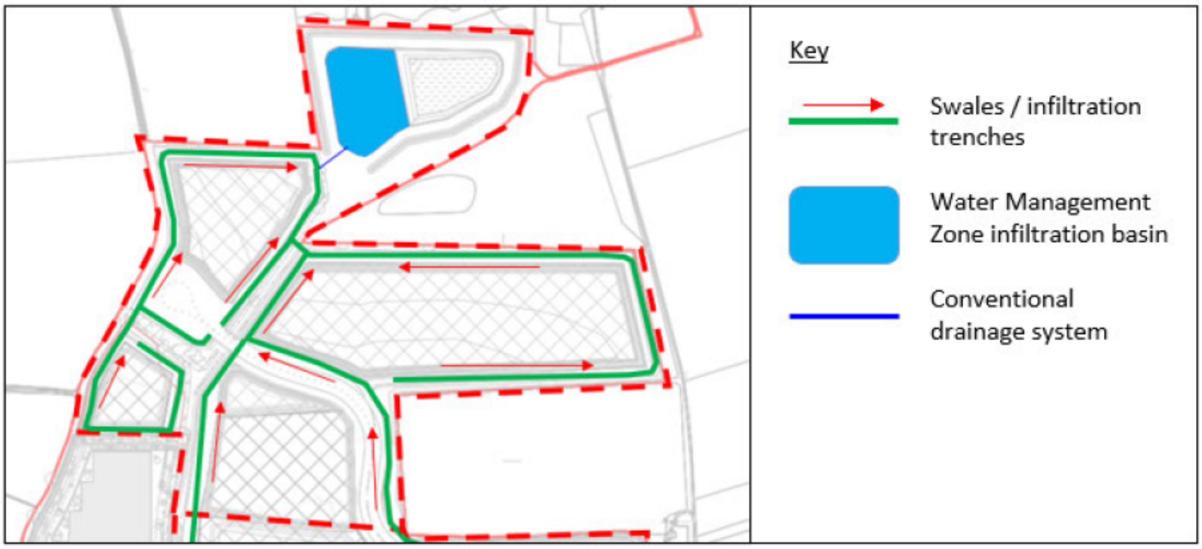
Overflow allowance to nearby watercourse	No	
Overflow to spine network	Yes	Allowance for 200 l/s, not included in model
Sediment forebay	Included	To be detailed in next design phase
Access ramp	Included	To be detailed in next design phase
Groundwater level	1.200 mAOD	Based on Environment Statement groundwater contours (Annex B)
MicroDrainage Source Control Summary		
FSR	10080.8 m³	1:100 year return period, 1440 winter storm
FEH 1999	12795.4 m³	1:100 year return period, 1440 winter storm
FEH 2013	**13422.3 m³**	1:100 year return period, 1440 winter storm
Civil 3D Model Summary		
Invert level of basin	5.200 mAOD	
Bottom of basin area	4916.6 m²	
Top of basin area (excluding freeboard)	9759.7 m²	
Freeboard allowance	300mm	
Side slopes	1:3	
Total volume provided	**25688.8 m³**	(excluding 300mm freeboard)

3.6 Catchment 5

3.6.1 Catchment 5 is to be north of catchment 4. It encompasses part of the haul road and is predominantly made up of proposed borrow pits and stockpile areas. The catchment has a total area of approximately 31.2 ha. A 50% PIMP factor has been applied to this area. As with catchment 4, this may be reduced in the future.

3.6.2 Two drainage networks along the site boundary have been designed as perimeter swales/infiltration trenches with perforated pipes, as well as a network surrounding the storage area. These networks discharge to WMZ5 located to the north of the catchment. No outfalls are proposed from WMZ5 at this stage.

Figure 3-5 - Catchment 5 proposed drainage



3.6.3 **WMZ5**

3.6.4 Table 3-5 summarises the parameters used to determine a conservative estimate of the attenuation volume required and the volume space-proofed for WMZ5.

Table 3-5 - Water Management Zone 5 - Infiltration Basin Summary

Design Input		**Comment**
Total catchment area	31.195 ha	
Percentage of runoff	50%	
Volumetric runoff coefficient (Cv)	0.568, 0.680	Summer, winter respectively
Infiltration rate	1.24E-06 m/s	
Overflow allowance to nearby watercourse	No	
Overflow to spine network	No	
Sediment forebay	Included	To be detailed in next design phase
Access ramp	Included	To be detailed in next design phase
Groundwater level	1.400 mAOD	Based on Environment Statement groundwater contours (Annex B)
MicroDrainage Source Control Summary		
FSR	9715.2 m^3	1:100 year return period, 1440 winter storm
FEH 1999	12296.3 m^3	1:100 year return period, 1440 winter storm

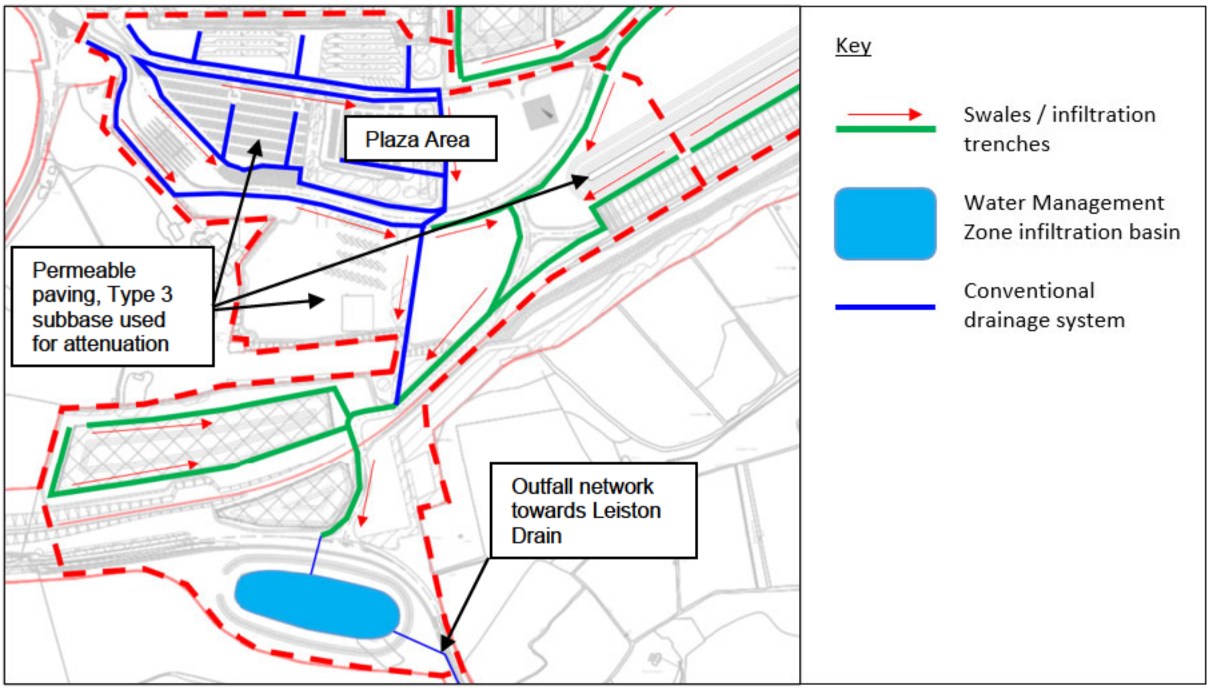
FEH 2013	12891.1 m^3	1:100 year return period, 1440 winter storm
Civil 3D Model Summary		
Invert level of basin	6.000 mAOD	
Bottom of basin area	7658.1 m^2	
Top of basin area (excluding freeboard)	9615.7 m^2	
Freeboard allowance	300mm	
Side slopes	1:3	
Total volume provided	**17223.8 m^3**	(excluding 300mm freeboard)

3.7 Catchment 6 & Plaza

3.7.1 Catchment 6 is located to the south-west of catchment 3 and encompasses site access roads, part of the railway, numerous site facilities, including rail and freight security buildings, vehicle inspection cabins, and the main TCA site offices. Catchment 6 also encompasses a sewage treatment plant, potable water storage facility and the Plaza area. The catchment has a total area of approximately 47.8 ha. A 58% PIMP has been applied to this catchment to account for stockpiles, soft landscaping and where TruckPave is proposed as hardstanding.

3.7.2 The rail drainage consists of filter drains adjacent to the track, cut off drains at the top of the cutting, and toe ditches at the bottom of the embankment. The Plaza drainage consists of filter drains along the road verges. Perimeter swales are proposed around the storage areas and adjacent to the access roads. All drainage networks discharge to WMZ6 located to the south of the catchment. An overflow is proposed to discharge runoff to the Leiston Drain near Lover's Lane.

Figure 3-6 - Catchment 6 proposed drainage



3.7.3 **WMZ6**

3.7.4 Table 3-6 summarises the parameters used to determine a conservative estimate of the attenuation volume required and the volume space-proofed for WMZ6.

Table 3-6 - Water Management Zone 6 - Infiltration Basin Summary

Design Input		Comment
Total catchment area	47.770 ha	
Percentage of runoff	58%	
Volumetric runoff coefficient (Cv)	0.604, 0.701	Summer, winter respectively
Infiltration rate	5.58E-06 m/s	
Overflow allowance to nearby watercourse	47.77 l/s	Assumed at 1 l/s/ha [1]
Overflow to spine network	No	
Sediment forebay	Included	To be detailed in next design phase
Access ramp	Included	To be detailed in next design phase
Groundwater level	2.100 mAOD	Based on Environment Statement groundwater contours (Annex B)

MicroDrainage Source Control Summary		
FSR	14418.3 m^3	1:100 year return period, 1440 winter storm
FEH 1999	19117.2 m^3	1:100 year return period, 1440 winter storm
FEH 2013	**20216.7 m^3**	1:100 year return period, 1440 winter storm
Civil 3D Model Summary		
Invert level of basin	8.000 mAOD	
Bottom of basin area	7165.8 m^2	
Top of basin area (excluding freeboard)	11287.5 m^2	
Freeboard allowance	300mm	
Side slopes	1:3	
Total volume provided	**19376.0 m^3**	(excluding 300mm freeboard)

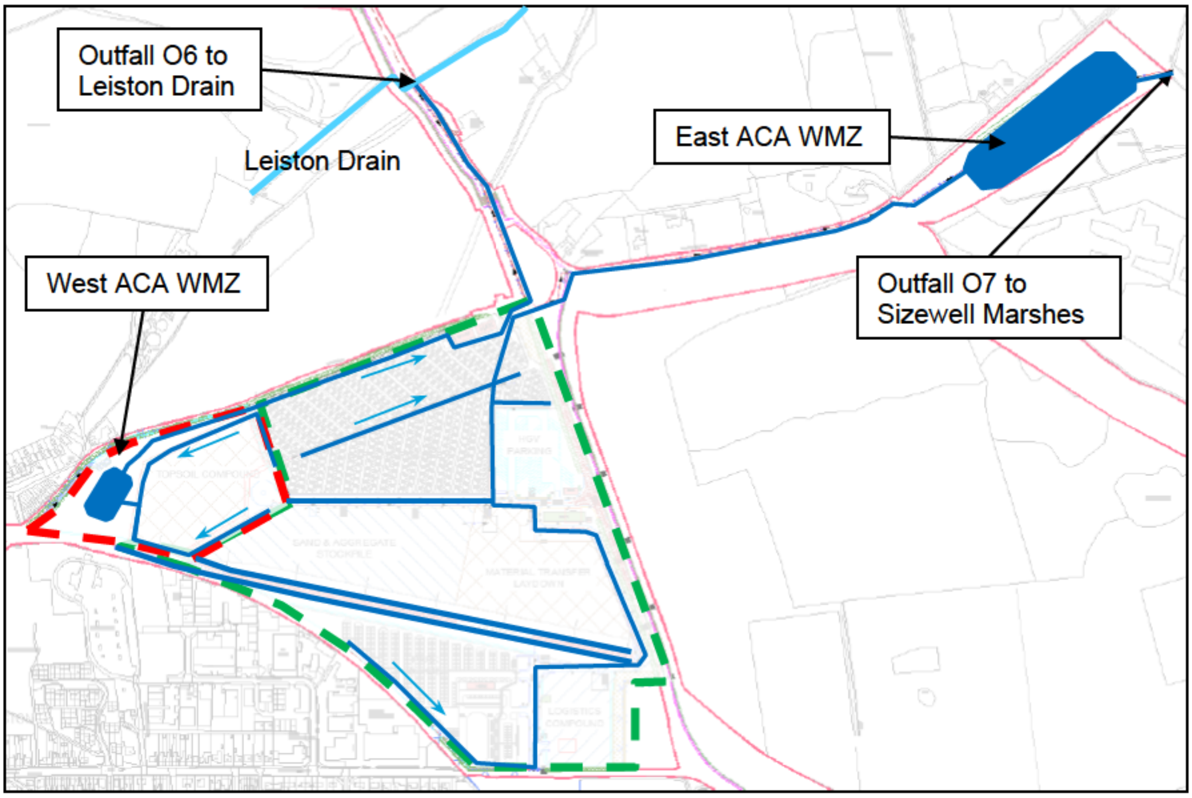
[1] Based on Environment Agency guidance - Rainfall runoff management for developments ref. SC030219. Limiting discharge rates for sites should be set to Qbar or 1 l/s/ha, whichever is greater.

3.8 Ancillary Construction Area (ACA)

3.8.1 The ACA is isolated from the TCA and MCA, and therefore has an independent surface water drainage network to that serving the main construction site. The ACA has an area of approximately 29.7 ha and encompasses caravan pitches, HGV parking, topsoil compound, sand and aggregate stockpile, material transfer laydown, park and ride and logistics compound. No infiltration is assumed within the ACA as per the DCO Outline Drainage Strategy, and runoff will be collected by a variety of features including swales, permeable paving with filter drains and conventional drainage elements.

3.8.2 Two water management zone attenuation features are proposed to store runoff prior to discharge. Runoff from the topsoil compound area and the area west of this compound (dashed red line in Figure 3-7) will be captured in swales and attenuated in the West ACA WMZ, before discharging to the Leiston Drain near Lover's Lane. Surface water runoff from all other areas (dashed green line in Figure 3-7) within the ACA will be conveyed to the East ACA WMZ, before discharging to the Sizewell Marshes. The outflows will be limited to greenfield runoff rates (Q_{bar}).

Figure 3-7 - ACA proposed drainage



3.8.3 **East ACA WMZ**

3.8.4 The drainage strategy within the ACA has been modified since Basic Design following agreement with the Environment Agency and Suffolk County Council to allow more runoff to be attenuated in the East WMZ and discharge to the Sizewell Marshes. Therefore, the area currently designated for the East WMZ in the construction site plot plan is being increased to meet the required volume calculated in Table 3-7.

3.8.5 The required attenuation volume for the East ACA WMZ is conservatively estimated as 21700 m^3. Further work will be undertaken during Detailed Design to determine the actual volume required, allowing for storage in the pipe network and infiltration within the WMZ.

Table 3-7 - ACA East - Infiltration Basin Summary

Design Input		Comment
Total catchment area	25.222 ha	
Percentage of runoff	100%	
Volumetric runoff coefficient (Cv)	0.761, 0.817	Summer, winter respectively
Infiltration rate	0 m/s	

Overflow allowance to nearby watercourse	59.87 l/s	Q_{bar}
Overflow to spine network	No	
Sediment forebay	Included	To be detailed in next design phase
Access ramp	Included	To be detailed in next design phase
Groundwater level	1.000 mAOD	Based on Environment Statement groundwater contours (Annex B)
MicroDrainage Source Control Summary		
FSR	15381.1 m^3	1:100 year return period, 1440 winter storm
FEH 1999	20579.7 m^3	1:100 year return period, 1440 winter storm
FEH 2013	**21641.3 m^3**	1:100 year return period, 1440 winter storm
Civil 3D Model Summary		
Invert level of basin	2.450 mAOD	
Freeboard allowance	300mm	
Side slopes	1:3	
Total volume provided	**22000 m^3**	(excluding 300mm freeboard)

3.8.6 West ACA WMZ

3.8.7 As stated above, the ACA drainage strategy is under development and the required attenuation volume for the West ACA WMZ is conservatively estimated as 3850 m^3. The current CSPP and Civil3D model includes a significantly smaller volume based on the previous ACA drainage strategy. Further modelling will be undertaken during Detailed Design to verify the size of the attenuation basin, including allowance for storage in the pipe network. Following this, the CSPP and Civil3D model will be updated accordingly.

Table 3-8 - ACA West - Infiltration Basin Summary

Design Input		Comment
Total catchment area	4.438 ha	
Percentage of runoff	100%	
Volumetric runoff coefficient (Cv)	0.761, 0.817	Summer, winter respectively
Infiltration rate	0 m/s	

Overflow allowance to nearby watercourse	10.53 l/s	Q_{bar}
Overflow to spine network	Yes	Allowance for 200 l/s, not included in model
Sediment forebay	Included	To be detailed in next design phase
Access ramp	Included	To be detailed in next design phase
Groundwater level	2.100 mAOD	Based on Environment Statement groundwater contours (Annex B)
MicroDrainage Source Control Summary		
FSR	2698.8 m^3	1:100 year return period, 1440 winter storm
FEH 1999	3623.2 m^3	1:100 year return period, 1440 winter storm
FEH 2013	**3812.3 m^3**	1:100 year return period, 1440 winter storm
Civil 3D Model Summary		
Invert level of basin	2.500 mAOD	
Freeboard allowance	300mm	
Side slopes	1:3	
Total volume provided	**4000 m^3**	Still to be modelled, but this area has been space-proofed for this size basin

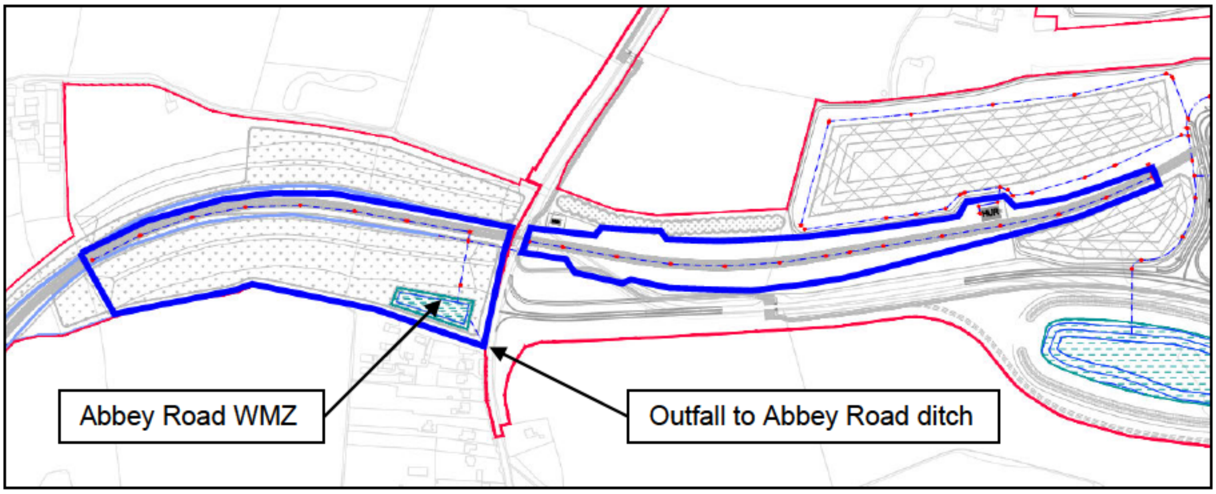
3.9 West Railway Catchment 3 - Abbey Road

3.9.1 The West Railway Catchment 3 is one of five catchments serving the proposed Green Rail Route, which is located with the Main Development Site. The railway drainage largely relies on infiltration trenches and swales to drain the proposed track in addition to allowing continuity of existing ditches and watercourses.

3.9.2 West Railways Catchment 3 is approximately 6.5 ha and is in cutting with a level crossing at Abbey Road. Cut-off ditches are proposed on both the side of the rail cutting in order to capture the runoff from the landscape bund. A filter drain is proposed at the downside of the embankment to drain the railway runoff. A WMZ basin coupled with hydro-brake is proposed to limit the discharge as required. Runoff that does not infiltrate at source will convey to a WMZ infiltration basin and overflow to the Abbey Road ditch.

3.9.3 Figure 3-8 shows the currently proposed Abbey Road WMZ basin location. This location may be updated in the future to account for emerging flood modelling information and existing known flooding issues in the vicinity of the current proposed WMZ basin.

Figure 3-8 - West Railway Catchment 3 – Abbey Road WMZ



3.9.4 **Abbey Road WMZ**

3.9.5 Table 3-9 summarises the parameters used to determine a conservative estimate of the attenuation volume required and the volume space-proofed for the Abbey Road WMZ.

Table 3-9 - Abbey Road WMZ - Infiltration Basin Summary

Design Input		**Comment**
Total catchment area	6.478 ha	
Percentage of runoff	50%	
Volumetric runoff coefficient (Cv)	0.568, 0.680	Summer, winter respectively
Infiltration rate	1.06E-04 m/s	
Overflow allowance to nearby watercourse	6.50 l/s	Assumed at 1 l/s/ha [1]
Overflow to spine network	No	
Sediment forebay	Included	To be detailed in next design phase
Access ramp	Included	To be detailed in next design phase
Groundwater level	3.000 mAOD	Based on Environment Statement groundwater contours (Annex B)
MicroDrainage Source Control Summary		
FSR	1048.1 m^3	1:100 year return period, 240 winter storm

FEH 1999	**1413.5 m³**	1:100 year return period, 240 winter storm
FEH 2013	1338.8 m³	1:100 year return period, 600 winter storm
Civil 3D Model Summary		
Invert level of basin	6.742 mAOD	
Bottom of basin area	1268.6 m²	
Top of basin area (excluding freeboard)	1964.5 m²	
Freeboard allowance	300mm	
Side slopes	1:3	
Total volume provided	**1872.0 m³**	(excluding 300mm freeboard)

[1] Based on Environment Agency guidance - Rainfall runoff management for developments ref. SC030219. Limiting discharge rates for sites should be set to Qbar or 1 l/s/ha, whichever is greater.

4 SUMMARY

4.1.1 This technical note summarises the required storage volumes for each WMZ attenuation basin across the SZC enabling works site. The volumes calculated are conservative and based on several assumptions. Further hydraulic modelling will be undertaken during Detailed Design which will decrease the required storage volumes. Table 4-1 provides a summary of the worst-case hydraulic model required storage volumes against the volumes currently provided for on the CSPP.

Table 4-1 - Water Management Zone - Infiltration Basin Summary

Design Input	Design Volume (m³) (worst case)	CAD Modelled Volume (m³)	Comment
WMZ1	14690.4	17328	Sufficient volume provided
WMZ2	12663.5	17694.5	Sufficient volume provided
WMZ3	15685.8	17341	Sufficient volume provided
WMZ4	13422.3	25688.8	Sufficient volume provided
WMZ5	12891.1	17223.8	Sufficient volume provided
WMZ6	20216.7	19376	Sufficient volume provided [3]
WMZ – ACA west	3812.3	4000	[1],[2] Sufficient volume provided

WMZ – ACA east	21641.3	22000	[1],[2] Sufficient volume provided
WMZ – Abbey Road	1413.5	1872	Sufficient volume provided

[1] Construction site plot plan is being updated to include additional volume as necessary to account for updated discharge strategy at the ACA in accordance with recent discussions with the EA and SCC.

[2] All WMZ infiltration basins have been sized based on source control models which do not consider additional storage volume in the network. Sizing the basins in this way allows space allocation on the plot plan, so that basin volumes and footprints can likely be downsized in the next design phase.

[3] Additional storage is provided in the Type 3 subbase of the permeable paving within the carpark of the plaza to provide the required design volume.

REFERENCES

1. Outline Drainage Strategy at Volume 2, Chapter 2, Appendix 2A of the Environmental Statement [APP-181]

2. Environment Agency – Climate change allowances, Table 2. Flood risk assessments: climate change allowances - GOV.UK (www.gov.uk)

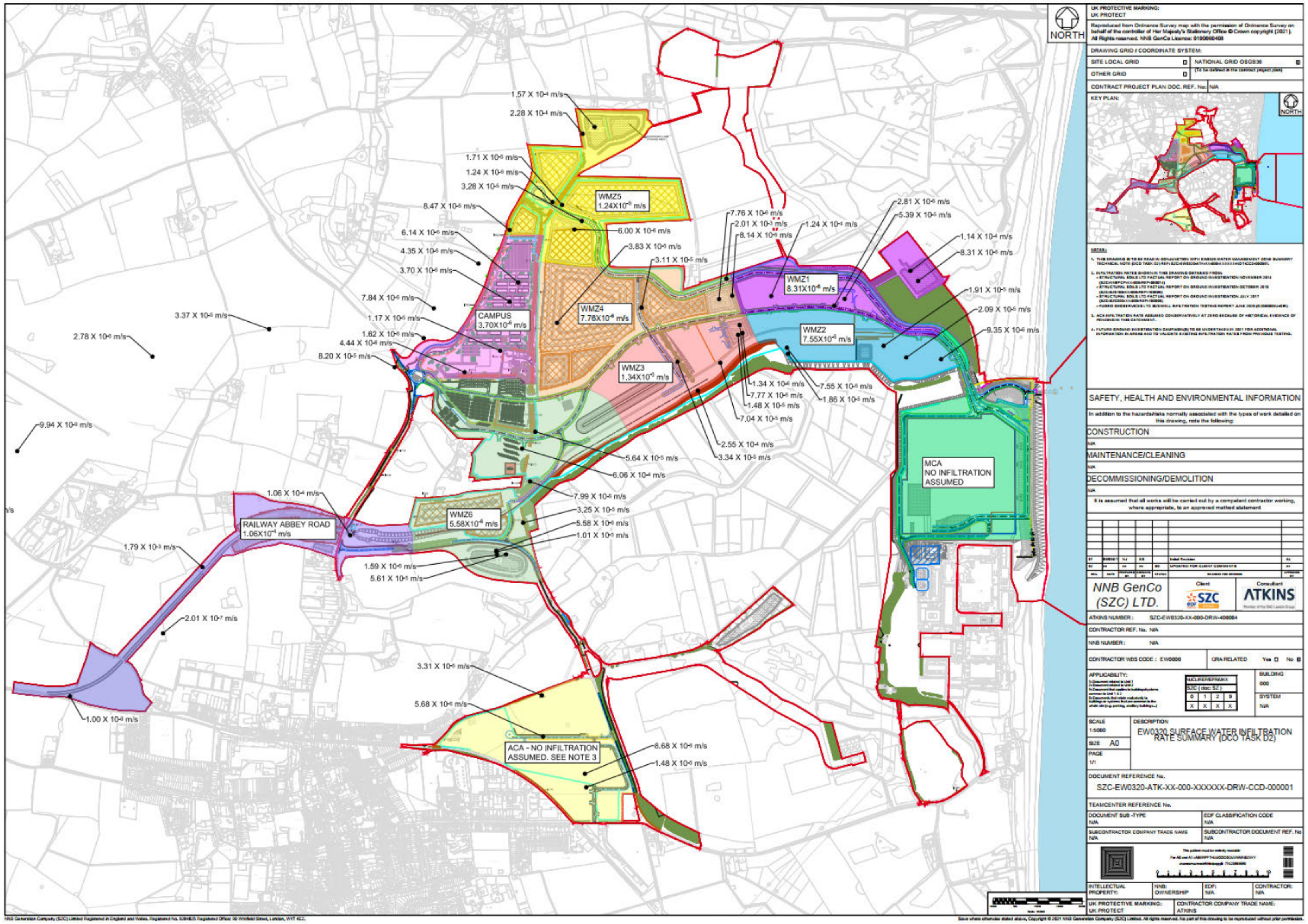
3. CIRIA - The SuDS Manual 2015. CIRIA C753

4. Fugro - Sizewell C Infiltration Testing Report on Ground Investigation without Geotechnical Evaluation. G200003U_GIR Rev 02

5. Environment Agency - Rainfall Runoff Management for Development. SC030219

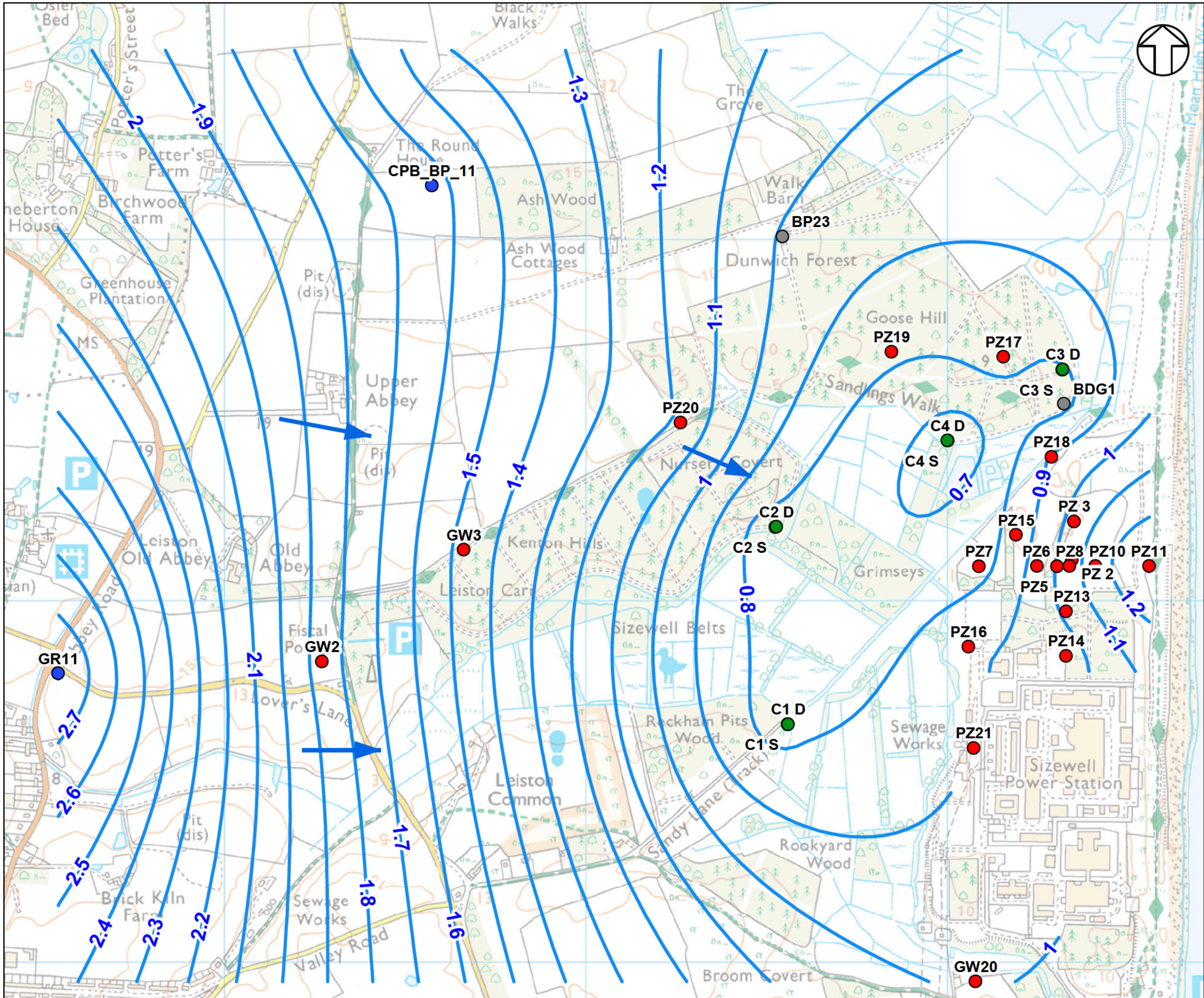
ANNEX A

Infiltration Tests Summary Drawing


NORTH
WMZ5
1.24X10⁻⁶ m/s
WMZ4
7.76X10⁻⁶ m/s
WMZ3
1.34X10⁻⁶ m/s
WMZ1
8.31X10⁻⁶ m/s
WMZ2
7.55X10⁻⁶ m/s
CAMPUS
3.70X10⁻⁶ m/s
WMZ6
5.58X10⁻⁶ m/s
RAILWAY ABBEY ROAD
1.06X10⁻⁴ m/s
MCA
NO INFILTRATION
ASSUMED
ACA - NO INFILTRATION
ASSUMED. SEE NOTE 3
SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
CONSTRUCTION
MAINTENANCE/CLEANING
DECOMMISSIONING/DEMOLITION
NNB GenCo
(SZC) LTD.
ATKINS
EW0320 SURFACE WATER INFILTRATION RATE SUMMARY (DCO TASK D2)
SZC-EW0320-ATK-XX-000-XXXXXX-DRW-CCD-000001

ANNEX B

Infiltration Tests Summary Drawing



NOTES

PEAT CONTOURS ARE CONSTRAINED TO THE EXTENT OF THE PEAT DEPOSITS

KEY

- 2010 BOREHOLES
- 2013 BOREHOLES
- 2014 BOREHOLES
- 2015 BOREHOLES
- GROUNDWATER CRAG CONTOURS (MAOD) - WINTER 2018
- GROUNDWATER FLOW DIRECTION

NOT PROTECTIVELY MARKED

SZC
EDF ENERGY
CGN

Project Title:
SIZEWELL C PROJECT
ENVIRONMENTAL STATEMENT
VOLUME 2
CHAPTER 19B1
GROUNDWATER AND SURFACE WATER APPENDIX B1

DRAWING TITLE:
GROUNDWATER CONTOURS IN CRAG AQUIFER DURING WINTER 20 8 (9 2 2018)

DRAWING NO:
FIGURE 19B 1.16

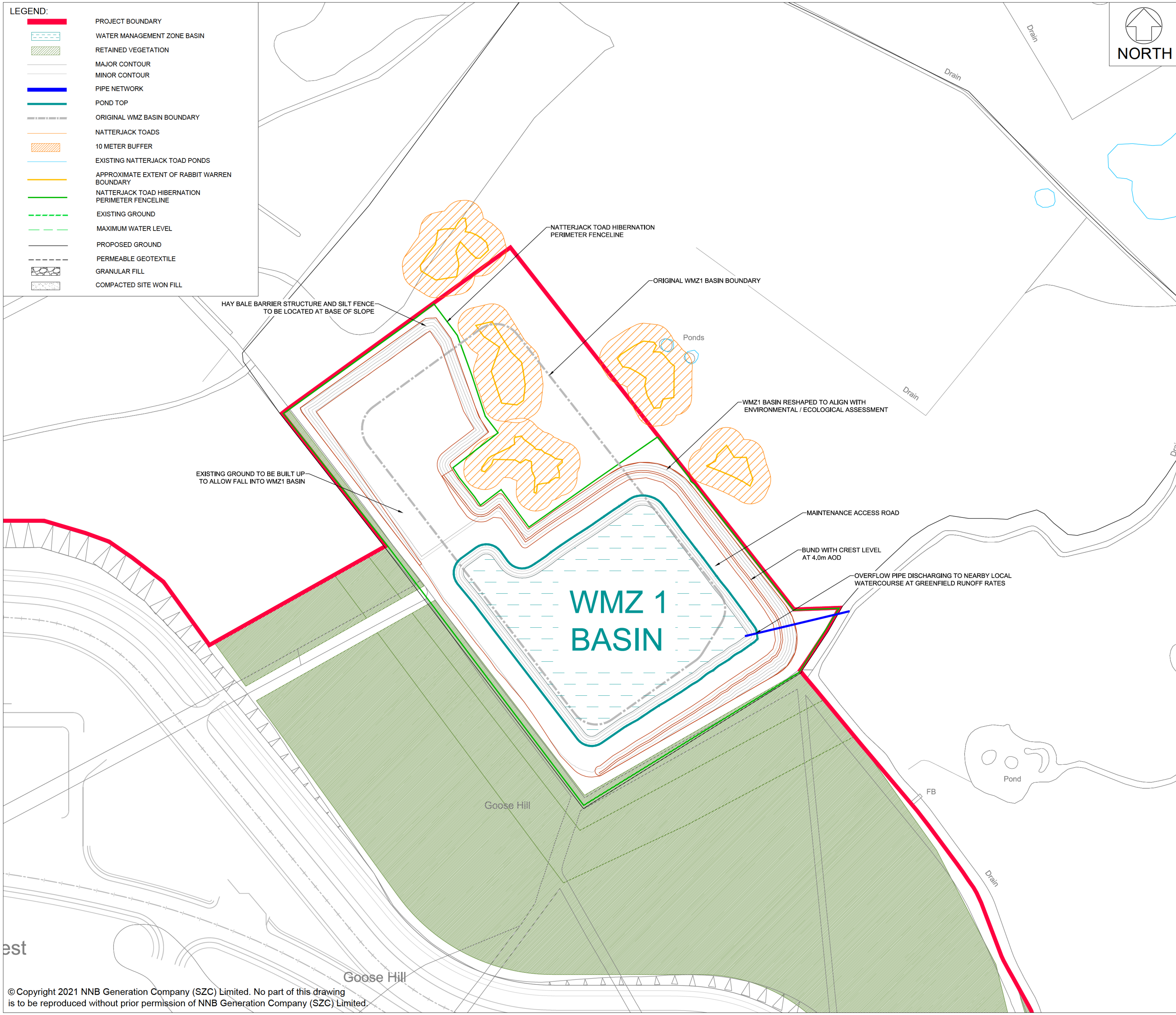
DATE:	DRAWN:	SCALE :
JAN 2020	S.R.H	1:10,103 @A3

SCALE BAR
0 0.1 0.2 0.3 0.4 0.5 KM

ANNEX C

Figure 1 – Water Management Zone 1 Basin

Figure 2 – Water Management Zones 3 and 4 Basins



KEY PLAN

NORTH

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.

REFERENCES:

1. SZC_MDS_RABBIT WARREN INFO

REVISION	DATE	DRAWN	CHECKED	REASONS FOR REVISION / COMMENTS	APPROVED
01	JULY 2021	SN	RV	DCO SUBMISSION	SZC Co

NOT PROTECTIVELY MARKED

COPYRIGHT:

PROJECT:
SIZEWELL C

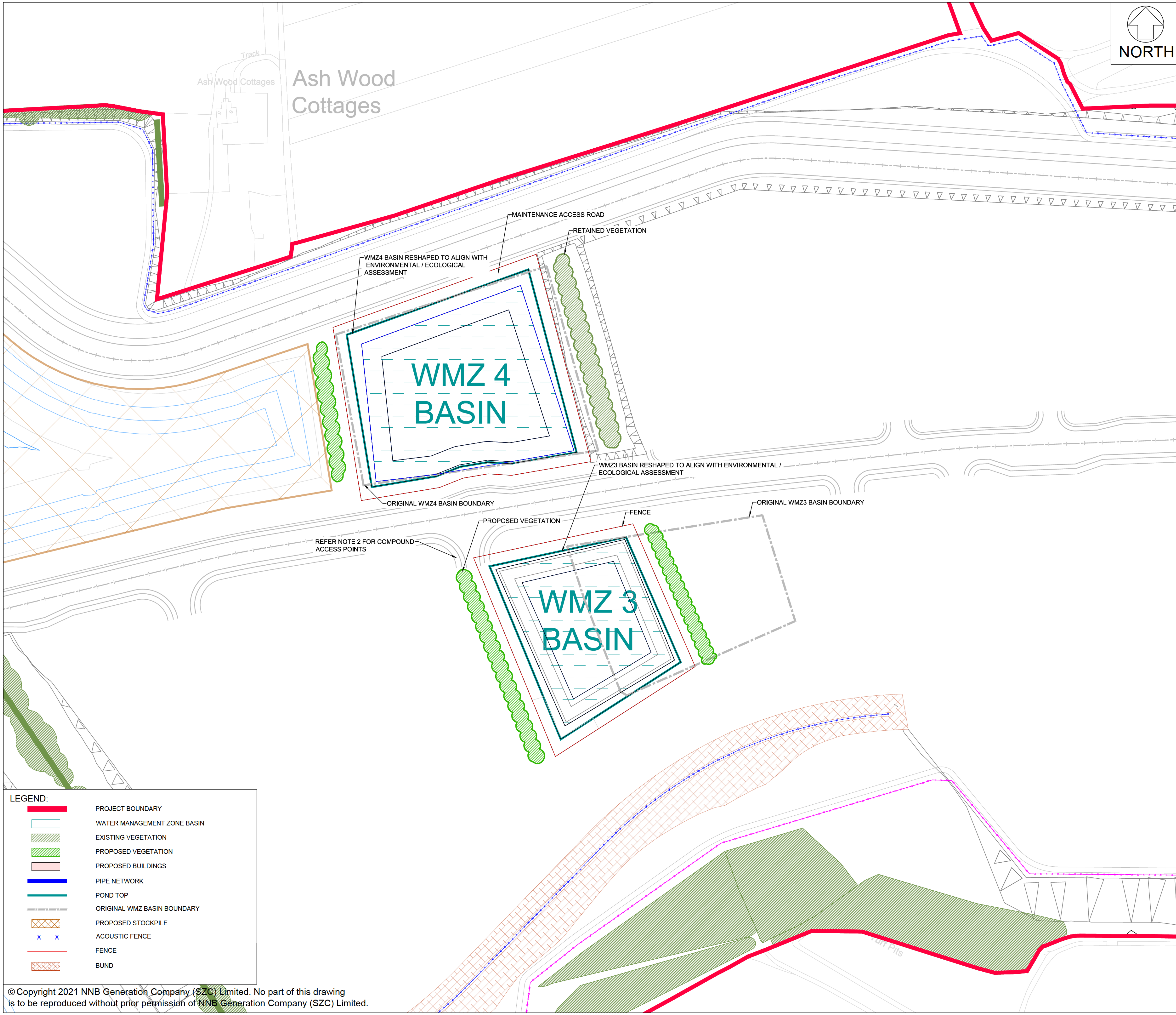
DOCUMENT:
MAIN DEVELOPMENT SITE
WATER MANAGEMENT ZONE SUMMARY
ANNEX C
DEADLINE 5 SUBMISSION JULY 2021

DRAWING TITLE:
WATER MANAGEMENT ZONE 1
DESIGN UPDATE - PLAN

FIGURE NO:	REVISION:
FIGURE 1	01

DATE:	DRAWN:	SCALE:
JULY 2021	SN	1:1000

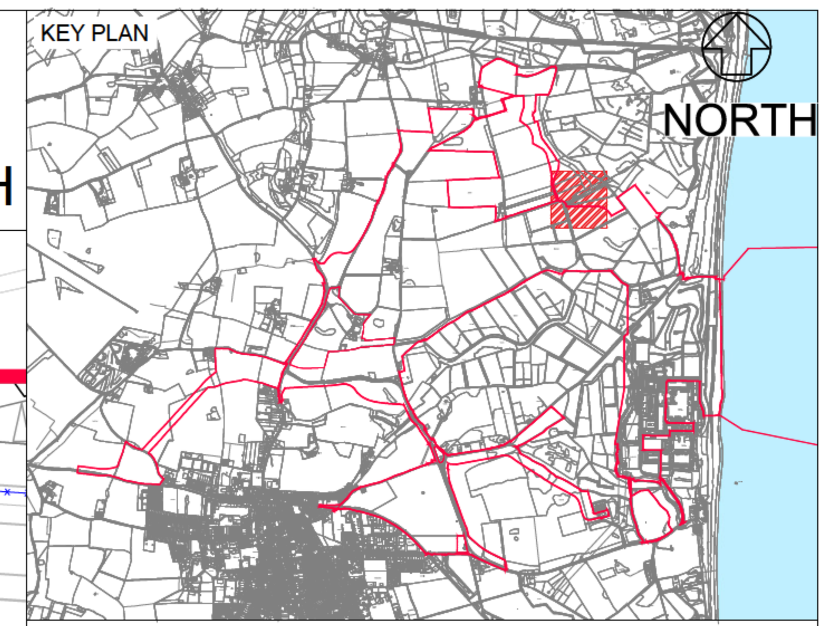
SCALE BAR:
10m 0m 10m 20m 30m 40m 50m 60m 70m
Scale 1:1000



LEGEND:

- PROJECT BOUNDARY
- WATER MANAGEMENT ZONE BASIN
- EXISTING VEGETATION
- PROPOSED VEGETATION
- PROPOSED BUILDINGS
- PIPE NETWORK
- POND TOP
- ORIGINAL WMZ BASIN BOUNDARY
- PROPOSED STOCKPILE
- ACOUSTIC FENCE
- FENCE
- BUND

KEY PLAN



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. COMPOUND ACCESS POINTS TO BE UPDATED IN THE NEXT DESIGN PHASE.

REVISION	DATE	DRAWN	CHECKED	REASONS FOR REVISION / COMMENTS	APPROVED
01	JULY 2021	SN	RV	DCO SUBMISSION	SZC Co

NOT PROTECTIVELY MARKED

PROJECT:
SIZEWELL C

DOCUMENT:
MAIN DEVELOPMENT SITE
WATER MANAGEMENT ZONE SUMMARY
ANNEX C
DEADLINE 5 SUBMISSION JULY 2021

DRAWING TITLE:
WATER MANAGEMENT ZONE 3 &4
DESIGN UPDATE PLAN LAYOUT

FIGURE NO:	REVISION:
FIGURE 2	01

DATE:	DRAWN:	SCALE:
JULY 2021	SN	1:1000

SCALE BAR:
10m 0m 10m 20m 30m 40m 50m 60m 70m
Scale 1:1000

ANNEX 2A.4: ACA DRAINAGE STRATEGY TECHNICAL NOTE

CONTENTS

TABLES

FIGURES

APPENDICES

GLOSSARY

2D/ 3D/ 4D	2-/ 3-/ 4-Dimensional
ACA	Ancillary Construction Area (known as "LEEIE" or "Land East of Eastlands Industrial Estate" in the DCO application) (referred to as the "ACA" or "Ancillary Construction Area" in this document
AD	Associated Development
BOD	Basis of Design
BYLOR	Bouygues Travaux Publics / Laing O'Rourke (Joint Venture)
CDM	Construction (Design & Management) Regulations 2015
CIRIA	Construction Industry Research and Information Association
DCO	Development Consent Order
EA	Environment Agency
ECI	Early Contractor Involvement
EDF	Electricité de France
EPRTM	Trade name for reactor type proposed for SZC
ESC	East Suffolk Council
EW	Enabling Works
EWBD	Enabling Works Basic Design
HGV	Heavy Goods Vehicle
IDB	Internal Drainage Board
IDT	Integrated Design Team
LEEIE	Land East of the Eastlands Industrial Estate
LLFA	Lead Local Flood Authority
mAOD	Metres Above Ordnance Datum
MCA	Main Construction Area
MW	Megawatt
NNB	Nuclear New Build
PIMP	Percentage Impermeable
QS	Quantity Survey (/ -or/ -ing)
RSPB	Royal Society for the Protection of Birds
SCC	Suffolk County Council
SFR	Safety Functional Requirement
SHE	Safety, Health and Environment
SSSI	Site of Specific Scientific Interest
SuDS	Sustainable Drainage Systems
SZB	Sizewell B
SZC	Sizewell C
TCA	Temporary Construction Area
TSS	Total Suspended Solids
WBS	Work Breakdown Structure (Package)
WMZ	Water Management Zone

OVERVIEW – SECOND REVISION

The Sizewell C (SZC) Development Consent Order (DCO) has been submitted and included a site wide Outline Drainage Strategy. This technical note aims to provide a more detailed background of the proposed Ancillary Construction Area (ACA) site (also known as Land East of Eastlands Industrial Estate (LEEIE)) and explain the development of the surface water management proposals for the site while it is operational.

The ACA will be one of the first areas of development as part of the SZC construction project. The ACA will be temporary and operational for approximately ten years before it is decommissioned at which point the site will be returned to predevelopment condition.

A first issue of the basic drainage design note for the ACA was shared informally with stakeholders during 2020, including East Suffolk Council (ESC), Suffolk County Council (SCC), the Environment Agency (EA), East Suffolk Internal Drainage Board (ESIDB) and Natural England (NE). A meeting was held with stakeholders on 17th December 2020 and feedback gained. In addition, SCC as the Lead Local Flood Authority (LLFA) wrote a letter to SZC Co. dated 8th February 2021 (Appendix A1), setting out concerns around drainage design. Therefore, this document has been revised to address the feedback received.

The surface water drainage design has been progressed to a basic level of design, to demonstrate that the proposed strategy can sufficiently manage surface water runoff generated by the proposed development, within the Order Limits and whilst complying with current local and national guidance.

The revised document:

- Provides more information on historic infiltration data on the ACA,
- Updates the discharge strategy, and therefore Sustainable Drainage (SuDS) proposals,
- Removes below ground storage structures; and
- Provides assurance that the SuDS storage features have been designed in accordance with best practice guidance and shows there is space for these on site within the order limits.

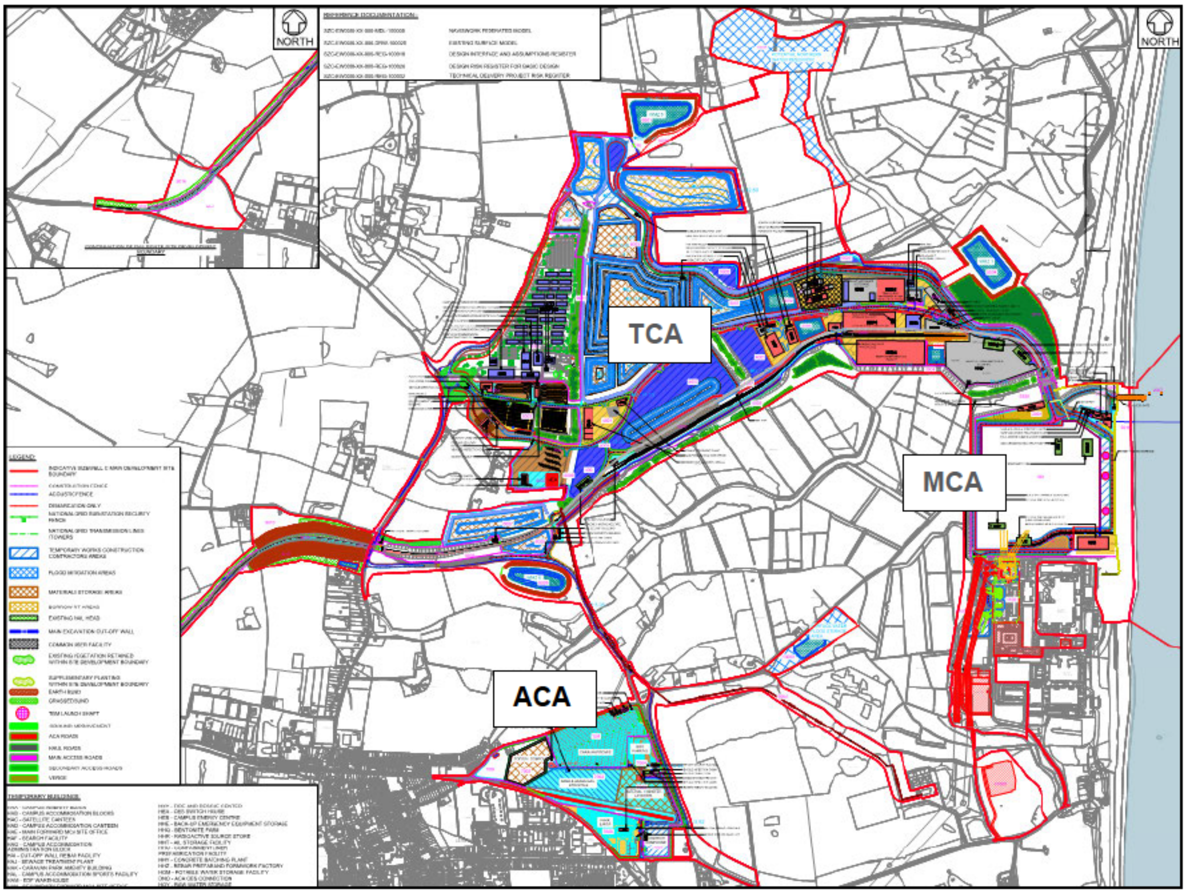
The design will be updated in the next design phase in conjunction with engagement with ESC, SCC, NE, EA and ESIDB.

1 INTRODUCTION

1.1 General

1.1.1 This technical note has been prepared to provide additional detail on the proposed Sizewell C (SZC) nuclear power station Enabling Works Basic Design (EWBD) surface water management proposals. This document primarily focuses on the Land East of the Eastlands Industrial Estate (LEEIE), as described in the Development Consent Order (DCO) submission, also known as the Ancillary Construction Area (ACA), the location of which is shown in Figure 1-1. Throughout this document, this area will be referred to as the ACA. SZC Co. acknowledge the design of surface water management will be updated and change throughout the next phases of design. SZC Co. will work collaboratively with Suffolk County Council (SCC) and other stakeholders throughout the detailed design phase.

Figure 1-1 - Sizewell C site, showing DCO boundary, ACA, MCA and TCA areas



1.1.2 Basic Design has been developed by SZC Co.

1.2 Project Background

1.2.1 The Sizewell C site is located on the Suffolk coast, approximately mid-way between Felixstowe and Lowestoft, to the north-east of the town of Leiston.

1.2.2 SZC Co. is applying for development consent to construct, operate and maintain Sizewell C nuclear power station. The project will take approximately 9-12 years to complete construction. The ACA will be required for the duration of this construction period to support the main construction works. After this point, the ACA will be returned to its existing state (i.e. a grassed field). This is summarised in the Development Consent Order (DCO) available publicly.

2 ACA CONSTRUCTION AREA

2.1 Existing ACA Site

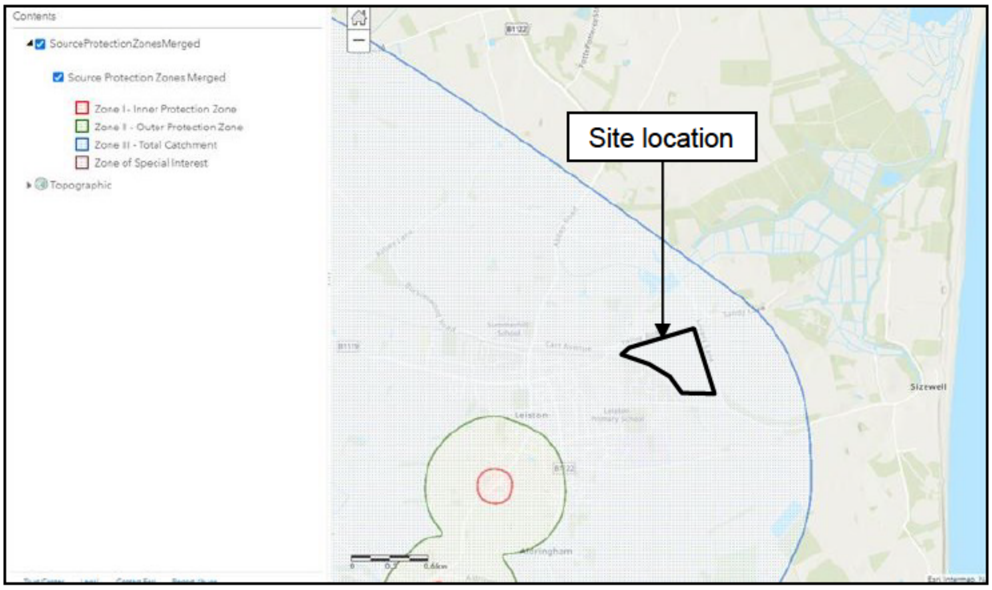
2.1.1 The ACA is currently an agricultural greenfield as shown in Figure 2-1 below, bounded by Valley Road, Lover's Lane, King George's Avenue and an existing railway line from Saxmundham. The site is approximately 30 hectares in area.

Figure 2-1 - Existing ACA greenfield

2.1.2 The whole of the proposed ACA is within Zone III of the Environment Agency (EA) groundwater source protection zone, shown in Figure 2-2. Although this does not mean a ban on discharge of surface water to groundwater at this site, it would need to be discussed with the EA should infiltration be considered in future on this site as a means of surface water disposal. However, as set out in Section 3 below, the potential for infiltration is extremely limited.

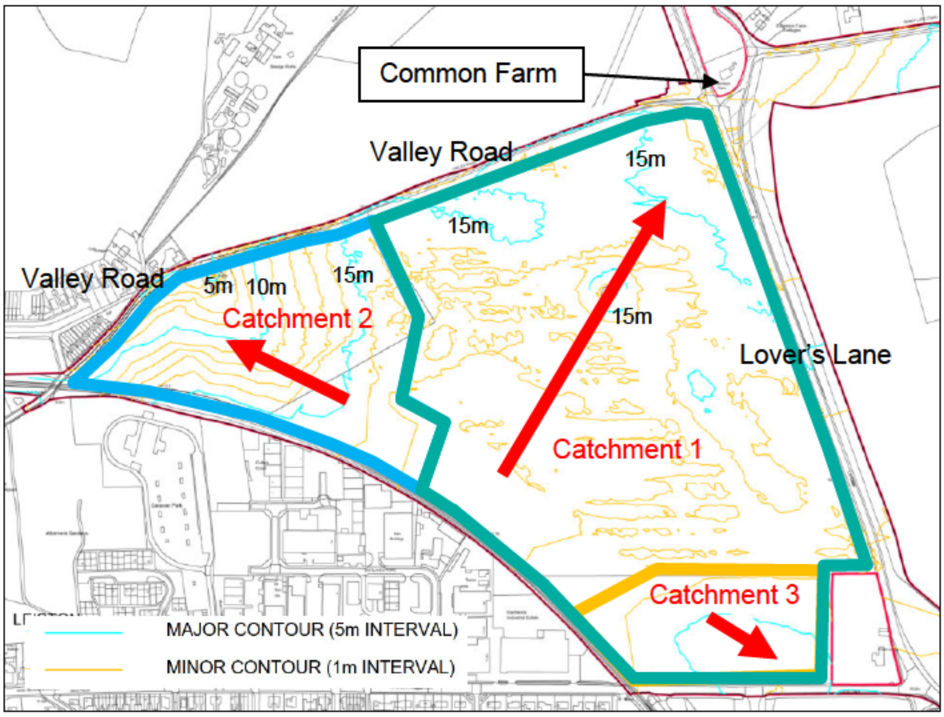
2.1.3 Groundwater levels in the ACA are shown to range between 1.6 mAOD and 2.1 mAOD (based on Environment Statement groundwater contours, presented here as Appendix B1).

Figure 2-2 - ACA groundwater source protection zone map



2.1.4 Figure 2-3 outlines the natural catchments based on the existing ground levels that were surveyed in 2019 using Lidar. The contours shown are at 1m intervals with the major (5m) contours highlighted in blue. The north-west section of the ACA is set lower than the remainder of the ACA and therefore does not contribute to the same catchment. Runoff from this area poses potential flood risk to the residential dwellings to the north of Valley Road. Catchment 2 encompasses approximately 4.4 ha of the ACA. Catchment 1 generally falls to the north-east to the junction of Valley Road with Lover's Lane at Common Farm which appears to generally travel towards the Leiston Drain. The southern part of the ACA falls south towards King George's Avenue, and is likely captured by an existing network within King George's Avenue, or infiltrates through roadside drainage systems. Catchment 3 currently includes an area of low-medium flood risk (i.e. between 1:30 and 1:1,000-year rainfall events). Flooding in this area will be alleviated as the site will capture surface water via permeable paving as well as a drainage network and discharged to the north.

Figure 2-3 - ACA site surface existing profile and surface water catchments (Waldeck Drone Survey 2019)



2.1.5 Further topographical surveys will be undertaken in 2021 to validate the existing data and inform the detailed design.

2.1.6 Greenfield runoff rates for the site have been calculated using UK SuDS guidance and are shown in Table 2-1 below. The output of the results from the UK SuDS calculation is attached in Appendix C1.

Table 2-1 - ACA greenfield runoff rates

Return Period (years)	Greenfield Rate (l/s)
1	61.3
Q_{BAR}	**70.4**
30	172.5
100	250.6

Q_{BAR} - peak rate of flow from a catchment for the mean annual flood - return period of approximately 1:2.3 years.

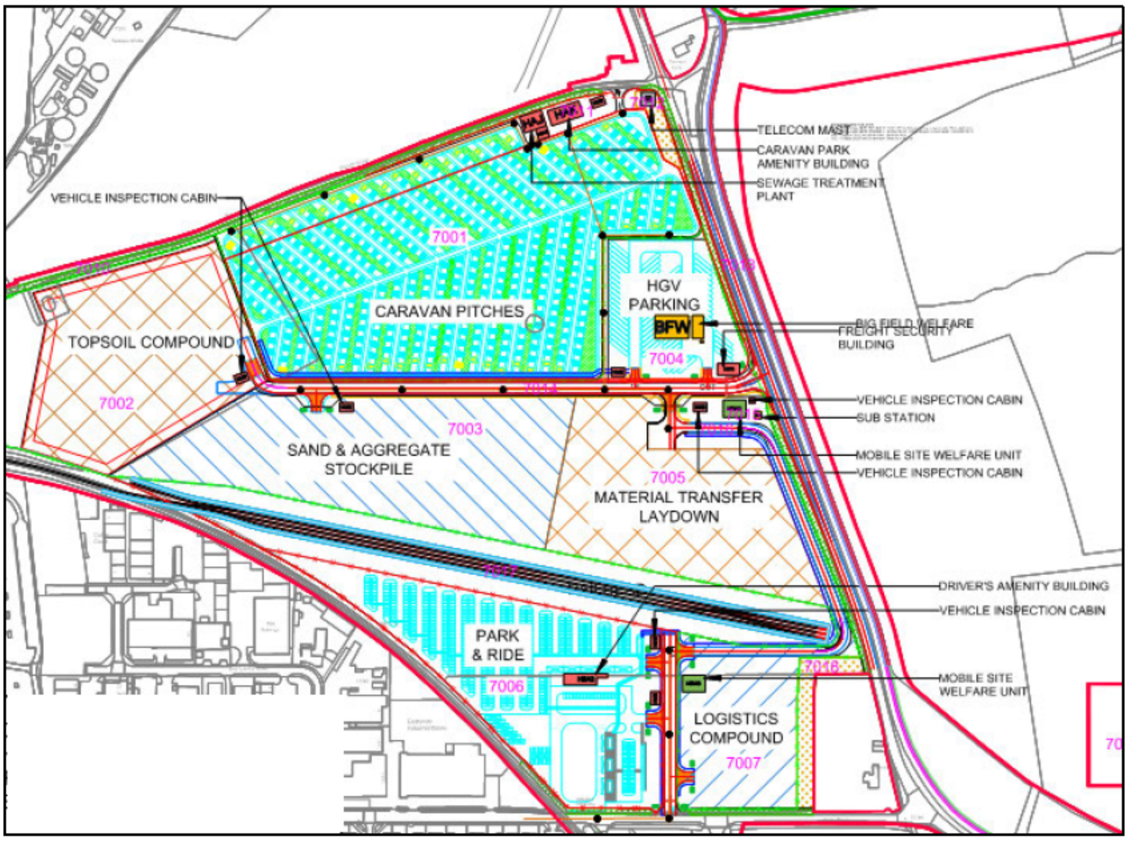
2.2 Proposal Overview

2.2.1 The ACA is proposed as a multi-purpose site with the following facilities:

- Caravan pitches to house approximately 400 caravans, providing temporary accommodation for some Contractors.
- Heavy Goods Vehicle (HGV) parking for Contractor vehicles required on site.
- Material stockpile areas – including a sand & aggregate stockpile area, a topsoil stockpile, and material transfer laydown area.
- Park and ride and logistics compounds to allow transport of staff to the main works areas.
- A rail-head central to the site to provide access for deliveries to site via rail.

These areas are shown in Figure 2-4.

Figure 2-4 - ACA areas



2.2.2 The ACA is isolated from the TCA and MCA, and therefore has an independent surface water drainage network to that serving the main construction site. With the above in mind, a drainage strategy has been developed for the ACA during the enabling works pre-detailed design stage, building from the overall drainage strategy. This design will be updated and refined during detailed design and with continued engagement with stakeholders such as East Suffolk Council (ESC), SCC, Natural England, the EA, and East Suffolk Internal Drainage Board (IDB). The drainage design strategy is highlighted in the following section.

3 ACA DRAINAGE STRATEGY DEVELOPMENT

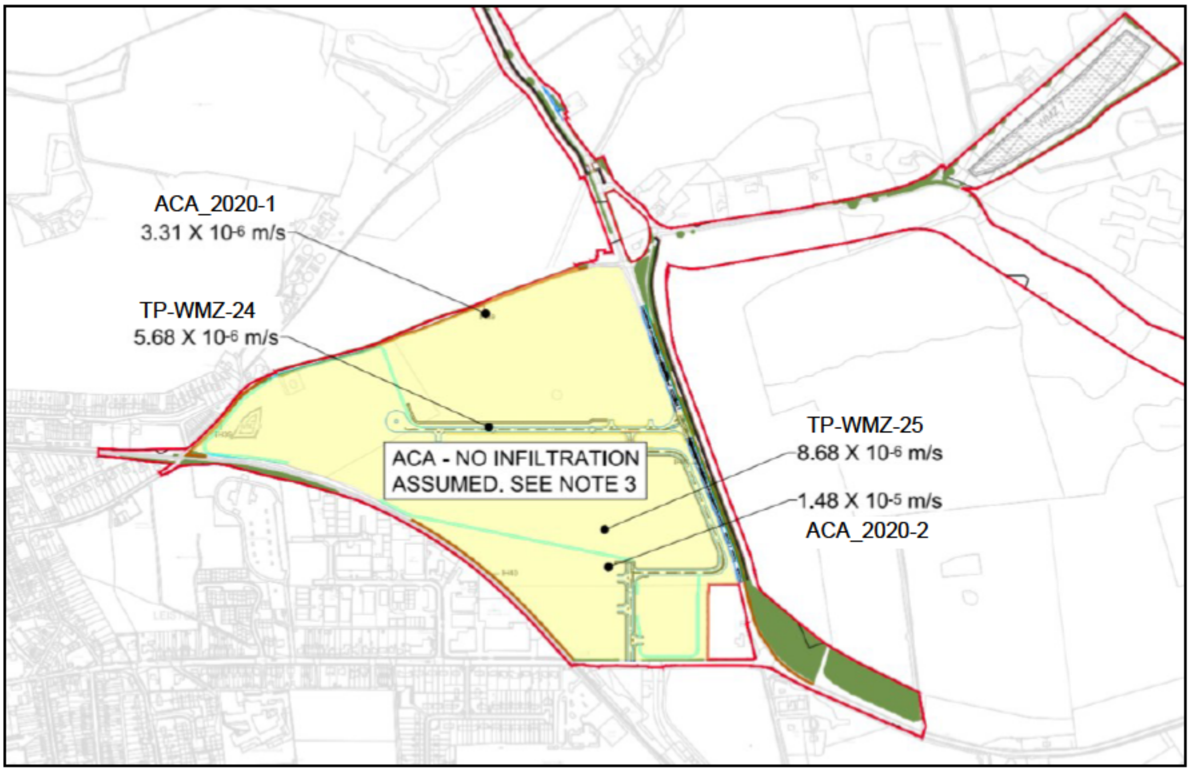
3.1 Background

3.1.1 The ACA drainage strategy has been informed by the site-wide Outline Drainage Strategy submitted with the DCO documentation (SZC Development Consent Order Outline Drainage Strategy EN010012-001802-SZC_Bk6_ES_V2_Ch2_Appx2A), as well as the proposed plot plan, described in Section 2.

3.1.2 As stated in the DCO drainage strategy, the ACA is known to have a low infiltration potential and therefore no infiltration has been conservatively assumed in Basic Design. The surface water runoff from this site would be managed on site, stored, and then discharged to a suitable nearby watercourse at an equivalent rate of Q_{BAR}, as agreed with external stakeholders on 17th December 2020 (see meeting minutes, item 4 in Appendix D1).

3.1.3 Figure 3-1 shows the historic infiltration rates recorded during ground investigation campaigns in 2016 by Structural Soils Limited (2016 Onshore Ground Investigation Campaign. Factual Report on Ground Investigation ref. SZC-SZC030-XX-000-REP-100000) and in 2020 by Fugro (Report on Ground Investigation without Geotechnical Evaluation. Sizewell Infiltration Testing ref G200003U_GIR Rev 02), within the ACA site. Infiltration test results from both reports are shown in Appendix E1. Whilst infiltration tests completed in April 2020 show improved infiltration rates and a potential opportunity to optimise the surface water drainage design, at this stage, no infiltration is assumed as a conservative measure to ensure that all surface water features are sized adequately. Further infiltration testing is planned in the ACA to confirm the infiltration potential and the design will be revised accordingly during Detailed Design. Infiltration has not been dismissed as an option for surface water disposal, and where permeable pavements are proposed, for example, it is expected that a percentage of surface water will infiltrate to ground. However, given previous history of ponding issues on the site, infiltration has not been relied upon in the design.

Figure 3-1 - ACA infiltration rate summary (results shown in Appendix E1)



3.1.4 The proposed drainage design will prioritise SuDS as a means of surface water treatment and discharge where practicable. The SuDS features currently proposed in the ACA include:

- Swales / Infiltration trenches (combined)
- Sediment ponds (2 no.)
- Permeable paving (where suitable) with filter drains

As well as the above, proprietary devices such as oil separators are also considered.

3.2 Design Strategy

3.2.1 The three existing catchments on site require different drainage strategies. As no infiltration is assumed, all surface water will be required to be discharged via watercourses adjacent to the site.

3.2.2 The original drainage strategy proposed in basic design aimed to mimic the existing site characteristics and predominantly discharge surface water runoff to the Leiston Drain at outfall O6, along Lover's Lane, at greenfield runoff rates. However, discussions with the EA, ESC, SCC and the IDB in

December 2020 concluded that there was a preference to make the primary surface water discharge from the ACA to the Sizewell Marshes instead (see Appendix D1 for meeting minutes, item 2).

3.2.3 To prevent altering the existing runoff characteristics, outfall O6 has been retained and is proposed to discharge flows from the Catchment 2 within the ACA only. This modification aims to improve water quality and quantity on site whilst providing an opportunity to recharge the Sizewell Marshes Site of Specific Scientific Interest (SSSI). It is important that the SSSI is neither overwhelmed with additional surface water runoff, nor starved of surface water during the construction and operation of SZC. Consequently, the approach adopted for the drainage of this site aims to maintain the existing drainage characteristics and forms the basis of the groundwater and surface water assessment in Volume 2, Chapter 19 of the Environmental Assessment. The importance of maintaining these drainage characteristics for the main development site has been reinforced in discussions with Natural England, the Suffolk Wildlife Trust, the Royal Society for the Protection of Birds (RSPB) and East Suffolk IDB.

3.2.4 Catchment 1 and 3 shown in Figure 2-3 are combined and make up 85% of the site. These catchments are proposed to be collected in gravity networks, either through permeable surfaces and filter drains where suitable, or gullies/channels with silt traps in hard surfaced areas. The surface water will then be conveyed towards a sediment pond east of the ACA, to provide attenuation and additional treatment, before discharging to the Sizewell Marshes.

3.2.5 Surface water runoff in Catchment 2 will be captured separately through swales and a sediment pond within the catchment, and then pumped east towards outfall O6 on Lover's Lane, discharging to the Leiston Drain. See Appendix F1 for the ACA surface water drainage general layout (SZC-EW0320-ATK-XX-000-XXXXXX-DRW-CCD-000004).

3.2.6 The outflow rate at both outfall locations will be restricted to the Q_{BAR} as agreed in the meeting quoted above.

3.2.7 Both sediment ponds (East ACA WMZ and West ACA WMZ) are be sized for a 1 in 100 year return period, including a 20% climate change allowance in accordance with the DCO outline drainage strategy.

3.2.8 A hydraulic model for the overall site has been constructed in Innovyze Microdrainage (2019) to size the networks and attenuation/infiltration features. The hydraulic model parameters used are summarised in Table 3-1.

Table 3-1 - ACA hydraulic model input parameters

	Parameter	Notes
Rainfall-Runoff method	Flood Studies Report (FSR), Flood Estimation Handbook (FEH) 1999 and 2013	All three models run to undertake sensitivity checks
Return Periods (years)	1, 30 and 100	As per DCO Outline Drainage Strategy [1]
Storm durations (min)	15 to 1440 (12 durations modelled)	As per DCO Outline Drainage Strategy [1]
Global time of entry (min)	15	Assumed site wide, however, to be refined (and likely increased) per catchment during detailed design
Volumetric Run-off Coefficient	0.761, 0.817 (summer, winter)	Wallingford Procedure Vol 1 Equation 7.3
Climate change (%)	20	As per DCO Outline Drainage Strategy [1] and EA guidance [2]
PIMP (%)	100	As per DCO Outline Drainage Strategy [1]

[1] Environmental Statement – 6.3 Volume 2 Main Development Site, Chapter 2 Description of the Permanent Development, Appendix 2A Outline Drainage Strategy (EN010012-001802-SZC_Bk6_ES_V2_Ch2_Appx2A)

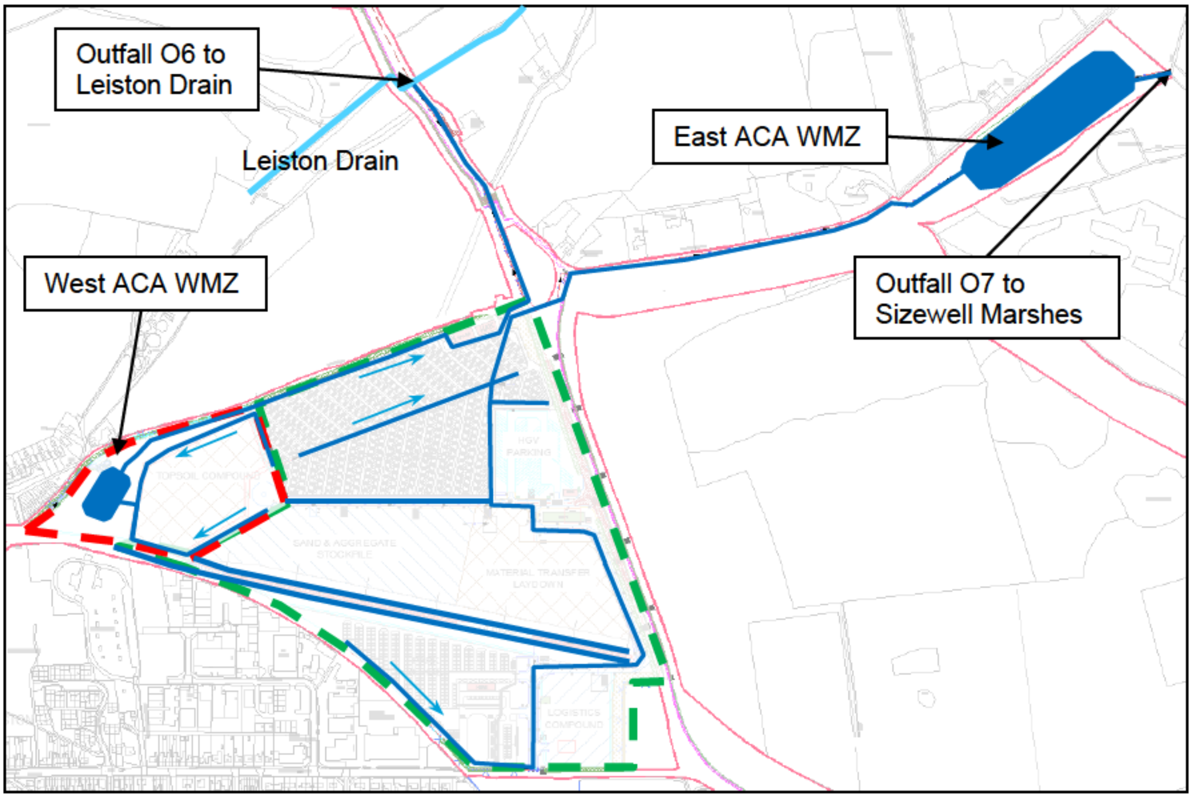
[2] Environment Agency – Flood risk assessment: climate change allowances - Table 2: peak rainfall intensity allowance in small catchments (less than 5 km2) or urban drainage catchments (based on a 1961 to 1990 baseline)

3.2.9 Main Catchment Overview (Catchment 1 & 3)

3.2.10 Catchments 1 & 3 are proposed to drain through a trunk network that runs from the park and ride area to the south, around the railhead, along the site access road, through the caravan pitches, to the north east of the main ACA site. This is shown indicatively in Figure 3-2 where catchments 1 & 3 are bound by the dashed-green line. From here, the surface water will be conveyed to an attenuation/infiltration basin (East ACA WMZ) east of the main ACA site, which will provide additional sediment treatment before discharging to the Sizewell Marshes at rate equivalent to Q_{BAR}.

3.2.11 Onsite attenuation will be provided in the subbase of the caravan pitches, logistics compound and materials transfer laydown areas, and is discussed further below. Groundwater levels in the ACA are shown to range between 1.6 mAOD and 2.1 mAOD (based on Environment Statement groundwater contours in Appendix B1), much lower than the finished ground levels (average 15 mAOD).

Figure 3-2 - ACA discharge solution – overview



3.2.12 The outflow rate at the proposed outfall locations has been proportionally obtained from the calculated Q_{BAR} for the ACA site. Surface water will be restricted to 10.5 l/s and 59.9 l/s at outfall 06 and outfall 07, respectively.

3.2.13 An initial conservative storage estimate for the East ACA WMZ resulted in a storage requirement of 21700 m^3 as stated in the Water Management Zone Summary technical note (ref. SZC-EW0321-ATK-XX-000-XXXXXX-NOT-CCD-000001). The assessment allowed for a proposed outflow flowrate of 59.9 l/s, however excluded any allowance for storage upstream of the WMZ within the pipe network and any SuDS features, which will likely result in a lower attenuation volume.

3.2.14 Hydraulic modelling of the ACA has been progressed and the water volume produced during a 100-year rainfall event including 20% climate change is 15,600 m^3. The current proposed storage pond using a 59.9 l/s outflow rate is as per Table 3-2. Further work will be undertaken during Detailed Design to refine the hydraulic modelling and optimise the storage requirements.

3.2.15 It is acknowledged that the location of the East ACA WMZ is beside a low-lying area which has been identified as being susceptible to flooding in the latest Flood Risk Assessment (FRA). The East ACA WMZ has been positioned to be outside the flooding extent of a 1 in 100 year fluvial flood event + 25% climate change as well as the 1,000 year coastal inundation flood extent.

Table 3-2 - East ACA WMZ attenuation basin summary

	Pond / Water Management Zone
Pond volume (m^3)	15,650 (3D model volume, excluding freeboard)
Crest level (mAOD)	3.000
Invert level (mAOD)	1.600
Pond depth (m)	1.100 (excluding freeboard)
Pond side slopes (1:X)	3
Freeboard (mm)	300
Groundwater level (mAOD)	1.100

3.2.16 An indicative detail of what the WMZ storage pond may look like is shown in Figure 3-3 and Figure 3-4. The WMZs will be developed during Detailed Design stage and will include details of the sediment forebays, access ramps, inlet and outlet structures and maintenance regimes. The East ACA WMZ is not designed to infiltrate due to the proximity to ground water levels. Whilst it is expected that there could be some limited infiltration, the West ACA WMZ basin is not designed to infiltrate at this stage and is therefore sized conservatively.

Figure 3-3 - WMZ - indicative detail

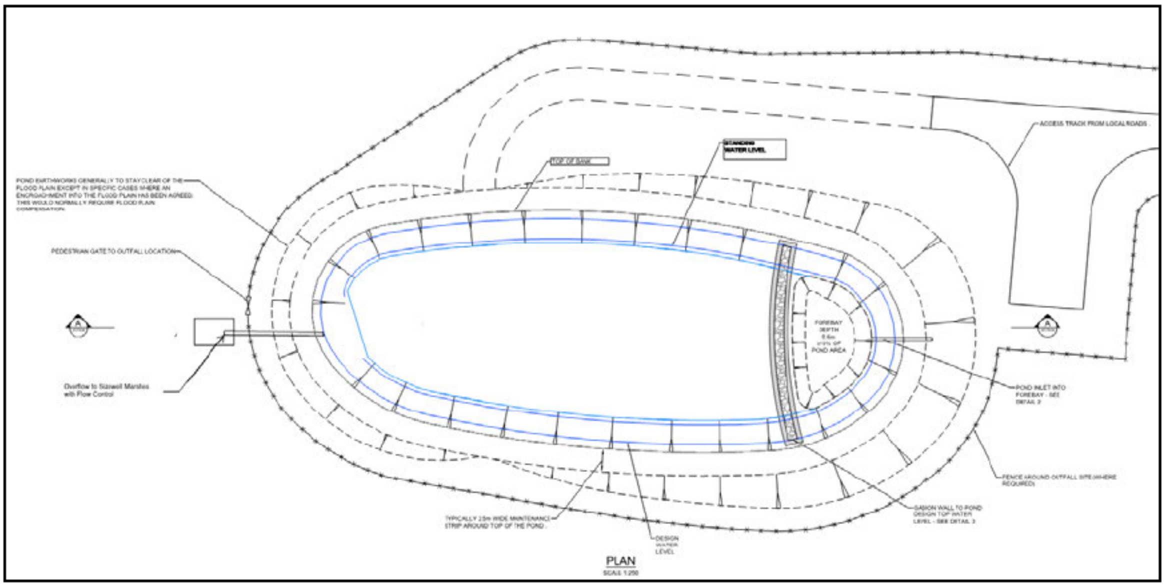
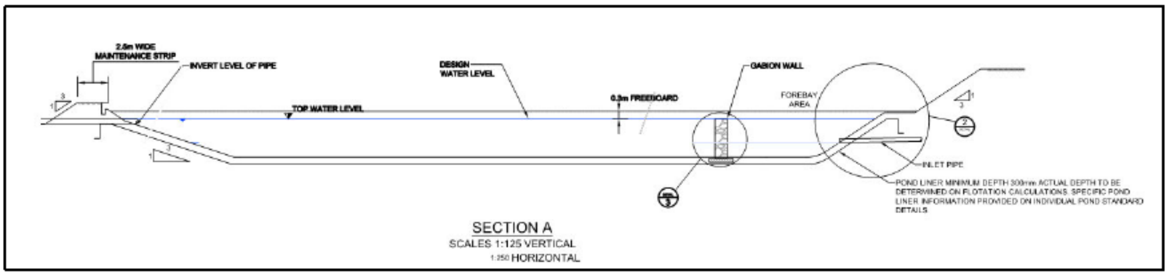


Figure 3-4 - WMZ - indicative section

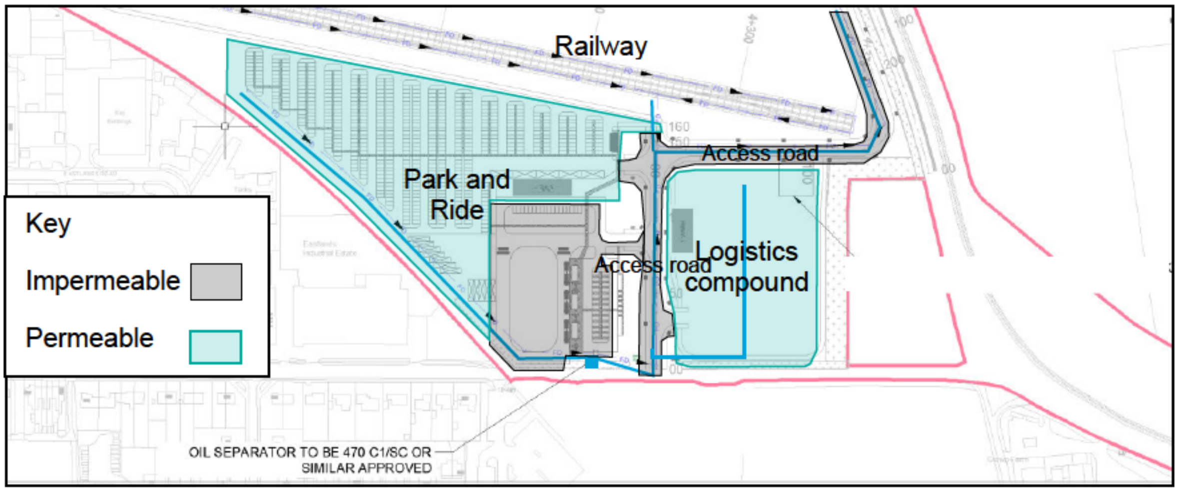


3.2.17 A high-level description of the drainage systems for each area within the main catchment are described in the sections below.

3.2.18 ***Park and Ride***

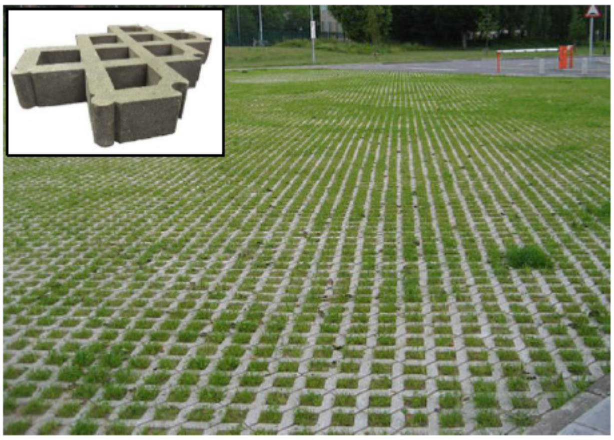
3.2.19 The park and ride area comprises two different surface types as shown in Figure 3-5.

Figure 3-5 - ACA discharge solution south of railway



3.2.20 The car parking area is proposed to generally have a permeable surface. This may be a truck-pave solution or similar, as shown in Figure 3-6.

Figure 3-6 - Truck-pave surface example



3.2.21 The area to the south-east of the park and ride is reserved for coaches and other large vehicle parking. At this stage, this area is proposed to be concrete pavement with channels and gullies to collect potential oil spills. This area may also be surfaced similarly to the park and ride area and use a permeable pavement but will be considered during Detailed Design.

3.2.22 ***Network Design***

3.2.23 Because the ACA is assumed to have no infiltration, from a hydraulic model perspective, all areas are considered to be 100% impermeable and all surface water runoff will be captured via their respective drainage systems.

3.2.24 The head of the trunk network at the park and ride begins with a 300mm dia. pipe, which increases to a 600mm dia. to drain the runoff from the park and ride. The internal secondary and tertiary networks have not been modelled at this stage, however across the permeable surface, there will be a number of filter drains at the base of the Type 3 pavement build-up which will connect to the trunk main.

3.2.25 For the impermeable surface area in the park and ride, it is proposed to drain the internal areas by a combination of gullies and channels, which drain to the carrier drains. All channels and gullies are to contain silt traps to provide a primary level of treatment. At this stage, an oil separator is proposed to contain the potential risk of oil spillage from the car park where large vehicles are parked long-term in line with pollution prevention guidance. Consideration of an oil separator is based on a risk management approach to provide reliability and robustness in the design to ensure no oils/hydrocarbons enter the SSSI downstream. It is acknowledged that SCC prefers to not use oil separators to capture and treat oil spills and instead supports the use of a lined permeable pavement whereby oil spills can be treated through granular pavement layers. To provide further treatment and protection of the receiving watercourse, a hydrodynamic separator such as a Hydro Downstream Defender may also be utilised in conjunction with a permeable pavement. This approach will be considered at the next design stage and is further discussed in Section 4.4.8.

3.2.26 ***Access Road drainage***

3.2.27 The road surface will be standard asphalt pavement, and runoff is currently proposed to be collected using standard kerb gullies at standard spacing. The gully leads of approximately 150mm diameter shall be connected to the collector system beneath the road. Implementation of a SuDS system such as a filter/fin drain will be considered during detailed design as an alternative to provide surface water treatment at the source. Use of filter drains versus standard collection systems such as kerb and gullies will be considered on a risk-based approach in the next design phase.

3.2.28 Because of the types of vehicles using the roads, a wheel wash is proposed at the entrance to the site to remove sediment from earthworks vehicles before coming into the ACA and going out of the ACA onto the public road. Additional sweeper vehicles will be utilised to maintain the cleanliness of the road. This detail needs to be developed during the next design phase.

3.2.29 ***Logistics Compound***

3.2.30 Similar to the Park and Ride area, the logistics compound is proposed to have permeable surfacing. The pavement build-up beneath this is currently proposed to include a sub-base of Type 3 fill providing a minimum porosity of 30%. Internal secondary and tertiary networks have not been modelled, however across the area, there will be a number of filter drains at the base of the Type 3 pavement layer which will connect to the trunk main.

3.2.31 ***Railway drainage***

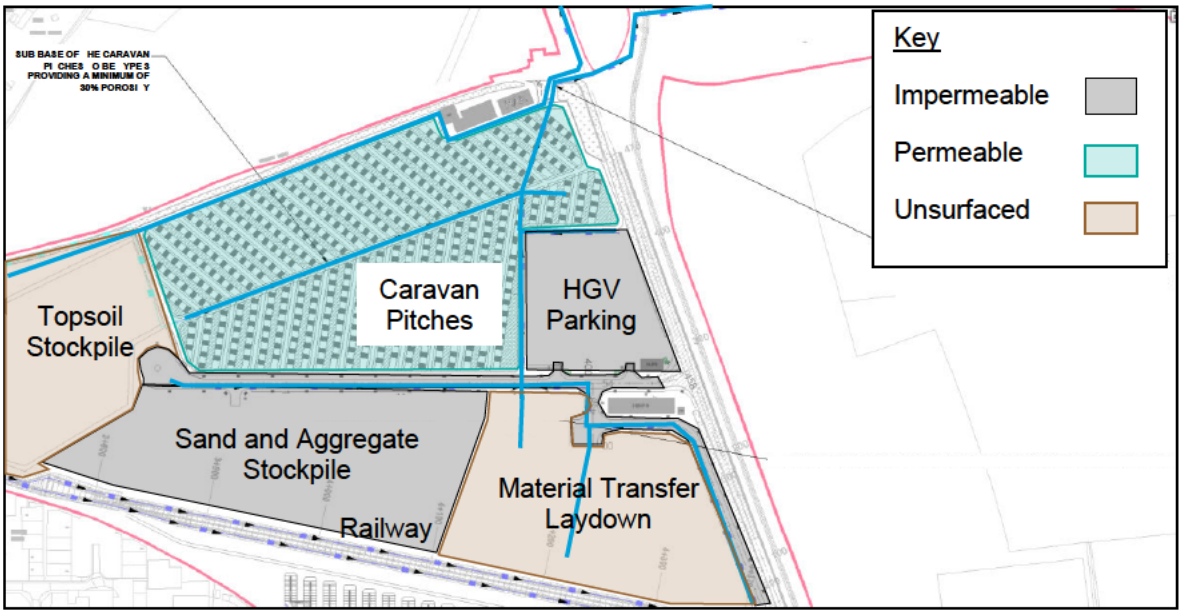
3.2.32 The runoff from the rail route is proposed to be collected by filter drains at a minimum crossfall of 1 in 30 draining on either side of the cutting, with catch pits proposed at 60m centres. The network discharges into the trunk main under the road via a sleeve through the rail retaining wall. Concrete perforated drainage channels will be considered as an alternative to filter drains to reduce the risk of blockages which are commonly experienced when using filter drains in railway applications. The trains will be diesel powered and will be able to park at this railhead. Refuelling will not be permitted on site, therefore the risk of oil spillages is lowered. A by-pass oil separator is proposed in this area to prevent oils and other hydrocarbons from entering the main network.

3.2.33 ***Sand & Aggregate Stockpiles***

3.2.34 The sand and aggregate stockpile areas will likely have a concrete base to allow materials to be constantly deposited in this location and moved around site via excavators and lorries. The surface water is currently proposed to be collected around the perimeter of the area via gullies and channels with silt traps to filter out the sediment. Further sediment settlement will be provided as the flows will convey to the East ACA WMZ. With increased engagement with logistic suppliers of sand and aggregate planned at the next design phase, discussions will consider the possibility to introduce swales in this area to capture and treat surface water runoff. Alternatively, implementation of an SDS Aqua-Xchange or equal filter drain network will be considered at the next design stage as opposed to conventional pipe/gully network to provide treatment opportunity.

3.2.35 It is understood SCC has concerns about blockages of silt traps and the lack of SuDS used in this part of the site. This needs further discussion and collaborative working with SCC and the EA to provide a suitable solution, however at this stage, standard collection methods with silt traps are proposed and maybe revised during Detailed Design. A maintenance management plan will be required and submitted prior to commencement of construction on the site.

Figure 3-7 - ACA discharge solution north of railway



3.2.36 ***Material Laydown Transfer***

3.2.37 The material transfer laydown area will likely be a gravelled surface, and therefore will allow surface water to infiltrate through granular materials, be naturally treated, and then be collected through filter drains within the sub-base build-up. A Type 3 granular fill providing a minimum porosity of 30% is proposed to provide storage across this area. Secondary and tertiary filter drains across the material transfer laydown area will convey flows to the trunk main.

3.2.38 ***HGV parking***

3.2.39 The surface of the HGV parking area is currently proposed to be a concreted heavy-duty pavement to allow for vehicle loads from HGVs. The concrete pavement will not allow infiltration, and therefore the surface water is currently proposed to be captured via gullies and channels with silt traps. The HGV area surface water network will be routed to a suitably sized oil separator to treat surface water for potential oil contamination prior to conveyance into the main network for the ACA.

3.2.40 This area will be revisited during Detailed Design to consider use of a permeable surface to filter contaminant naturally and use a SDS Aqua-Xchange or equal filter drain system, however at this stage, an oil separator is considered necessary given the pavement type and intended use.

3.2.41 ***Caravan Pitches***

3.2.42 The caravan pitch area has a permeable pavement surface which is proposed to be truck-pave (Figure 3-6) or similar. The pavement build-up beneath this is currently proposed to include a 200mm thick sub-base of Type 3 fill providing a minimum porosity of 30% this provides attenuation. The thickness of the sub-base has been based on the hydraulic performance and may be revised following structural design of the pavement. The flows will then convey to the trunk main and towards the East ACA WMZ.

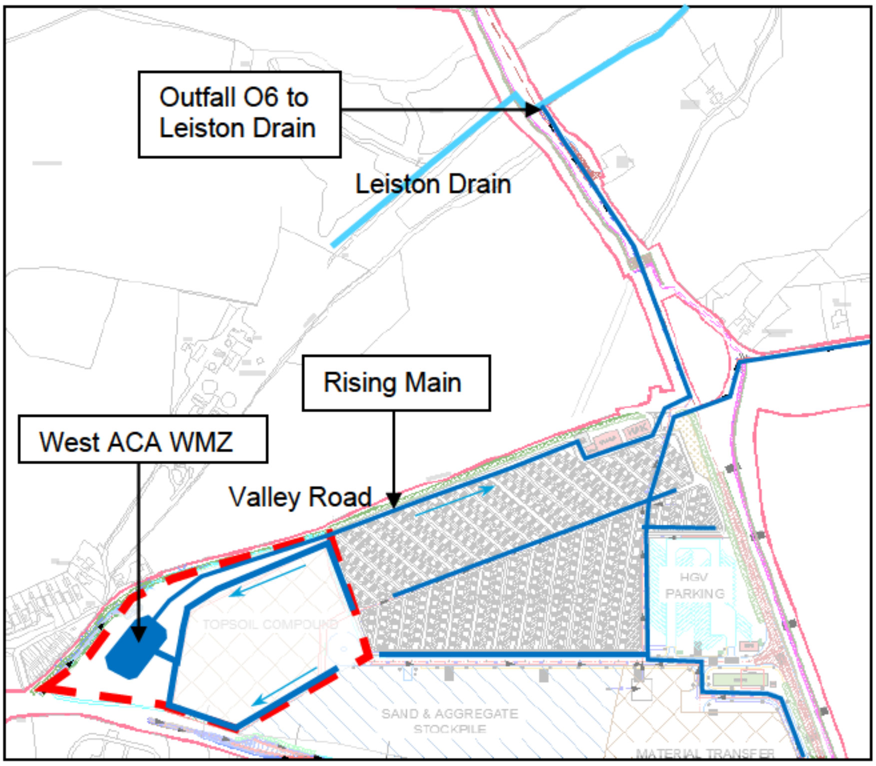
3.2.43 **Topsoil compound and area west of the topsoil compound (Catchment 2)**

3.2.44 This area of the site drains to the north-west towards Valley Road. There is an existing surface water network along Valley Road. SCC have indicated that the external network would require upgrade should a connection from the ACA be made to this asset due to capacity issues. Because of the uncertainty around this, at this stage the current solution will not discharge to the external network. This will be discussed with SCC to assess the possibility and the extent of upgrade to the existing network required.

3.2.45 Therefore, surface water runoff in Catchment 2, indicatively outlined by dashed-red line in Figure 3-8 is proposed to be captured separately through perimeter swales that convey to a sediment pond (West ACA WMZ) within the catchment and to stop any water running off site. As no infiltration is assumed, the attenuated runoff will require pumping from the low point of the site, east towards outfall O6 on Lover's Lane, discharging to the Leiston Drain.

3.2.46 The proposed swales and West ACA WMZ will be sized to accommodate the runoff volumes for a 100-year return period storm event. The swales will be designed in accordance with the CIRIA C753 SuDS Manual and check dams may be incorporated to the design to restrict the average velocity given that the existing ground levels fall steeply and to provide opportunity to treat captured runoff.

Figure 3-8 - ACA discharge solution – Topsoil Compound and area west of compound



3.2.47 An initial conservative storage estimate for the West ACA WMZ resulted in a storage requirement of 4000 m^3, with a proposed flowrate to the Leiston Drain of 10.5 l/s, as stated in the Water Management Zone Summary technical note (ref. SZC-EW0321-ATK-XX-000-XXXXXX-NOT-CCD-000001). The proposed rate is based on the calculated Q_{BAR} for the ACA site (Appendix C1). This assessment was undertaken using a source control calculation, which excluded any onsite storage upstream of the WMZ within the swale network.

3.2.48 Hydraulic modelling of the ACA has been progressed and the water volume produced during a 100-year rainfall event including 20% climate change is 1,900 m^3. Further work will be undertaken during Detailed Design to refine the hydraulic modelling and optimise the storage requirements. The current proposed storage pond using an outflow rate of 10.5 l/s is as per Table 3-3.

Table 3-3 - West ACA WMZ infiltration basin summary

	Pond / Water Management Zone
Pond volume (m^3)	2,100 (3D model volume, excluding freeboard)
Crest level (mAOD)	8.000
Invert level (mAOD)	5.700
Pond depth (m)	2.0 (excluding freeboard)
Pond side slopes (1:X)	3
Freeboard (mm)	300
Groundwater level (mAOD)	2.100

3.2.49 The attenuated volumes will be discharged to the Leiston Drain via a rising main of 100mm diameter at a rising gradient of 1:70 with a duty-assist pump capacity of 10.5l/s. The next stage of design for the West ACA WMZ sediment pond will include assessment for pump failure events to ensure that in the event of a pump failure, surface water runoff would not leave the site.

3.2.50 ***Topsoil Stockpile***

3.2.51 When the site is first occupied, the topsoil across the site will gradually be stripped and stockpiled in the north-west corner of the site as indicated on the general arrangement figures. The topsoil stockpile will be hydroseeded to minimise sediment runoff, however before the grass is established, the surface water will need to be captured and treated prior to discharge to the Leiston Drain. Furthermore, the topsoil stockpile will likely need to be churned approximately every two years to retain the nutrients and minerals in the soil, to allow it to be reused in the future. This will disturb the vegetated state of the topsoil stockpile and increase sediment runoff in the surface water.

3.2.52 The topsoil stockpile is proposed to be surrounded by a combination of hay bales and swales to remove the majority of the sediment in the surface water. The swales will convey surface water runoff towards the north west to the West ACA WMZ where further treatment can be undertaken. A typical detail of the swales and hay bales is shown in Figure 3-9 and Figure 3-10.

Figure 3-9 - Typical swale/infiltration trench detail

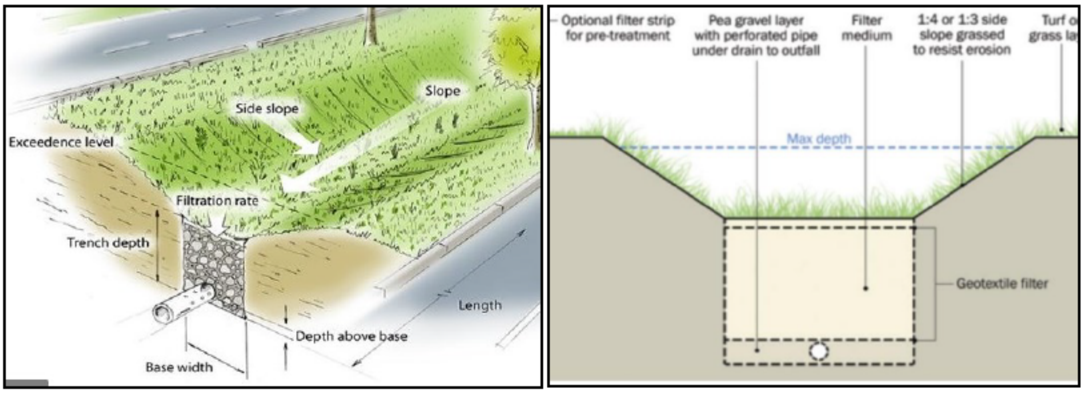
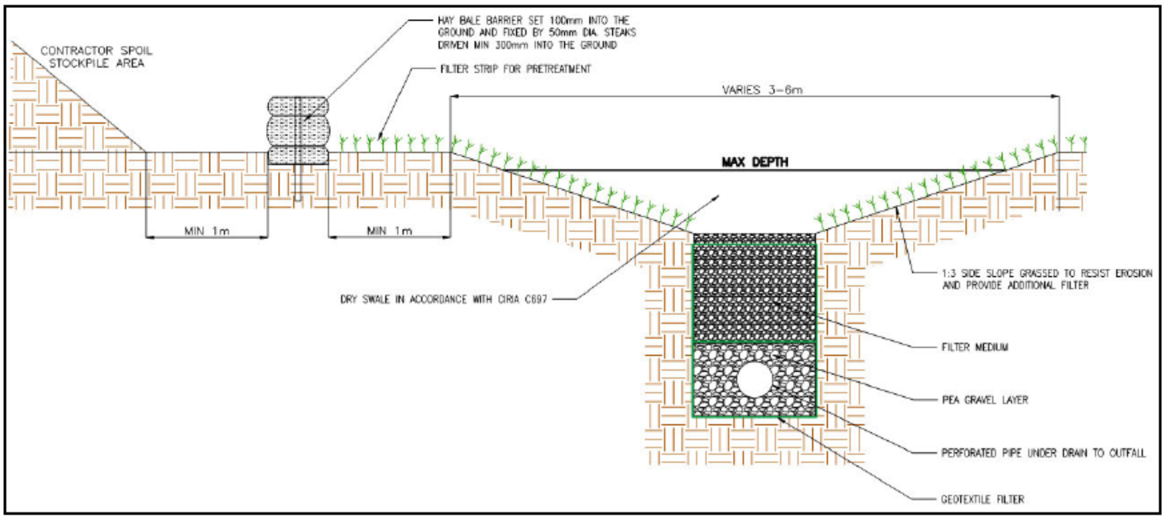


Figure 3-10 - Stockpile boundary treatment proposal



4 REVIEW OF ACA DRAINAGE STRATEGY THROUGH DETAILED DESIGN

4.1 Surface Water Catchment Methods

4.1.1 As the proposed ACA drainage strategy is developed through Detailed Design, it will be assessed to ensure it is the optimal solution to managing surface water on the site. This will include reviewing the design against opportunities where SuDS can be further utilised, with respect to practicality in each location of the ACA. During Detailed Design, the proposed surface water drainage infrastructure will consider failure scenarios to provide assurance that the proposed infrastructure is adequately sized to manage surface water runoff within the order limits, specifically targeted at what happens if the network becomes blocked.

4.1.2 SuDS and other design inputs

4.1.3 A priority in design was to use SuDS features where possible for the treatment, maintenance, and sustainability benefits. Table 4-1 shows an overview of the available SuDS techniques based on Table 7.1 of CIRIA. As stated in section 3.1, infiltration structures are not considered at this stage in the design. Living roofs will not be suitable on this industrial construction site either, with most buildings on site being prefabricated structures. Water will be reused as much as possible throughout the construction process. Rainwater harvesting tanks will be investigated in the next design phase, as well as the potential of reusing the WMZ water for construction activities where appropriate. This will also decrease the use of potable water on site.

Table 4-1 - Overview of SuDS techniques (based on Table 7.1 CIRIA C753)

SuDS Techniques	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
Re-use on site	✓	✓	✓
Living Roofs	✓	✓	✓
Basins & Ponds – Wetland – Balancing pond – Detention basin – Retention pond	✓	✓	✓
Filter strips and swales	✓	✓	✓
Infiltration – Soakaways – Infiltration trenches – Infiltration basin	✓	✓	✓
Permeable surface and filter drains – Gravelled areas – Paving blocks – Porous paving	✓	✓	
Tanked systems – Oversized pipes and box culverts	✓		

– Storm cells			
Proprietary treatment systems – Oil separators – Settlement units		✓	

4.1.4 The following SuDS techniques have been proposed in the design of the surface water drainage:

- Swales and a pond (West ACA WMZ) at the topsoil compound.
- A pond (East ACA WMZ) to the east of the site
- Permeable pavements and filter drains at the park and ride, material transfer laydown areas, the caravan pitches and logistics compound.
- Filter drains at the railway track drainage.

4.1.5 The following SuDS techniques will be considered in detailed design phase to further reduce runoff from the development and provide pollution reduction:

- Additional filter strips / filter drains along access roads
- Additional permeable paved areas
- Additional swales

4.2 Surface Water Storage Methods

4.2.1 As stated in Section 3.2.9 the ACA will discharge into the surface water network in the vicinity of the site, namely the Leiston Drain and the Sizewell Marshes. Discharge will be limited to a Q_{BAR}, therefore on-site attenuation will be required. The following attenuation methods will be utilised:

- Two ponds (WMZs) – west of the topsoil compound and east of ACA.
- Permeable pavements (Type 3 subbase minimum porosity of 30%) - Park and ride, caravan pitches, material transfer laydown areas and logistics compound.

4.3 Maintenance

4.3.1 The surface water design aims to minimise maintenance required on site by aiming to use gravity systems rather than pressurised systems as much as possible. There will still be an element of maintenance required by the Contractor over time.

4.3.2 All surface water components are to be managed within the project by the Contractor. Regular maintenance of the surface water system will be undertaken throughout the lifecycle of the ACA. The Contractor will be required to submit a surface water operations and maintenance management plan that complies with the Code of Construction Practice (CoCP) prior to commencing construction on site.

4.3.3 The planned operational life of the ACA is expected to be approximately 10 years, after which it will be returned to its original greenfield condition. Swales and ponds will be maintained to ensure there is enough vegetation to operate as required for filtering runoff but kept cut to ensure the system is free flowing (in accordance with the CIRIA C753 SuDS Manual). Swales and ponds will be dredged of excess silt build up as required.

4.3.4 All below ground drainage will be designed in accordance with Sewers for Adoption (7th ed.) with all allowances for access and jetting. All filter drains with internal perforated pipes will be provided with rodding eyes on the ends.

4.3.5 A designated maintenance management plan will be in place for the life of the development, this will be used to ensure all aspects of the drainage system are regularly maintained as regularly as deemed necessary for each drainage element. The maintenance management plan will be submitted for approval prior to construction on site.

4.4 Surface Water Treatment

4.4.1 Pollution risk from runoff from the site has been managed through SuDS (assessed using the index approach) where possible. Where SuDS techniques are not currently proposed, other forms of sediment capture are provided. This is through the inclusion of silt traps, catch pits and oil separators within the traditional drainage systems.

4.4.2 **SuDS Index approach to water quality risk management**

4.4.3 As set out in Section 26.7.1 of the CIRIA C753 SuDS Manual, the simple index approach is used to assess water quality risk management and ultimately determine what SuDS measures are required to treat different types of developments. The steps are set out as:

Step 1 – Allocate suitable pollution hazard indices for the proposed land use

Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index

Step 3 – Where the discharge is to protected surface waters or groundwater, consider the need for a more precautionary approach

4.4.4 Given the general use of the ACA site we can allocate pollution indices (Table 26.2 CIRIA SuDS Manual) as one of the two categories, show in Table 4-2. The SuDS Manual does not provide a figure suitable for material stockpiles or loose topsoil, so a "medium" level pollution hazard level is assumed for these areas.

Table 4-2 - Pollution hazard indices for different land use classifications

Land Use	Pollution hazard levels	Total suspended solids (TSS)	Metals	Hydrocarbons
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways.	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways.	High	0.8	0.8	0.9

4.4.5 Table 4-3 summarises the intended use of each site within the ACA and the assigned pollution hazard level.

Table 4-3 - ACA pollution hazard indices assigned

ACA area	Description of proposed use	Assigned pollution hazard levels
Park and Ride area	Will be used for transporting site staff from the ACA to and from the TCA and MCA. Will constitute parking for site staff with a dedicated bus service	Medium

Logistics compound	Management depot for transport of staff and good around the sites	Medium
Railway	Railhead used for delivery of materials (sands, aggregates and other materials) to the ACA	Medium
Material Transfer Laydown	Laydown area for materials delivered to site from the train.	High
Sand & Aggregate Stockpile	Laydown area for the storage of sand and aggregates delivered to site from the train	High
Topsoil compound	Storage area for stripped topsoil	High
HGV parking	Parking area for contractors' HGVs and other plant	High
Caravan Pitches	For early contractors' accommodation and compounds	Medium

4.4.6 Indicative SuDS pollution mitigation indices are stated in Table 26.3 of the CIRIA SuDS Manual, copied into Table 4-4.

Table 4-4 - Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices		
Land Use	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swales	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8

4.4.7 Assessing the proposed SuDS features for each of the ACA area we can determine a total pollution mitigation index (Table 26.3 CIRIA SuDS Manual) for each, see Table 4-5 below. This assessment is based on the current proposals and will be updated during the next design phase to reflect additional SuDS elements that are described in section 3.2.9 and

3.2.43. Where additional SuDS features are not considered appropriate at this design stage, proprietary, non-SuDS treatment are proposed in these areas. This is further discussed in section 4.4.8.

Table 4-5 - ACA SuDS mitigation indices for discharges to surface waters

ACA area	Assigned Pollution hazard levels	SuDS features proposed	Total SuDS mitigation Index		
			TSS	Metals	Hydrocarbons
Park and Ride area	Medium	- Permeable pavement - Pond	1.05 (>0.7)	0.95 (>0.6)	0.95 (>0.7)
Logistics compound	Medium	- Permeable Pavement - Pond	1.05 (>0.7)	0.95 (>0.6)	0.95 (>0.7)
Railway	Medium	- Filter drains - Pond	0.75 (>0.7)*	0.75 (>0.6)*	0.65 (<0.7)*
Material Transfer Laydown	High	- Permeable Pavement - Pond	1.05 (>0.8)	0.95 (>0.8)	0.95 (>0.9)
Sand & Aggregate Stockpile	High	- Pond	0.7 (<0.8)**	NA	NA
Topsoil compound	High	- Swale - Pond	0.85 (>0.8)	0.95 (>0.8)	0.85 (<0.9)
HGV parking	High	- Pond	0.7 (<0.8)*	0.7 (<0.8)*	0.5 (<0.9)*
Caravan Pitches	Medium	- Permeable Pavement - Pond	1.05 (>0.7)	0.95 (>0.6)	0.95 (>0.7)

** Drainage treatment to be supplemented by proprietary non-SuDS treatment, to be discussed and agreed with LLFA.*

*** Sand & Aggregate stockpile compound to be reviewed in next design phase to investigate the use of swales or filter drains around the perimeter of this compound.*

4.4.8 Proprietary drainage methods water quality risk management

4.4.9 As presented above, the current approach to manage surface water runoff along the access roads and sand/aggregate stockpile areas, is to use traditional drainage systems. For the railway and HGV areas supplementary treatment through traditional drainage will also be required. All proprietary drainage features will include silt traps and catch pits in all gullies and manholes, where required separators will be implemented to manage water quality risks from TSS, metals and hydrocarbons.

4.4.10 The HGV parking area is currently proposed to drain through an oil separator to mitigate the risk of hydrocarbon spillage where large vehicles are parked long-term. The design will comply with the initiatives and best practice guidance for pollution prevention for impermeable areas. At this stage, this is deemed to be the most practicable solution. Similarly, the railway drainage will require a by-pass separator before connecting into the sitewide drainage network. The benefit of capturing potential oil spills and treating them in a proprietary device of specific performance specifications is that risk of pollution to downstream sensitive areas is greatly reduced. Proprietary drainage features also provide a level of certainty from past performance that is not immediately offered by vegetative solutions in the early months (sometimes 12 to 18 months) as they establish.

4.4.11 In places, such systems may be used a fail-safe method of treatment to supplement primary treatment observed using SuDS techniques and will be explored in future design stages.

5 CONCLUSION

5.1.1 The ACA drainage strategy has been informed by the DCO Outline Drainage Strategy. This includes not relying on infiltration as a means of surface water disposal, aiming to treat at source, and using suitable treatment methods where reasonable on site.

5.1.2 This note highlights that surface water on site will be collected primarily using SuDS techniques in combination with conventional drainage systems, and be stored, treated and discharged to nearby watercourses. There are several SuDS treatment mechanisms proposed on the site, as well as additional proprietary treatment systems. The surface water design prioritises SuDS features as a means of capture, treatment, and storage, and will be further considered in the next design stage.

5.1.3 The surface water design improves the existing flood risk of the site by allowing systems to capture surface water runoff and attenuate this up to the 1 in 100-year storm event, in accordance with national and local guidance. This is particularly shown in the north-west corner of the site, where swales will be installed to intercept overland flow that previously was directed to Valley Road. This area now captures and retains surface water on site and improves the flood risk to the properties downstream.

5.1.4 The surface water drainage design needs to be progressed further, in conjunction with external stakeholders such as ESC, SCC, Natural England, the EA, and East Suffolk IDB. Throughout the next design phase, these stakeholders will be engaged with regularly to enable a suitable design that meets the needs of each party.

APPENDIX A:

A.1. Suffolk County Council Briefing Note

08 February 2021

The Sizewell C Project

Suffolk County Council briefing note to SZC Co. regarding its concerns on surface water drainage

Background

1. At the meeting between Suffolk County Council (the Council) and SZC Co. on 1 February 2021, the Council raised that it had concerns regarding the surface water drainage proposals not only for the Land East of Eastland Industrial Estate (LEEIE), but also for most of the other sites. This note set out the concerns and expectations of the Council as the Lead Local Flood Authority (referred to in the document as the LLFA) for these other sites.

Current progress

2. To date, good progress has been made on surface water drainage strategies for both the Two Village Bypass and the Sizewell Link Road. There are regular monthly meetings between the design team and key stakeholders to assess progress on multiple topics, determine potential solutions to any problems that have arisen and a good mechanism of feedback between meetings.
3. Whilst surface water drainage strategies are coming together for both schemes these are at quite a high level with no calculations or technical drawings provided to date.
4. The Land East of Eastlands Industrial Estate (LEEIE) is the only other site to have seen any progress with regards to surface water drainage strategies. The LLFA has significant concerns with the proposed approach to surface water management at this site.
5. No progress on surface water drainage strategies has been communicated to the Council for the other sites (Main Development Site, North & South Park & Rides, Freight Management Facility, Yoxford Roundabout). It is noted that the changes consultation includes a temporary outfall pipe from Main Development Site onto the beach. The need for this is a clear indication that more detailed work has been undertaken to assess surface water drainage strategies for this site that is yet to be communicated to the Council.

Specific concerns

6. Concerns regarding the approach taken for LEEIE have been made previously. This position remains unchanged. Two points worth highlighting from this site are;
   a. SZC Co.'s notion that there is 'insufficient space for SuDS'. This argument is not accepted by the LLFA on any of the proposed development sites. NPS EN-1 is clear that priority should be given to the use of SuDS.
   b. SZC Co.'s notion that the site is only temporary, and on that basis, local and national design guidance as usually applied, and thus a SuDS approach, is not necessarily applicable. This argument is not accepted by the LLFA on any of the proposed development sites. NPS EN-1 does not differentiate between temporary and permanent. The potential surface

water flood risk presented by a development is no less important just because it is temporary. If anything, temporary developments for construction purposes have the potential to further increase surface water flood risk compared to permanent development due to suspended sediments etc associated with construction works.

7. Due to the site's location within a sensitive environment, the Main Development Site (MDS) is of particular concern to the LLFA. This is all the more relevant given the proposed site uses. Very high-level details have been provided as part of the submission documentation, but no further information has been received to date.

8. Proposals for any site need to have a deliverable surface water drainage strategy. This infrastructure is essential to prevent an increase in flood risk and in this instance (MDS) to prevent any potential harm to the surrounding sensitive environment. The space required for SuDS should be assessed, determined, and allocated ***prior*** to space for other site uses being allocated; to ensure there is sufficient space for this essential infrastructure. The LLFA is concerned that this approach may not have been followed by SZC Co.

9. As previously stated, no information has been received for any site, with the exception of LEEIE, Two Village Bypass and Sizewell Link Road.

10. All the points raised in the Issues Tracker, shared in 2019 with the applicant, remain outstanding with little if any progress made on the vast majority of issues raised to date.

<u>What we expect</u>

11. The LLFA expect to see (ideally before, or at worst during, the Examination process) a deliverable surface water drainage strategy for each site of proposed development. Whilst the LLFA understand that at that stage detailed design is not essential, we do expect to see evidence that the strategy can be delivered, i.e. the measures can sufficiently manage surface water runoff generated by the proposed development, within the Order Limits and whilst complying with current local and national design guidance.

12. The LFFA understands that infiltration testing has been undertaken at all sites. However, the LLFA is yet to see the results of this testing in most instances. If a design is solely based on infiltration, SZC Co. needs to evidence that a suitable infiltration rate has been achieved. If a suitable infiltration rate has not been evidenced, an alternative method of surface water disposal (as per surface water disposal hierarchy) should be identified and an appropriate design developed on this basis.

13. If infiltration testing has not been undertaken for a particular site, then it must be demonstrated that;

    a. An infiltration strategy can be achieved with a minimum infiltration rate of 10mm/hr and an appropriate Factor of Safety; and

    b. An alternative method of surface water disposal is achievable (as per surface water drainage hierarchy).

    It must be demonstrated that both options are deliverable within the Order Limits if no infiltration testing is available.

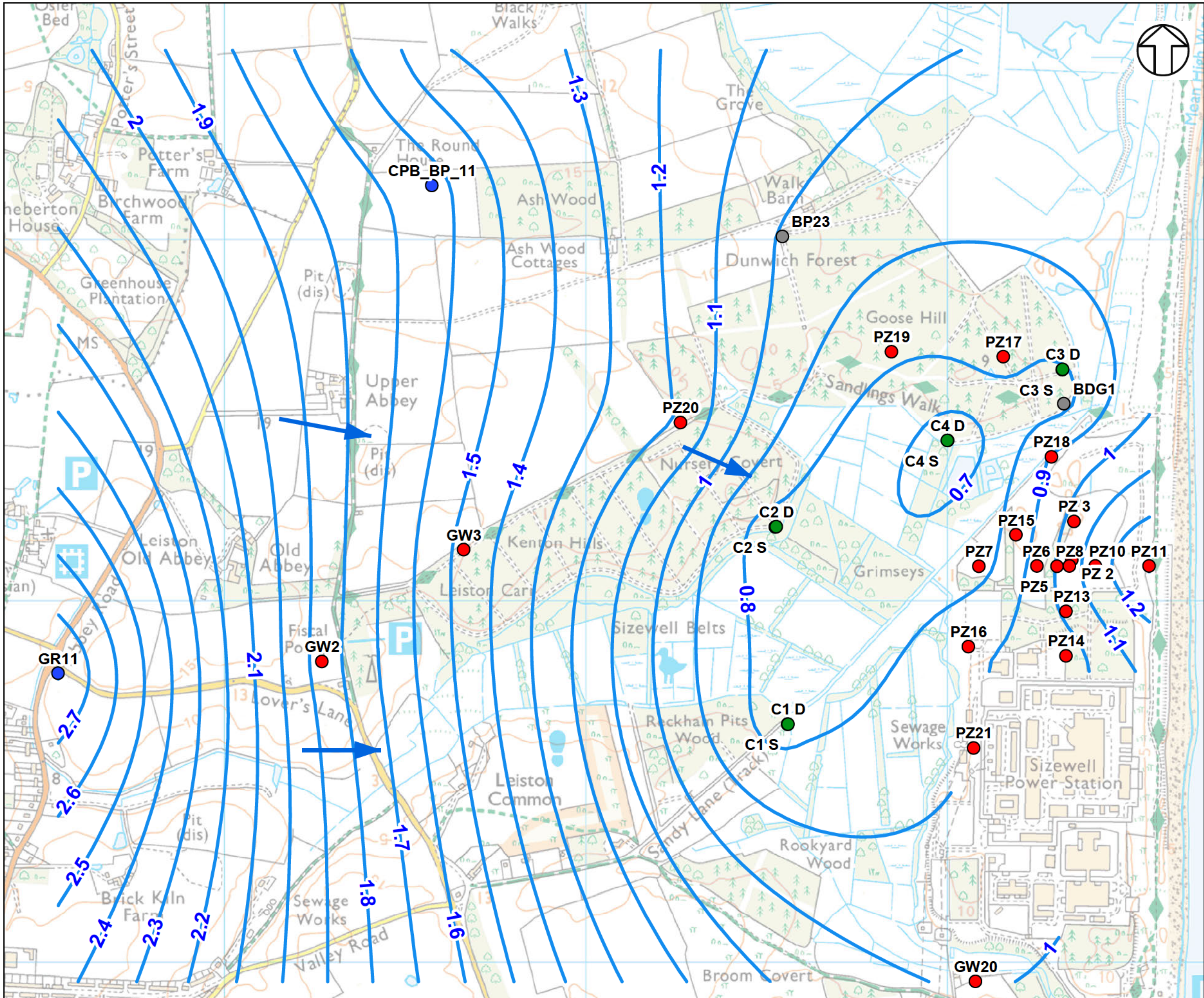
14. Any drainage strategy must consider flood risk as identified in the relevant Flood Risk Assessments.
15. It is important that all design development considers maximum water levels, total basin depths, side slope gradients and the potential for each SuDS component to deliver surface water treatment. All these aspects will affect the sizing of SuDS components which ultimately impact land take and in turn, deliverability (especially on constrained sites).

Recommended next Steps

16. The LLFA strongly recommends that the joint working approach with the LLFA taken for the design development of Two Village Bypass and Sizewell Link Road is replicated for each of the other development sites. This transparent and integrated approach has given the LLFA assurance that design is progressing in the right direction, even if more detailed information is not yet available for these two schemes.
17. As design development progresses further, additional details should be provided to the LLFA. This should include but is not limited to, results of ground investigation testing, dimensioned plans of proposed SUDS, design assumptions, results of rainfall simulations for proposed design and details of future maintenance arrangements.

APPENDIX B:

B.1. Groundwater Contour Drawing



NOTES

PEAT CONTOURS ARE CONSTRAINED TO THE EXTENT OF THE PEAT DEPOSITS

KEY

- 2010 BOREHOLES
- 2013 BOREHOLES
- 2014 BOREHOLES
- 2015 BOREHOLES
- GROUNDWATER CRAG CONTOURS (MAOD) - WINTER 2018
- GROUNDWATER FLOW DIRECTION

NOT PROTECTIVELY MARKED

Project Title:
SIZEWELL C PROJECT
ENVIRONMENTAL STATEMENT
VOLUME 2
CHAPTER 19B1
GROUNDWATER AND SURFACE WATER APPENDIX B1

DRAWING TITLE:
GROUNDWATER CONTOURS IN CRAG AQUIFER DURING WINTER 20 8 (9 2 2018)

DRAWING NO:
FIGURE 19B 1.16

DATE:	DRAWN:	SCALE :
JAN 2020	S.R.H	1:10,103 @A3

SCALE BAR

0 0.1 0.2 0.3 0.4 0.5 KM

APPENDIX C:

C.1. UK SuDS Greenfield Runoff Rate

HR Wallingford
Working with water

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Ka Po Leung
Site name:	Sizewell C
Site location:	ACA & WMZ7

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

Site Details

Latitude:	52.20902° N
Longitude:	1.59176° E
Reference:	3647457570
Date:	Jan 20 2021 18:01

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 50 (30.475)

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	3	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.37	0.37

Hydrological characteristics

	Default	Edited
SAAR (mm):	581	581
Hydrological region:	5	5
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	2.45	2.45
Growth curve factor 100 years:	3.56	3.56
Growth curve factor 200 years:	4.21	4.21

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates

Area Ratio: 0.60950

	Default	Edited	Interpolated
Q_{BAR} (l/s):	115.5	115.5	70.40
1 in 1 year (l/s):	100.49	100.49	61.25
1 in 30 years (l/s):	282.98	282.98	172.48
1 in 100 year (l/s):	411.19	411.19	250.62
1 in 200 years (l/s):	486.26	486.26	

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

APPENDIX D:

D.1. EDF – LEEIE EWBD Drainage Design Feedback

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Minutes

SZC Project - DCO

Meeting:	EDF – LEEIE EWBD Basic Drainage Design Feedback		
Attendees:	[redacted] EDF) JH [redacted] Atkins) JJ [redacted] Atkins) NK [redacted] Atkins) ES [redacted] Wood) SDL [redacted] BM [redacted] EST [redacted] MW [redacted] JM [redacted] S [redacted] GB [redacted] LC	**Meeting Type:**	MS Teams
Apologies:	-	**Meeting held on:**	17 December 2020 1400-1530h

Meeting Agenda

1. Introductions
2. Review Objective(s) for the Meeting
3. Feedback on the enabling works basic design for drainage at LEEIE / ACA:
   a. WMA
   b. EA
   c. SCC
4. Was meeting objective(s) met?
5. AOB and next meeting date
6. Close

Meeting Minutes – 18/11/2020

Minute Ref	Actions/Comments	Who	By when
1.	**Introductions** Introductions and scene setting by [redacted] Objective 1 - Discussion around the feedback received from the EA, SCC and WMA on the technical information previously provided for the LEEIE (EW0302 ACA Drainage Strategy Technical Note), to understand concerns, points of clarity and area of common ground. Objective 2 – Time allowing, enable discussion on any other aspect of the change consultation pertaining to drainage e.g. the proposed temporary marine outfall.		
2.	YS: Questions on specific discharge rates and also queries as to why the discharge is currently proposed directly into Leiston Drain and not into the attenuation basin that would be preferable. BM: Agree – would be beneficial to go through a basin and provide improvements to the water quality. EDF should also seek to consult with Natural England for specific water quality requirements. ES: Happy to change the local strategy if all stakeholders agree it is the right approach. EST: Current EA position is that this site will not require permitting. ACTION: Potential design change - basin to be used prior to outfall to Leiston Drain. Subject to discussions with NE	JH	

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SZC Project - DCO

Minute Ref	Actions/Comments	Who	By when
3.	GB: Concern that pumping may be an issue under Land Drainage as downstream landowners do not have to consent to artificial flows. Something that will need to be considered. ES: Current intention is to pump internally and treat prior to discharge, so not going into third party land prior to discharge. GB: Chemistry is important and ecologists will seek reassurance that flows into Leiston Drain are of suitable quality. Also volume, given that Leiston is susceptible to flooding. MW: Modelling has shown that flood water will weir over Lovers Lane before backing up and causing any flooding in Leiston. Catchment 2 is the only area of LEEIE that flows towards Leiston.		
4	ES – Question: which green field runoff rate would be acceptable? MW: two options, preferably Q bar YS: Q bar Also seeking model outputs to understand storage. ES: Happy to provide. Will need to make some adjustments first before providing ACTION: Q bar to be used. ACTION: Model outputs to be provided once updated. And subject to discussions with NE.	ES ES	
5.	BM: Questions over logistics compound uses. ES: Understand it will be an area that will be used for temporary storage of things - lower risk. BM: If low risk then no interceptor required. If that changes then it may be required. ES: Will seek further information on area usage. MW: Would need to understand how exceedance events are managed for the site as a whole. ACTION: Information on logistics compound to be provided.	ES	
6.	BM: Concern over underground storage. Currently backing up. Can a pollution control device be used? ES: still under consideration but might be possible to incorporate in detailed design stage. BM: a pollution control device at the WMZ outlet may be a better option, although there are concerns over maintenance. JJ: Acknowledged that careful maintenance will be required but pointed out that operation and maintenance processes are taken very seriously on a nuclear power plant. ES: Likely to be considered further under detailed development, but concern noted.		
7.	BM: Question over the interceptor at HGV parking. ES: proposed oil intercept a at HGV parking MW: has to be a failsafe and not a primary.		
8.	BM: Question over the silt traps for stockpiles and how these will work. ES: Not yet fully considered - further information in detailed design stage		
9.	MW: question to the EA on pollution – would the EA require a permit to discharge into a main river? EST: No, it would not be required		
10.	MW: appears that treatment is not enough into a number of locations based on the index approach in the SuDS manual. MW: wants stockpiles area to be higher risk. Unclear how this is different to HGV parking. ES: vehicles will come in to remove and deposit materials. No long-term parking. Can discuss use further. MW: Not having enough space is not an excuse for not implementing SUDS JJ: SuDS Guidance principally developed for the likes of housing developments, not temporary structures likely lasting less than 10 years before being returned to existing state. Our approach has been to ensure SuDS are uppermost in the design thinking and to protect in particular the SSSI, so a balance across the site needs to be sought. We will look to enhance Amenity and BioDiversity within the LEEIE area as these are two of the four pillars of SuDS. Evidence has shown this helpful to residents mental health well-being		

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Template No: NNB-301-TEM-000015

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Minute Ref	Actions/Comments	Who	By when
	MW: Acknowledges the point but the principles of SuDS must be observed. JJ: We will continue to work together to ensure the principles are observed.		
11.	MW: HGV parking – why different to the freight management facility which proposes permeable surfacing? ES: Little knowledge in this area. We'll need to look into before responding. **ACTION**: Review freight management facility proposals.	ES	
12.	MW: Question over storage under the caravan pitches. Over 12,000 cubic meters proposed where a two metre difference in ground level is shown on LIDAR. Does it back up and only use part of the storage or will it flood? ES: don't recall a two metre level difference. Storage would not necessarily follow the ground profile. It is likely that a changed approach at the outfall arrangement discussed in 2 above will reduce the need for this type of storage we will respond accordingly MW: If ground profile changes, drainage routes will also change, i.e. are catchments redefined.	ES	
13.	MW: For the stockpiles, agree with the hay bale approach to intercept runoff, but concern over the swale. Need more information on this. Suggested it won't work under certain circumstances. Where does it outfall to? ES: Need to come back after reviewing. **ACTION**: Review swale and provide further information.	ES	
14.	MW: Infiltration rates – needs to assume there is no infiltration. ES: Have assumed and there is no infiltration, although there will be some. MW: Would like to see output of GI / infiltration testing.		
15.	MW: Pond will not meet quality requirements for a pond so a basin will be better. ES: Comment noted MW: Note that there could be a legacy benefit.		
16.	SDL: detailed design will provide a more appropriate level of detail for permitting, if required.		
17.	MW: changes consultation wording suggests a temporary outfall up until the 1 in 30 year event. A 1 in 30 should be held above ground. Needs to understand the proposals. ES: We will come back with something more detailed. YS: Concerned if discharge into sea more frequently than 1 in 30. Would like to know criteria. JH: The intention of the 1 in 30 year value in the consultation was to provide an example of the likely exceedance event, rather than be definitive, since more work is required to match criteria to the construction phasing and activities. Agree that as the design evolves a more detailed description of deployment will be required, set in the context of the environmental sensitivities, i.e. seeking to provide outcome- rather than output-led approach. JJ: We are aware of sensitivities of the area and the need to keep water in the area. Intended to be used as a fail-safe as it is known that the drains in the area back up in winter months, and discharging may result in local flooding. GB: Water level management required. Standing water can be beneficial to the local ecology particularly in drought. JJ: Acknowledged, the use of source control elements throughout the site is predicated against the backdrop of maintaining ground water levels, the ecology and environment being uppermost in mind. MW: 1 in 30 to be contained **ACTION**: Provide further detail on temporary outfall proposals.	ES	
18.	Were objective(s) met? EST: a very productive meeting to be recorded as such on NSIP form. **ACTION**: JH to provide NSIP draft to EST	JH	
19.	**AOB and next meeting date** MW: Would like meetings for each AD site going forward		

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SZC Project - DCO

Minute Ref	Actions/Comments	Who	By when
	YS: Agree with MW JM: would like Natural England to be invited to future meetings No next meeting date set. ACTION: Invite NE to next meeting	JH	
20.	Close		

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Template No: NNB-301-TEM-000015 PROTECTIVE MARKING

APPENDIX E:

E.1. Infiltration Rate Testing Results

TP-WMZ-24 & TP-WMZ-25 from Structural Soils Limited, July 2017 - 2016 Onshore Ground Investigation Campaign. Factual Report on Ground Investigation (SZC-SZC030-XX-000-REP-100000)

ACA_2020-1 & ACA_2020-2 from Fugro - Sizewell C Infiltration Testing Report on Ground Investigation without Geotechnical Evaluation (G200003U_GIR Rev 02)

FULL SCALE SOAKAWAY TEST

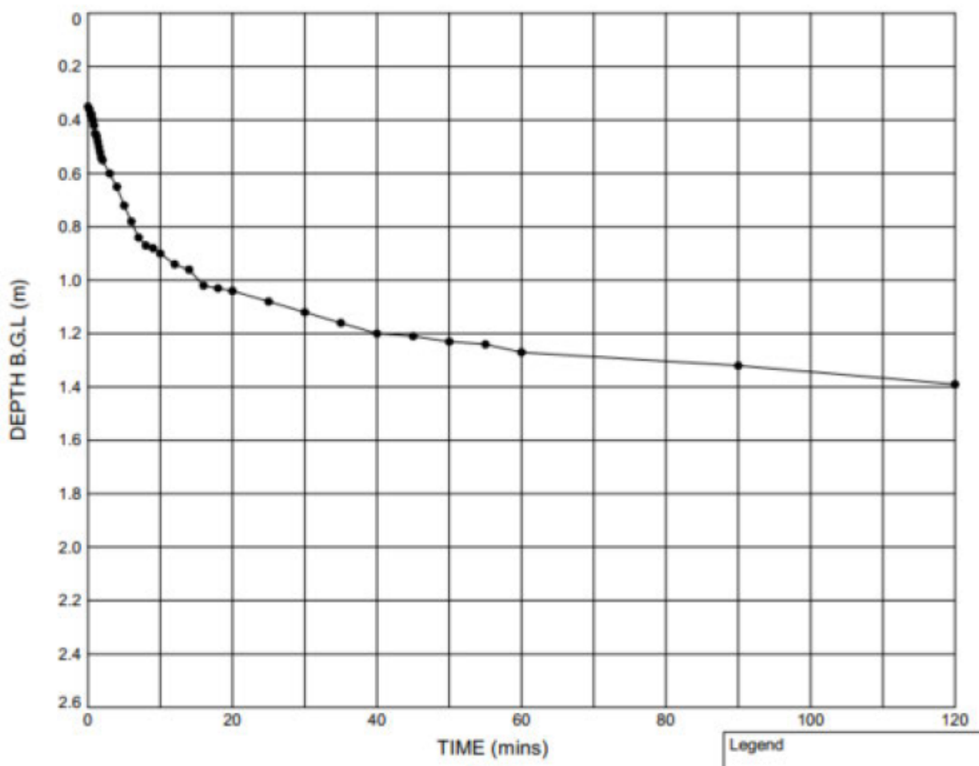
Non-standard test

Soakaway Test - Position ID : **TP-WMZ-24**

Ground Level (m): **16.92**

National Grid Co-ordinates: **E:645407.4 N:262892.8**

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME



Test 1

Pit start depth:	=	3.00	m
Pit final depth:	=	3.00	m
Effective depth, De	=	2.65	m
Effective storage volume, V_{p75-25}	=	0.9540	m³
Surface area, a_{p50}	=	5.4900	m²
Time, t_{p75-25}	=	30619	secs
Infiltration rate, f	=	5.68×10^{-6}	m/s

Please note test data was extrapolated to obtain tp75-tp25.

Legend

● Test 1 (14.3.17)

Plan (Not to scale)

1.20

0.60

No Bearing Taken

STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	Compiled By	Date	Checked By	Date
	[redacted]	14/6/17	[redacted]	14/6/17
	Contract: Sizewell Section 53 Land		Contract Ref: 764156	

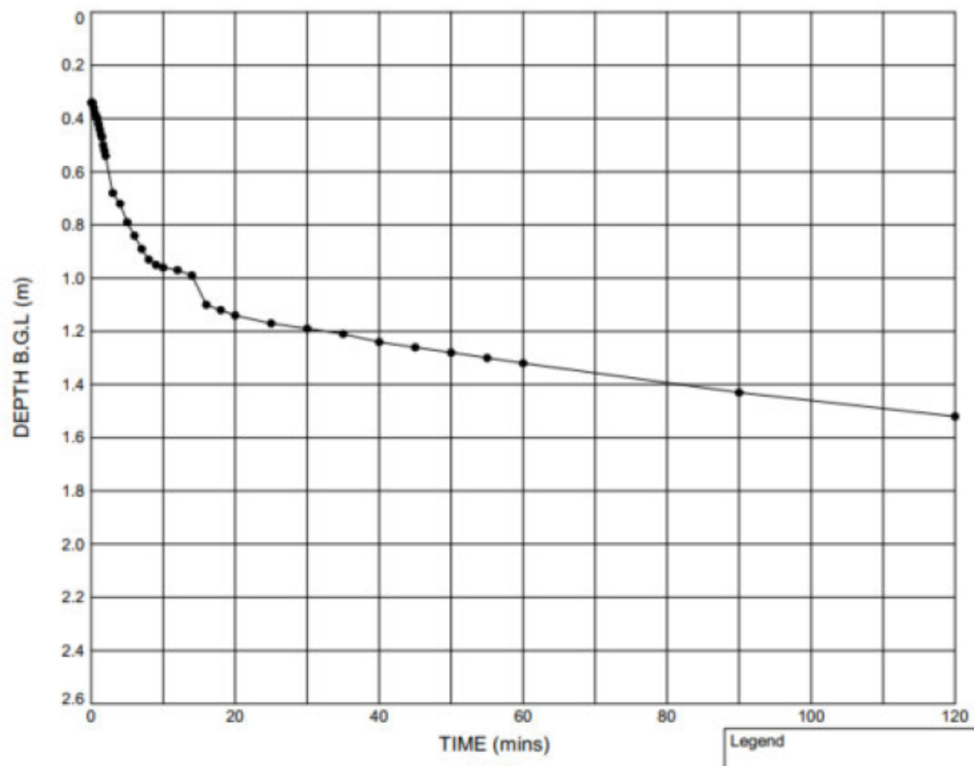
FULL SCALE SOAKAWAY TEST

Non-standard test

Soakaway Test - Position ID : **TP-WMZ-25**

Ground Level (m): **16.44** National Grid Co-ordinates: **E:645595.9 N:262725.8**

PLOT OF DEPTH OF WATER BELOW GROUND LEVEL AGAINST TIME



Legend

● Test 1 (14.3.17)

Pit start depth:	=	3.00	m
Pit final depth:	=	3.00	m
Effective depth, De	=	2.66	m
Effective storage volume, V_{p75-25}	=	1.6758	m³
Surface area, a_{p50}	=	8.4420	m²
Time, t_{p75-25}	=	22861	secs
Infiltration rate, f	=	$8.68x10^{-6}$	m/s

Please note test data was extrapolated to obtain tp75-tp25.

Plan (Not to scale)

2.10

0.60

No Bearing Taken

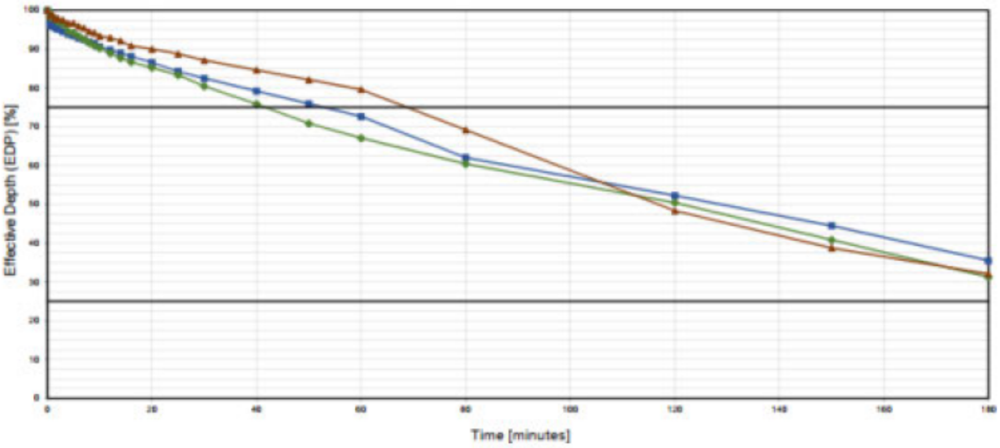
STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	Compiled By	Date	Checked By	Date
	[redacted]	14/6/17	[redacted]	14/6/17
	Contract: Sizewell Section 53 Land		Contract Ref: 764156	

GINT_LIBRARY_V8_06.GLB LibVersion: v8_06_017 PrjVersion: v8_06 - Core+Logs - 002 | Graph I - TP SOAKAWAY - 2 - FINAL REPORT - A4P | 764156 - SIZEWELL SECTION 53 LAND.GPJ - v8_06. | 14/6/17 - 10:05 | AC7 |

NNB GENERATION COMPANY (SZC)
SIZEWELL INFILTRATION TESTING

SOAKAWAY TEST RECORD

Date	06/03/2020	Operator	JJL	Hole Depth	3.50 m	Hole No.	ACA_2020-1



Test 1 ■				Test 2 ◆				Test 3 ▲			
Start Time =	11:25			Start Time =	14:32			Start Time =	08:35		
Test Top =	0.45	m BGL		Test Top =	0.50	m BGL		Test Top =	0.50	m BGL	
Test Base =	2.90	m BGL		Test Base =	2.90	m BGL		Test Base =	2.90	m BGL	
75% EDP =	1.06	m BGL		75% EDP =	1.10	m BGL		75% EDP =	1.10	m BGL	
50% EDP =	1.68	m BGL		50% EDP =	1.70	m BGL		50% EDP =	1.70	m BGL	
Elapsed Time [hr:min:sec]	Water [m BDL]	Water [m BGL]	EDP [%]	Elapsed Time [hr:min:sec]	Water [m BDL]	Water [m BGL]	EDP [%]	Elapsed Time [hr:min:sec]	Water [m BDL]	Water [m BGL]	EDP [%]
00:00:00		0.45	100	00:00:00		0.50	100	00:00:00		0.50	100
00:00:30		0.54	96	00:00:30		0.54	98	00:00:30		0.53	99
00:01:00		0.55	96	00:01:00		0.54	98	00:01:00		0.53	99
00:01:30		0.56	96	00:01:30		0.56	98	00:01:30		0.55	98
00:02:00		0.57	95	00:02:00		0.57	97	00:02:00		0.55	98
00:03:00		0.59	94	00:03:00		0.59	96	00:03:00		0.56	98
00:04:00		0.60	94	00:04:00		0.63	95	00:04:00		0.58	97
00:05:00		0.61	93	00:05:00		0.64	94	00:05:00		0.58	97
00:06:00		0.63	93	00:06:00		0.66	93	00:06:00		0.60	96
00:07:00		0.64	92	00:07:00		0.68	93	00:07:00		0.61	95
00:08:00		0.65	92	00:08:00		0.70	92	00:08:00		0.63	95
00:09:00		0.66	91	00:09:00		0.72	91	00:09:00		0.64	94
00:10:00		0.68	91	00:10:00		0.74	90	00:10:00		0.66	93
00:12:00		0.70	90	00:12:00		0.77	89	00:12:00		0.67	93
00:14:00		0.72	89	00:14:00		0.80	88	00:14:00		0.69	92
00:16:00		0.74	88	00:16:00		0.82	87	00:16:00		0.72	91
00:20:00		0.78	87	00:20:00		0.86	85	00:20:00		0.74	90
00:25:00		0.84	84	00:25:00		0.90	83	00:25:00		0.77	89
00:30:00		0.88	82	00:30:00		0.97	80	00:30:00		0.81	87
00:40:00		0.96	79	00:40:00		1.08	76	00:40:00		0.87	85
00:50:00		1.04	76	00:50:00		1.20	71	00:50:00		0.93	82
01:00:00		1.12	73	01:00:00		1.29	67	01:00:00		0.99	80
01:20:00		1.38	62	01:20:00		1.45	60	01:20:00		1.24	69
02:00:00		1.62	52	02:00:00		1.69	50	02:00:00		1.74	48
02:30:00		1.81	44	02:30:00		1.92	41	02:30:00		1.97	39
03:00:00		2.03	36	03:00:00		2.15	31	03:00:00		2.13	32

Datum (-ve denotes AGL) = 0.00 m BGL
Ground Level taken as Datum.

Input by KB 09/03/2020 | Checked by JJL 12/03/2020 | Approved by NHA 05/06/2020

Contract No. G200003U

Page 1 of 2

NNB GENERATION COMPANY (SZC)
SIZEWELL INFILTRATION TESTING

SOAKAWAY TEST RECORD							
Date	06/03/2020	Operator	JJL	Hole Depth	3.50 m	Hole No.	ACA_2020-1

Test Details

Datum (-ve denotes AGL) =	0.00 m BGL	Well Screen	
		External Diameter =	0.225 m
Hole Diameter =	0.30 m	Internal Diameter =	0.205 m
Hole Depth =	3.50 m BGL	Filter Material	
		Assumed Solid Fraction =	57.62 %
		Assumed Porosity =	42.38 %

Weather: Fine.

Geology: SAND and GRAVEL.

Remarks

Test 1 and Test 2 undertaken on 06/03/2020; Test 3 undertaken on 07/03/2020.
Test carried out inside 225mm well screen in gravel filled borehole. Volume of gravel fraction assumed to be 57.62% of the total volume of gravel filled space. Gravel filter commenced 0.50m BGL.
Standing water was noted at 2.90m BGL before test started; this standing water level is taken as the test base depth.
Water level did not reach 25% EPD for all Test 1, Test 2 and Test 3; infiltration rate based on data between 75% EPD and 50% EPD.

Calculation

Test 1 ■			Test 2 ◆			Test 3 ▲		
Start Time =	11:25		Start Time =	14:32		Start Time =	08:35	
Test Top =	0.45	m BGL	Test Top =	0.50	m BGL	Test Top =	0.50	m BGL
Test Base =	2.90	m BGL	Test Base =	2.90	m BGL	Test Base =	2.90	m BGL
EDP =	2.45	m	EDP =	2.40	m	EDP =	2.40	m
75% EDP =	1.06	m BGL	75% EDP =	1.10	m BGL	75% EDP =	1.10	m BGL
50% EDP =	1.68	m BGL	50% EDP =	1.70	m BGL	50% EDP =	1.70	m BGL
V =	0.17	m^3	V =	0.17	m^3	V =	0.17	m^3
Vg =	0.04	m^3	Vg =	0.04	m^3	Vg =	0.04	m^3
Vp =	0.13	m^3	Vp =	0.13	m^3	Vp =	0.13	m^3
Vp75-50 =	0.03	m^3	Vp75-50 =	0.03	m^3	Vp75-50 =	0.03	m^3
ap =	2.08	m^2	ap =	2.05	m^2	ap =	2.05	m^2
Tp75 =	3142	s	Tp75 =	2520	s	Tp75 =	4124	s
Tp50 =	7800	s	Tp50 =	7200	s	Tp50 =	6971	s
Infiltration Rate, f =	3.34E-06	m/s	Infiltration Rate, f =	3.31E-06	m/s	Infiltration Rate, f =	5.43E-06	m/s

Notes

m AGL/BGL = metres above / below ground level
m BDL = metres below datum level

Effective depth of soakaway (EDP) is calculated from the initial water level to the base of hole.

V is the effective storage volume of water in the hole (ESV) when gravel fill not used; Vg is the effective volume taken up by the gravel.
Vp is the ESV, less the volume of the gravel fraction.
Vp75-50 is the ESV between 75% and 50% effective depth, less the volume of the gravel fraction.

ap is the average internal surface area of the hole between 75% and 50% effective depth including base area.

Tp75 is time at 75% EDP; Tp50 is time at 50% EDP.
Tp75-50 is the assessed time for water level to fall from 75% to 50% EDP.

$$Soil\ Infiltration\ rate, f = \frac{V_{P75-50}}{ap \times T_{P75-50s}}$$

Input by KB 09/03/2020 | Checked by JJL 12/03/2020 | Approved by NHA 05/06/2020

Contract No. G200003U

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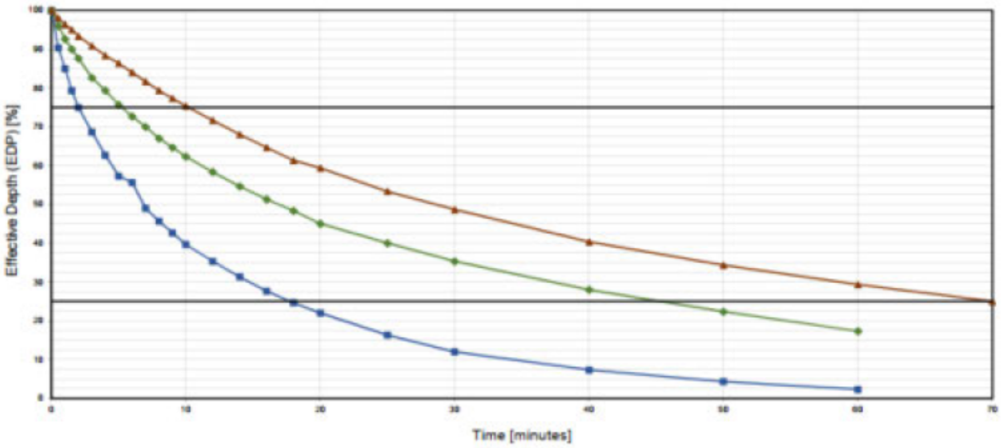
NNB GENERATION COMPANY (SZC)
SIZEWELL INFILTRATION TESTING

SOAKAWAY TEST RECORD							
Date	07/03/2020	Operator	JJL	Hole Depth	3.50 m	Hole No.	ACA_2020-2



Test 1 ■				Test 2 ◆				Test 3 ▲			
Start Time =	15:10			Start Time =	09:02			Start Time =	10:05		
Test Top =	0.50		m BGL	Test Top =	0.50		m BGL	Test Top =	0.50		m BGL
Test Base =	3.50		m BGL	Test Base =	3.50		m BGL	Test Base =	3.50		m BGL
75% EDP =	1.25		m BGL	75% EDP =	1.25		m BGL	75% EDP =	1.25		m BGL
25% EDP =	2.75		m BGL	25% EDP =	2.75		m BGL	25% EDP =	2.75		m BGL
Elapsed Time [hr:min:sec]	Water [m BDL]	Water [m BGL]	EDP [%]	Elapsed Time [hr:min:sec]	Water [m BDL]	Water [m BGL]	EDP [%]	Elapsed Time [hr:min:sec]	Water [m BDL]	Water [m BGL]	EDP [%]
00:00:00		0.50	100	00:00:00		0.50	100	00:00:00		0.50	100
00:00:30		0.79	90	00:00:30		0.62	96	00:00:30		0.56	98
00:01:00		0.95	85	00:01:00		0.72	93	00:01:00		0.61	96
00:01:30		1.12	79	00:01:30		0.80	90	00:01:30		0.65	95
00:02:00		1.25	75	00:02:00		0.87	88	00:02:00		0.70	93
00:03:00		1.44	69	00:03:00		1.02	83	00:03:00		0.78	91
00:04:00		1.62	63	00:04:00		1.12	79	00:04:00		0.85	88
00:05:00		1.78	57	00:05:00		1.23	76	00:05:00		0.91	86
00:06:00		1.83	56	00:06:00		1.32	73	00:06:00		0.98	84
00:07:00		2.03	49	00:07:00		1.40	70	00:07:00		1.05	82
00:08:00		2.13	46	00:08:00		1.49	67	00:08:00		1.12	79
00:09:00		2.22	43	00:09:00		1.56	65	00:09:00		1.18	77
00:10:00		2.31	40	00:10:00		1.63	62	00:10:00		1.24	75
00:12:00		2.44	35	00:12:00		1.75	58	00:12:00		1.35	72
00:14:00		2.56	31	00:14:00		1.86	55	00:14:00		1.46	68
00:16:00		2.67	28	00:16:00		1.96	51	00:16:00		1.56	65
00:18:00		2.76	25	00:18:00		2.05	48	00:18:00		1.66	61
00:20:00		2.84	22	00:20:00		2.15	45	00:20:00		1.72	59
00:25:00		3.01	16	00:25:00		2.30	40	00:25:00		1.90	53
00:30:00		3.14	12	00:30:00		2.44	35	00:30:00		2.04	49
00:40:00		3.28	7	00:40:00		2.66	28	00:40:00		2.29	40
00:50:00		3.37	4	00:50:00		2.83	22	00:50:00		2.47	34
01:00:00		3.43	2	01:00:00		2.98	17	01:00:00		2.62	29
								01:10:00		2.75	25

Datum (-ve denotes AGL) = 0.00 m BGL
Ground Level taken as Datum.

Input by KB 09/03/2020   Checked by JJL 12/03/2020   Approved by NHA 05/06/2020

Contract No. G200003U

Page 1 of 2

NNB GENERATION COMPANY (SZC)
SIZEWELL INFILTRATION TESTING

SOAKAWAY TEST RECORD							
Date	07/03/2020	Operator	JJL	Hole Depth	3.50 m	Hole No.	ACA_2020-2

Test Details

Datum (-ve denotes AGL) =	0.00 m BGL	Well Screen	
		External Diameter =	0.225 m
Hole Diameter =	0.30 m	Internal Diameter =	0.205 m
Hole Depth =	3.50 m BGL	Filter Material	
		Assumed Solid Fraction =	57.62 %
		Assumed Porosity =	42.38 %

Weather: Cloudy.

Geology: Orangish brown SAND.

Remarks

Test 1 undertaken on 07/03/2020; Test 2 and Test 3 undertaken on 08/03/2020.

Test carried out inside 225mm well screen in gravel filled borehole. Volume of gravel fraction assumed to be 57.62% of the total volume of gravel filled space. Gravel filter commences at 0.50m BGL.

Calculation

Test 1 ■			Test 2 ◆			Test 3 ▲		
Start Time =	15:10		Start Time =	09:02		Start Time =	10:05	
Test Top =	0.50	m BGL	Test Top =	0.50	m BGL	Test Top =	0.50	m BGL
Test Base =	3.50	m BGL	Test Base =	3.50	m BGL	Test Base =	3.50	m BGL
EDP =	3.00	m	EDP =	3.00	m	EDP =	3.00	m
75% EDP =	1.25	m BGL	75% EDP =	1.25	m BGL	75% EDP =	1.25	m BGL
25% EDP =	2.75	m BGL	25% EDP =	2.75	m BGL	25% EDP =	2.75	m BGL
V =	0.21	m^3	V =	0.21	m^3	V =	0.21	m^3
Vg =	0.05	m^3	Vg =	0.05	m^3	Vg =	0.05	m^3
Vp =	0.16	m^3	Vp =	0.16	m^3	Vp =	0.16	m^3
Vp75-25 =	0.08	m^3	Vp75-25 =	0.08	m^3	Vp75-25 =	0.08	m^3
ap50 =	1.48	m^2	ap50 =	1.48	m^2	ap50 =	1.48	m^2
Tp75 =	120	s	Tp75 =	321	s	Tp75 =	600	s
Tp25 =	1071	s	Tp25 =	2767	s	Tp25 =	4200	s
Infiltration Rate, f =	5.61E-05	m/s	Infiltration Rate, f =	2.18E-05	m/s	Infiltration Rate, f =	1.48E-05	m/s

Notes

m AGL/BGL = metres above / below ground level
m BDL = metres below datum level

Effective depth of soakaway (EDP) is calculated from the initial water level to the base of hole.

V is the effective storage volume of water in the hole (ESV) when gravel fill not used; Vg is the effective volume taken up by the gravel solid;
Vp is the ESV, less the volume of the gravel fraction.
Vp75-25 is the ESV between 75% and 25% effective depth, less the volume of the gravel fraction.

ap50 is the internal surface area of the hole up to 50% effective depth including base area.

Tp75 is time at 75% EDP; Tp25 is time at 25% EDP.
Tp75-25 is the assessed time for water level to fall from 75% to 25% EDP.

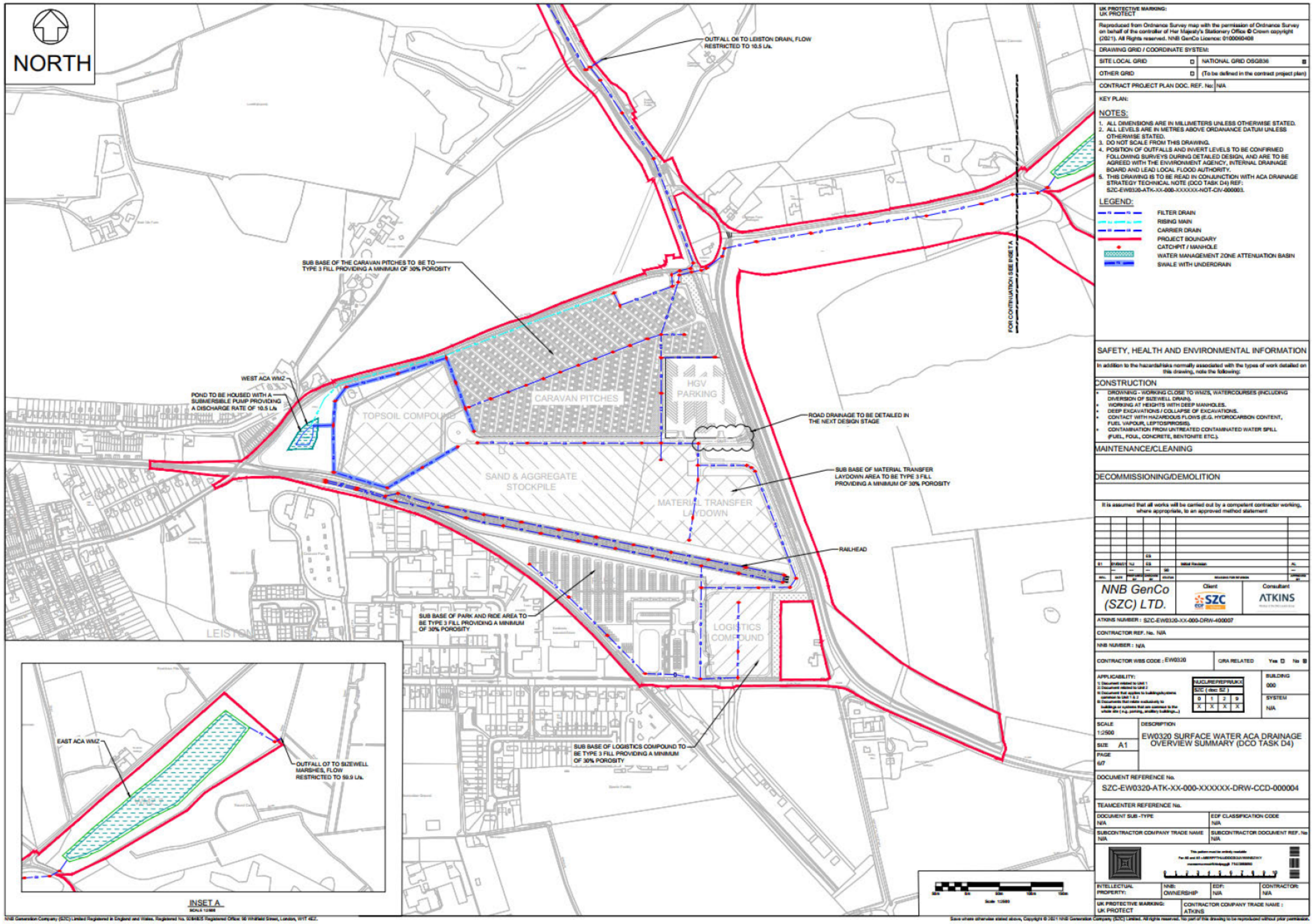
$$Soil\ Infiltration\ rate, f = \frac{V_{P75-25}}{ap50 \times T_{P75-25}}$$

Input by KB 09/03/2020 | Checked by JJL 12/03/2020 | Approved by NHA 05/06/2020

Contract No. G200003U

APPENDIX F:

F.1. ACA Surface Water Drainage Layout


NORTH
OUTFALL O6 TO LEISTON DRAIN, FLOW RESTRICTED TO 10.5 L/s.
SUB BASE OF THE CARAVAN PITCHES TO BE TO TYPE 3 FILL PROVIDING A MINIMUM OF 30% POROSITY
WEST ACA WMZ
POND TO BE HOUSED WITH A SUBMERSIBLE PUMP PROVIDING A DISCHARGE RATE OF 10.5 L/s
CARAVAN PITCHES
HGV PARKING
TOPSOIL COMPOUND
ROAD DRAINAGE TO BE DETAILED IN THE NEXT DESIGN STAGE
SAND & AGGREGATE STOCKPILE
SUB BASE OF MATERIAL TRANSFER LAYDOWN AREA TO BE TYPE 3 FILL PROVIDING A MINIMUM OF 30% POROSITY
MATERIAL TRANSFER LAYDOWN
RAILHEAD
SUB BASE OF PARK AND RIDE AREA TO BE TYPE 3 FILL PROVIDING A MINIMUM OF 30% POROSITY
LOGISTICS COMPOUND
LEISTON
SUB BASE OF LOGISTICS COMPOUND TO BE TYPE 3 FILL PROVIDING A MINIMUM OF 30% POROSITY
EAST ACA WMZ
OUTFALL O7 TO SIZEWELL MARSHES, FLOW RESTRICTED TO 50.9 L/s.
INSET A
FOR CONTINUATION SEE INSET A
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE STATED.
3. DO NOT SCALE FROM THIS DRAWING.
4. POSITION OF OUTFALLS AND INVERT LEVELS TO BE CONFIRMED FOLLOWING SURVEYS DURING DETAILED DESIGN, AND ARE TO BE AGREED WITH THE ENVIRONMENT AGENCY, INTERNAL DRAINAGE BOARD AND LEAD LOCAL FLOOD AUTHORITY.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACA DRAINAGE STRATEGY TECHNICAL NOTE (DCO TASK D4)
LEGEND:
FILTER DRAIN
RISING MAIN
CARRIER DRAIN
PROJECT BOUNDARY
CATCHPIT / MANHOLE
WATER MANAGEMENT ZONE ATTENUATION BASIN
SWALE WITH UNDERDRAIN
SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
CONSTRUCTION
MAINTENANCE/CLEANING
DECOMMISSIONING/DEMOLITION
NNB GenCo (SZC) LTD.
SZC
ATKINS
SCALE 1:2500
SIZE A1
DESCRIPTION
EW0320 SURFACE WATER ACA DRAINAGE OVERVIEW SUMMARY (DCO TASK D4)
DOCUMENT REFERENCE No.
SZC-EW0320-ATK-XX-000-XXXXXX-DRW-CCD-000004

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