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Revision 01

Sizewell C Project

Construction Water Discharge Activity Permit Application MDS/CWDA/13 Supporting Information Document

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REVISION HISTORY

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01	Final	Initial Issue	[redacted]	14/04/2025

CONTENTS

1 NON-TECHNICAL SUMMARY

1.1 Purpose of this Document

This Supporting Information Document (SID) accompanies the application for a Construction Water Discharge Activity (CWDA) environmental permit which will enable proposed discharge activities to sea associated with the development of the Sizewell C (SZC) power station, hereinafter referred to as “the project”. The project development itself and associated schemes are subject to the Sizewell C Development Consent Order (DCO) (referred to throughout this document as the ‘DCO’).

This permit application is being referred to as MDS/CWDA/13 within the SZC project.

1.1.1 Project and Site Description

The site of the SZC development currently under construction is centred at UK National Grid Reference (NGR) TM 47355 64128. It is located on the Suffolk coast, approximately mid-way between Felixstowe and Lowestoft, to the north-east of Leiston. The site address being used for the construction works is Sizewell B power station, near Leiston, Suffolk, IP16 4UR (as the nearest operational facility).

This permit application covers several effluent sources which will be generated from construction-related activities taking place across the Main Development Site (MDS), referred to throughout this application as the “site”. Reference may be made specifically in relation to the:

- Main Construction Area (MCA) - the area which, once construction is complete, will house the nuclear reactors and supporting power plant infrastructure; and
- Temporary Construction Area (TCA) - an area located to the north and west of the MCA being used for construction purposes and during the construction phase of the development only.

The MCA and TCA form separate parts of the MDS. All the areas referenced within the MDS are located within the DCO Red Line Boundary which is shown in **Figure 2.1** below.

There are several statutory designated sites that the site falls within, or within proximity to. These are explained in more detail in **Section 2.2** of this supporting information document.

1.2 Scope of Permit Application

There is a need to manage certain effluent streams which will be generated across the site throughout the construction phase of the SZC development. These comprise of process wastewater (or trade effluent), foul wastewater, surface water and groundwater. Each effluent stream will need to be managed and/or treated accordingly to ensure that the risk of any pollution is avoided or minimised as far as reasonably practicable. Where effluent sources cannot be infiltrated back to ground, for example due to their nature, composition or volume, they must be managed and treated appropriately before being discharged offsite. The sources of effluent included within the scope of this permit application are to be combined prior to being discharged to the North Sea, which is located to the east of the site. The discharge is proposed to be made to the sea via a pipeline, which is referred to within the project as the ‘Combined Drainage Outfall’ (CDO) and then dispersed above the seabed via a marine diffuser head. The CDO will supersede the Temporary Marine Outfall (TMO) which is scheduled to take mainly treated surface water and limited ground water during the early enabling construction period (up until October 2026 approximately). Permission to discharge via the TMO (MDS/CWDA/18) was covered in a separate permit application to the Environment Agency (EA).

This permit application encompasses the following proposed water discharge activities and subsequent effluent streams:

1. Discharge of treated surface water run-off from the MCA;
2. Discharge of groundwater from the MCA, including water produced by the installation and development of wells;
3. Discharge of treated foul water from the MCA;
4. Discharge of treated foul water from the Eastern TCA;
5. Discharge of treated foul water from the Western TCA;
6. Discharge of treated water from the sweeper tip facility; and
7. Discharge of treated water from the bentonite plant.

In addition to the above-described effluent streams, other discharges, included but not limited to the following, are anticipated to be added to the CDO discharge stream as the SZC construction phasing progresses:

8. Discharge of treated industrial foul water from marine and tunnelling (M&T) activities including grout batching, Tunnel Boring Machine (TBM) cooling, general site water, shaft and tunnel leaks, and tunnelling dewatering line;
9. Discharge from an inundation event (arising from an emergency tunnel dewatering event); and
10. Discharge of treated effluent from TBM Slurry treatment plant.

Effluent streams 8, 9 and 10 will therefore be included in a permit variation application at an appropriate time (based on the wider construction programme requirements). They are excluded from the scope of this application.

It is proposed that each of the activities, or discharge effluent streams, within scope of this application are managed and treated (where required) to meet desired water quality limits, prior to being combined in an onshore collection chamber, connected to the CDO pipeline, which carries the combined discharges beneath the seabed before being dispersed via a diffuser structure at a marine dispersion head in the North Sea. Each of the proposed water discharge activities subject to this permit application is described in more detail throughout this supporting information document.

During the pre-application process, the EA advised that the CDO collection chamber would not in itself represent a water discharge activity. This is due to the fact that the seven activities included in this application all occur upstream of the CDO collection chamber, and that the collection chamber itself is not designed to provide treatment. The seven activities included in this application are linked to treatment plants and as this report explains, each have anticipated effluent water qualities.

The above activities require a CWDA environmental permit under the Environmental Permitting (England and Wales) Regulations 2016, as amended (EPR). Seven CWDAs are being sought as part of this single permit application; this has been confirmed with the EA during pre-application discussions. The number of activities included in the permit application is reflected in the application fees which are to be made payable to the EA as regulator for the proposed discharge activities.

Based on the current scheduled programme it is anticipated the earliest discharge activity is anticipated to commence in October 2026, once the CDO has been constructed. The discharge activities outlined in this application are anticipated to have differing durations, depending upon the activity to which the discharge relates. Some will therefore start and finish earlier than others in line with the current construction programme.

Requirements for abstraction licences, or other consents such as Marine Management Organisation (MMO) licences, are beyond the scope of this permit application.

1.3 Structure of permit application

This permit application sets out the background, context and relevant design and construction information in relation to the proposed water discharge activities. This SID is intended to be read in conjunction with the completed GOV.UK permit application forms and other supporting documents submitted as part of the application.

This supporting information document is set out as follows:

Section 1 – Non-Technical Summary (this section).

Section 2 - Introduction and Context.

Section 3 – Scope of Permit Application – this section explains the sources of effluent relevant to this permit application, including how and where they originate.

Section 4 – Treatment, Flow rates and Discharge Volumes – this section explains how all sources of effluent are expected to be managed, treated and discharged, and includes proposed effluent parameters.

Section 5 – Supporting Risk Assessments and Modelling have been undertaken, as per the relevant GOV.UK guidance for Surface Water Pollution Risk Assessments[1] to support the proposed discharge activities and ensure any potential impacts to the receptor (the North Sea) have been identified and appropriately considered. A qualitative environmental risk assessment (ERA) has also been undertaken as per the GOV.UK risk assessment guidance[2] for bespoke permit applications that has considered sources-pathways-receptors likely to be present on site in relation to the proposed discharge activities specifically.

Section 6 – Proposed Monitoring and Sampling Arrangements. Ultimately, any monitoring and / or sampling arrangements will be dependent on the requirements set out in the environmental permit, however this section has been included in this document to provide an indication of what arrangements are considered likely to be required.

Section 7 – The proposed CWDAs will be subject to the requirements of the SZC Environmental Management System (EMS) that will be applied on site. This will ensure there are effective processes and / or procedures in place regarding management of the discharge activities. A summary of the SZC EMS has been included within this supporting information document.

Section 8 – Concluding Remarks.

1.4 Definitions

The below table includes the acronyms used throughout this supporting information document.

Term / Abbreviation	Definition
AA	Annual Average
ACA	Ancillary Construction Area
BOD	Biochemical Oxygen Demand
CDO	Combined Drainage Outfall

[1] Surface water pollution risk assessment for your environmental permit - GOV.UK (www.gov.uk)

[2] https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit

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Term / Abbreviation	Definition
CEFAS	Centre for Environmental, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CoCP	Code of Construction Practice
CoW	Cut-off wall
CRoW	Countryside and Rights of Way Act
CUF	Common User Facility
CWDA	Construction Water Discharge Activity
DCO	Development Consent Order
EA	Environment Agency
EDRMS	Electronic Document and Records Management System
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016, as amended
EQS	Environmental Quality Standards
ERA	Environmental Risk Assessment
ES	Environmental Statement
FPS	Foul water Pumping Station
GETM	General Estuarine Transport Model
HDPE	High-density Polyethylene
HRA	Habitats Risk Assessment
HSV	Surface water treatment plant
IMS	Integrated Management System
LOD	Limit of Detection
M&T	Marine and Tunnelling
MAC	Maximum Allowable Concentration
MBBR	Moving Bed Biofilm Reactor
MCA	Main Construction Area
MCERTS	EA Monitoring Certification Scheme
MDS	Main Development Site
MMO	Marine Management Organisation
NGR	National Grid Reference
PINS	Planning Inspectorate
PTP	Package treatment plant
RAMS	Risk Assessment and Method Statement
RPS	Regulatory Position Statement

Term / Abbreviation	Definition
SAC	Special Area of Conservation
SAF	Submerged Aerated Filter
SID	Supporting Information Document
SPA	Special Protection Area
SS	Suspended Solids
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SZC	Sizewell C (project)
SZC Ltd	Sizewell C (limited company)
STP	Sewage Treatment Plant
TBM	Tunnel Boring Machine
TCA	Temporary Construction Area
TLS	Tunnel Launch Shaft
TMO	Temporary Marine Outfall
TSS	Total Suspended Solids
UKAS	United Kingdom Accreditation Service
UV	Ultra-violet
WER	Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (SI 2017/407)
WFD	Water Framework Directive
WMZ	Water Management Zone

1.5 Discharge Calculations and Treatment Strategies

The discharge activities within the scope of this permit application have been underpinned by separate design packages of work. These have informed any treatment requirements, subsequent flow rates and maximum daily discharge volumes in relation to each effluent stream. Some of the effluent streams will be treated independently and then transferred to the CDO collection chamber, while others may be treated (if required) then combined prior to entry into the collection chamber. All effluent streams will then mix in the CDO collection chamber prior to discharge into the North Sea via the outfall pipeline.

Calculations and treatment strategies (where treatment is required) for each discharge effluent stream are described in more detail in **Section 4** and **Section 5** of this supporting information document. Process flow diagrams have also been included to aid understanding of how each effluent stream will be managed. The maximum flow rates are provided, alongside the daily discharge volumes which are the highest possible volume of effluent that could or would be discharged in one day. The average discharge volumes are likely to be less and will vary between continuous and intermittent. The flow rates and discharged effluent volumes will be managed through:

- individual treatment plant pumping arrangements (controlled flow rates), and
- control of the combined discharge from the collection chamber to the CDO outfall (to be based on a certain volume collected within the collection chamber before discharge is made to sea).

Specific treatment measures to be incorporated into the management of the proposed discharge effluent streams have been based upon the water quality parameters considered appropriate and achievable for each effluent stream to be discharged and the overall combined effluent stream which will be entering the North Sea from the CDO. These are described in more detail within **Section 4** of this supporting information document. Note that the information used to inform this permit application is based on the design and construction information that is currently available, which includes performance specifications for treatment systems. Ultimately however, the final design of any treatment plants will be determined by the treatment plant suppliers that are not yet procured (they will be required to meet the design performance specifications wherever possible). Furthermore, final treatment requirements will ultimately be dependent upon effluent water quality limits set by the EA in the CWDA permit. Therefore, some of the information contained within this application in relation to proposed treatment strategies, methods, flow rates, volumes and durations could change. Any changes which are made as the design and construction programme commences and progresses, that could impact the proposed CWDA's, will be communicated to the EA during the permit determination period.

1.6 Provision of Additional Information

Sufficient information is contained within this supporting information document to support the permit application being made. However, the document identifies certain areas where information may still be subject to change, for example due to final design specifications yet to be confirmed, or where construction sequencing information is required once contractors have been appointed. This information, where relevant to the proposed discharge activities, will be made available to the EA throughout the permit determination period. This has been highlighted to the EA during the pre-application stage.

1.7 Appendices

Ref	Title	Document Reference (Revision)	Summary
1	Appendix A1 - Environmental Permit Application Forms Part A and F1	101489452	Part A – About You Part F1 – Charges and Declarations
2	Appendix A2 - Environmental Permit Application Forms Part B2	101489448	Part B2 – General New Bespoke Permit
3	Appendix A3 - Environmental Permit Application Forms Part B6 – Groundwater from MCA	101489453	Part B6 – Water Discharge Activity (Discharge of groundwater from the MCA)
4	Appendix A4 - Environmental Permit Application Forms Part B6 – Treated surface from MCA	101489454	Part B6 – Water Discharge Activity (Discharge of treated surface water from the MCA)
5	Appendix A5 - Environmental Permit Application Forms Part B6 – Discharge of treated foul water from MCA (HAJ 1.1)	101489456	Part B6 – Water Discharge Activity (Discharge of treated foul water from MCA (HAJ1.1))

Ref	Title	Document Reference (Revision)	Summary
6	Appendix A6 - Environmental Permit Application Forms Part B6 – Treated foul water from TCA (HAJ 1.2)	101489457	Part B6 – Water Discharge Activity (Discharge of treated foul water from TCA (HAJ1.2))
7	Appendix A7 - Environmental Permit Application Forms Part B6 – Treated foul water from TCA (HAJ 1.3)	101489459	Part B6 – Water Discharge Activity (Discharge of treated foul water from TCA (HAJ1.3))
8	Appendix A8 - Environmental Permit Application Forms Part B6 – Treated water from the Sweeper Tip	101489462	Part B6 – Water Discharge Activity (Treated water from the Sweeper Tip Facility)
9	Appendix A9 - Environmental Permit Application Forms Part B6 – Treated water from Bentonite Plant	101489465	Part B6 – Water Discharge Activity (Treated water from the Bentonite Plant)
10	Appendix B – CEFAS Marine Modelling Assessment – BEEMS Technical Report TR588 Sizewell C Construction Water Discharge Assessment: Groundwater	101152134	Sizewell C Construction Water Discharge Assessment and Modelling
11	Appendix C – Bespoke Qualitative Environmental Risk Assessment	101489477	Supporting assessments required as per GOV.UK permit application requirements.
12	Appendix D – Package to Inform Habitats Regulations Assessment (HRA) and Countryside and Rights of Way (CRoW) Assessment	101489490	Supporting assessments required as per GOV.UK permit application requirements.
13	Appendix E – MDS/CWDA/13 (Combined Drainage Outfall) Water Environment Regulations Compliance Assessment	101489480	Supporting assessments required as per GOV.UK permit application requirements.
14	Appendix F - List of Directors	101295874	List of Directors
15	Appendix G – Surface Water Micro Drainage Reports	101489491	Microdrainage reports for MCA Surface water
16	Appendix H – Extract from Environmental Statement	101489494	Extract from Environmental Statement: 6.3 Volume 2 Main Development Site Chapter 19 Groundwater and Surface Water, PINS Reference number EN0100125

2 INTRODUCTION AND CONTEXT

2.1 Background to Proposed Discharge Activity Requirements

There is a need to discharge wastewater into the North Sea during the construction period of the project as multiple effluent streams will be generated from various on-site activities. Due to the volume and nature of the effluent streams, and the location of the site, these cannot all be discharged to foul wastewater treatment works or inland freshwaters. Therefore, it was determined as part of the DCO stage of the project, that an outfall would be constructed to carry certain effluent streams into the North Sea, following suitable treatment so as not to adversely impact receiving marine water quality. The CDO was therefore proposed which includes a pipeline that will carry the combined effluent streams into the North Sea as one combined flow. The CDO is anticipated to be operational from October 2026 and is expected to supersede the TMO that is anticipated to be constructed first for the initial discharge of surface water run-off and limited groundwater during early construction phases. The TMO has been subject to a separate permit application (MDS/CWDA/18) and is therefore not included in this application.

2.2 Description of the Site

The site is centred at NGR TM 47355 64128 in East Suffolk, on the Suffolk Coast, approximately halfway between Felixstowe and Lowestoft, to the north-east of Leiston. It is located to the north of the existing Sizewell B power station, the address for which is currently being used for the development, as described above.

A full description of the development, including details on how it will operate once built, is available publicly online from the Planning Inspectorate website. In summary, and for the purposes of informing the reader of this document, the development comprises two main elements from a construction perspective:

- the MDS: to include aspects such as the reactor buildings, turbine halls, cooling and drainage water infrastructure, interim waste / fuel storage, operational service centre, offices and electricity transmission equipment. The MDS comprises the MCA, the TCA and the Ancillary Construction Area (ACA) (the latter of which is outside the scope of this permit application); and
- Off-Site Infrastructure elements: including Darsham Park and Ride, Wickham Market Park and Ride, a Freight Management Facility and improvements to rail / highways infrastructure including the Sizewell Link Road, Two Village Bypass, Yoxford Roundabout, AD6 Road Scheme and Leiston Branch Line upgrades. None of the above off-site infrastructure areas are included within the scope of this permit application.

The areas to which this permit application relates to include the MCA and the TCA, each of which are summarised further below:

MCA: The MCA is the main platform for the development. It is located to the east of the MDS, along the Sizewell Foreshore. Sizewell Marshes Site of Special Scientific Interest (SSSI) is located to the west of the MCA.

TCA: The TCA comprises of the area of land located primarily to the north and west of the MCA and to the north of Sizewell Marshes SSSI. This is to be used for construction purposes and during the construction phase of the SZC project only. It will house the main construction campus alongside other activities.

Section 3 below describes in more detail the activities to be undertaken in each of the above areas and the reason for the required CWDA permit.

Figure 2.1 below shows the Sizewell C MDS site boundary (DCO red line boundary) while **Figure 2.2** shows the locations of the MCA and TCA which are subject to this permit application. **Figure 2.2** has been included for information purposes only to show the location of these aspects; the remaining elements of the drawing are not relevant to this permit application.

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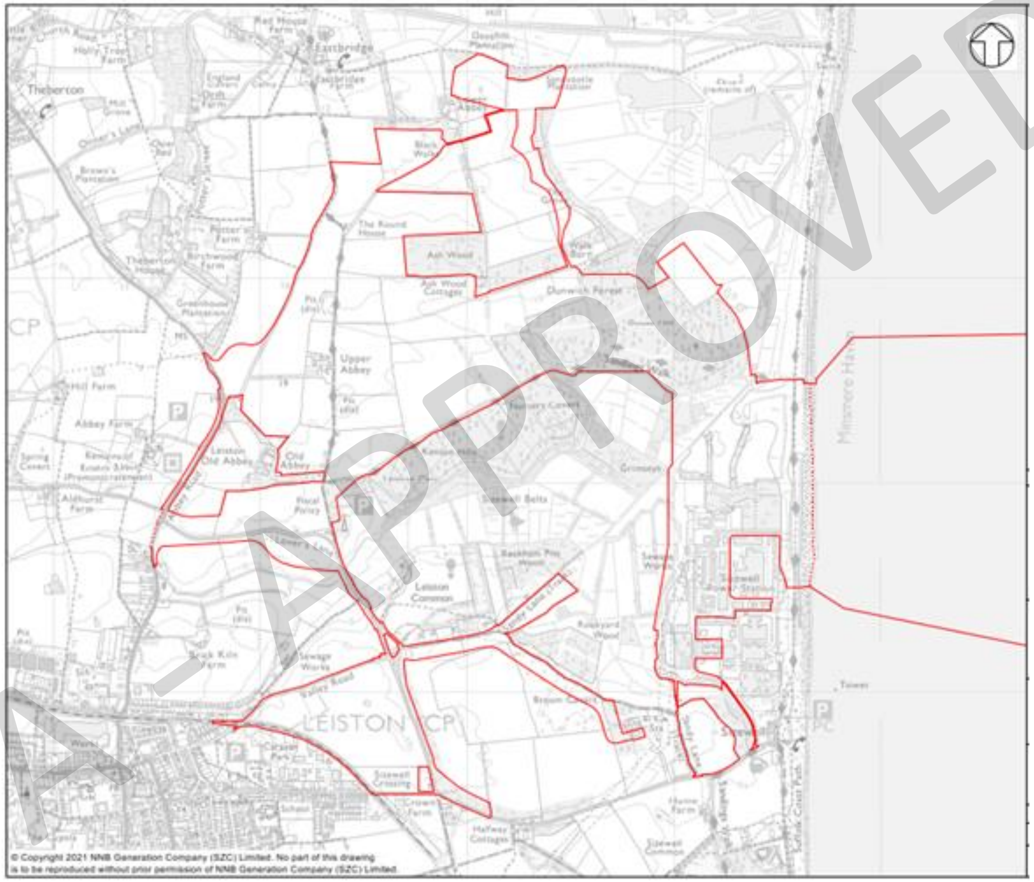

Figure 2.1 - DCO Red Line Boundary

Source: Sizewell C Drainage Strategy, Location Plan and Site Boundary, Figure 2a.1 (Aug 2021)

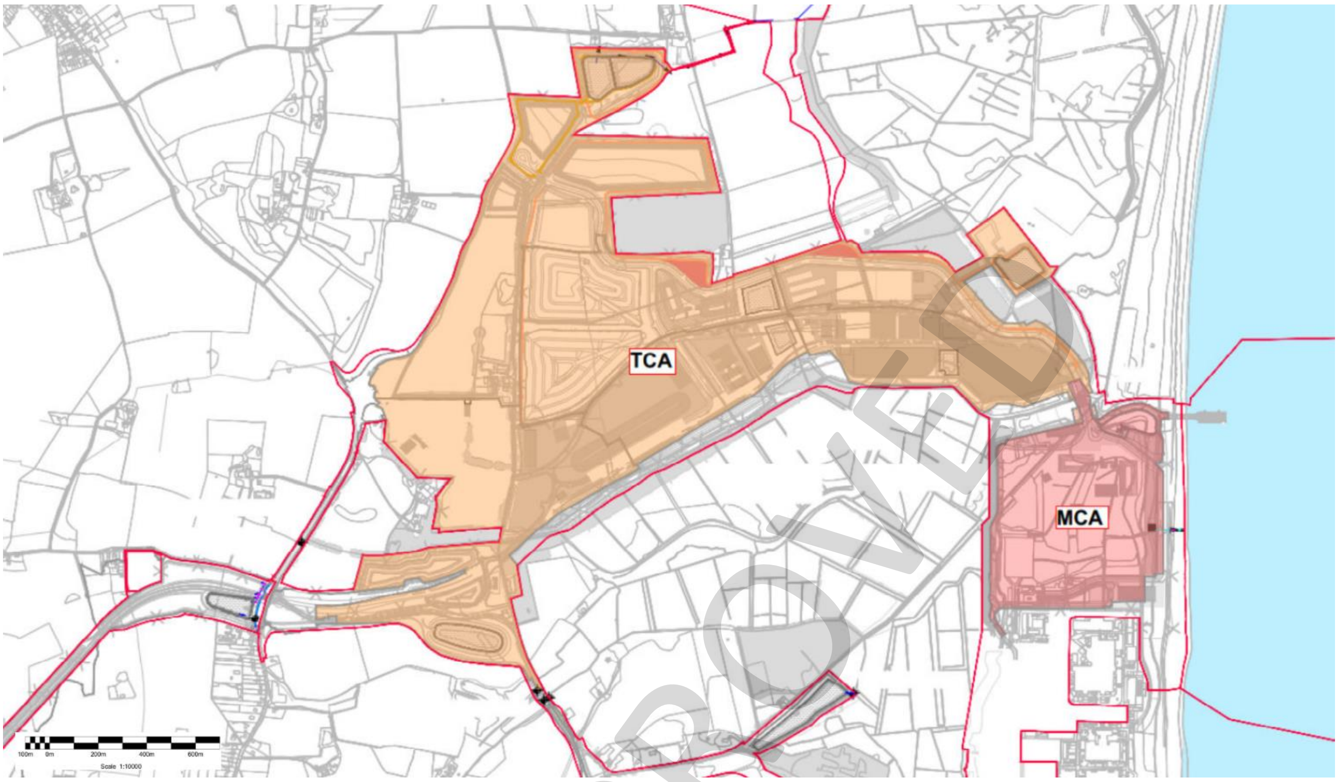

Figure 2.2 - Locations of MCA and TCA

Source: MDS/CWDA/18 Outfall Arrangement. Teamcenter Reference 101207183.

The discharge activities outlined within this permit application are proposed to take place in the following areas:

Table 2.1 - Discharge Activity Locations

Discharge Activity Number	Proposed Discharge Activity	National Grid References
1	Discharge of treated surface water run-off from the MCA	TM 47546 63838
2	Discharge of groundwater from the MCA, including water produced by the installation and development of wells	TM 47327 64091
3	Discharge of treated foul water from the MCA (from sewage treatment plant known as 'HAJ 1.1')	TM 47552 64368
4	Discharge of treated foul water from the TCA (from sewage treatment plant known as 'HAJ 1.2')	TM 46914 64804
5	Discharge of treated foul water from the TCA (from sewage treatment plant known as 'HAJ 1.3')	TM 45521 64393
6	Discharge of treated water from the sweeper tip facility	TM 45462 64353
7	Discharge of treated water from Bentonite Plant	TM 47399 64197

Section 3 and **Section 4** below summarise in more detail the proposed discharge activities.

The CDO pipeline will discharge the final combined effluent via a marine dispersion head (diffuser system) in the Sizewell Bay area of the North Sea. The pipeline will run below sea-level and ground-level (below the Sizewell Foreshore) and will come ashore at the CDO collection chamber in the MCA.

The project site lies within a flood risk zone, with parts of the site falling within Flood Risk Zone 3, which is described as having a higher probability of flooding from rivers and the sea. Parts of the site are protected by existing flood defences. A separate Flood Risk Assessment was completed as part of Sizewell C Limited's application for planning permission which resulted in the DCO being made (see Volume 5.2 Main Development Site Flood Risk Assessment, May 2020, Planning Inspectorate (PINS) Reference Number EN010012[3]), and this has been used to inform both construction and operational design elements of the SZC project. Risks from flooding have been considered in the supporting bespoke qualitative ERA that has been submitted as part of this permit application (see **Appendix C**).

[3] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010012/EN010012-001707-SZC_Bk5_5.2_Main_Development_Site_Flood_Risk_Assessment.pdf

The underlying geology and hydrogeology of the site was considered extensively during the DCO process and outlined in the supporting Environmental Statement (6.3 Volume 2 Main Development Site Chapter 19 Groundwater and Surface Water, PINS Reference number EN0100125), which is publicly available information. The relevant excerpt from this Environmental Statement (ES) is also provided in **Appendix H**. In summary, the proposed development is sited upon a bedrock geology of Crag formation underlain by Chalk, with superficial geology comprising marine beach deposits, tidal flat deposits, Lowestoft formation, peat deposits and made ground (within the MCA platform area). It is located on a Secondary A aquifer (superficial) and Secondary (undifferentiated) aquifer. The crag and chalk bedrock aquifers are classified as Principal aquifers. There are no groundwater source protection zones within the vicinity of the MCA.

2.2.1 Site Surroundings

There are several areas subject to statutory designations either within the vicinity of the discharge point, or within close proximity to the proposed discharge activities including:

- Sizewell Marshes SSSI;
- Outer Thames Estuary Special Protection Area (SPA);
- Southern North Sea Special Area of Conservation (SAC);
- Minsmere-Walberswick Ramsar site;
- Minsmere to Walberswick Heaths & Marshes SAC; and
- Suffolk Coast and Heaths National Landscape.

The impacts of the project, including associated construction works, on the site settings and surrounding features were considered in a Habitats Regulations Assessment (HRA) as part of Sizewell C Limited's application for planning permission (which resulted in the DCO being made). However, a separate HRA and Countryside and Rights of Way (CRoW) assessment will be undertaken specifically in relation to this permit application and the proposed discharge activities (see **Section 5** below).

2.3 Regulatory Context

In accordance with the EPR, a bespoke CWDA permit will be required for the proposed discharge activities to take place. Under Schedule 21[4] of the EPR, a 'water discharge activity' is defined to include:

'the discharge or entry to inland freshwaters, **coastal waters,** or relevant territorial waters of any:

(i) Poisonous, noxious or polluting matter,

(ii) Waste matter, or

(iii) Trade effluent or sewage effluent'.

The seven proposed activities which form the subject matter of this application fall within this definition. The discharge will comprise of the effluent streams described above in **Section 1**.

The seven proposed discharge activities have been combined into a single permit application as all will be discharged at the same discharge location in the North Sea, via one outfall pipeline from the CDO collection chamber. The discharge will not contain any form of effluent other than those described above (including the future discharges outlined in **Section 1.2**) and in the remainder of this supporting information document.

[4] The Environmental Permitting (England and Wales) Regulations 2016 (legislation.gov.uk)

The discharge activity types being applied for under the EPR are:

- 1.3.12 Trade effluent and / or non-sewage effluent and / or rainfall-related discharges to surface water or groundwater with a volume greater than 5m^3 a day (MCA Surface Water)
- 1.3.12 Trade effluent and / or non-sewage effluent and / or rainfall-related discharges to surface water or groundwater with a volume greater than 5m^3 a day (MCA Groundwater)
- 1.3.10 Sewage effluent discharge with a volume greater than 50 m^3 a day to surface water. For MCA foul (Sewage treatment plant HAJ 1.1)
- 1.3.10 Sewage effluent discharge with a volume greater than 50 m^3 a day to surface water. For TCA foul (Sewage treatment plant HAJ 1.2)
- 1.3.10 Sewage effluent discharge with a volume greater than 50 m^3 a day to surface water. For TCA foul (Sewage treatment plant HAJ 1.3)
- 1.3.12 Trade effluent and / or non-sewage effluent and / or rainfall-related discharges to surface water or groundwater with a volume greater than 5m^3 a day (discharge of trade effluent consisting of site drainage)
- 1.3.12 Trade effluent and / or non-sewage effluent and / or rainfall-related discharges to surface water or groundwater with a volume greater than 5m^3 a day (treated effluent from the Bentonite Plant)

Any additional charges will be made as required in accordance with the EA charging scheme.

As part of the permit application process, the following key pieces of GOV.UK guidance have been followed:

- GOV.UK guidance Discharges to surface water and groundwater: environmental permits[5]
- GOV.UK guidance Risk assessments for your environmental permit[6]
- GOV.UK guidance Surface water pollution risk assessment for your environmental permit[1]
- The EA's approach to groundwater protection February 2018 Version 1.2[7]
- GOV.UK guidance Temporary dewatering from excavations to surface water: Regulatory Position Statement (RPS) 261[8]
- GOV.UK guidance Groundwater activity exclusions from environmental permits[9]

The following application forms have been completed and are enclosed with this application (please refer to **Appendix A**):

- Part A About you
- Part B2 New bespoke permit

[5] Discharges to surface water and groundwater: environmental permits - GOV.UK

[6] Risk Assessments for your environmental permit - GOV.UK

[7] The Environment Agency's approach to groundwater protection (publishing.service.gov.uk)

[8] Temporary dewatering from excavations to surface water: RPS 261 - GOV.UK (www.gov.uk)

[9] Groundwater activity exclusions from environmental permits - GOV.UK (www.gov.uk)

- Part B6 Bespoke water discharge activity (including Section 1: Discharges to tidal river, tidal stream, estuary or coastal waters)
- Part F1 Charges and declarations

The company applying for the permit, and which will act as 'legal operator', is Sizewell C Limited.

Other environmental permits, consents and/or licences, including in respect of other proposed CWDAs, are being applied for separately as required. They are not included in the scope of this application.

2.4 Pre-application regulatory engagement

Regular pre-application discussions with the EA, as the regulator responsible for CWDA permits, have taken place since an initial regulatory engagement session which was held in May 2024. The pre-application discussions have enabled specific aspects of the permit application to be shared and reviewed to ensure that all relevant regulatory requirements and any other considerations (where applicable) have been appropriately addressed. The Centre for Environmental, Fisheries and Aquaculture Science (CEFAS) have performed a technical consultancy role to support this application, completing the required Surface Water Pollution Risk Assessment, and have also attended these pre-application discussions. This has helped to ensure all required information is contained within the permit application and its supporting documents.

3 SCOPE OF PERMIT APPLICATION

This Section provides context to the proposed discharge activities, the associated infrastructure and intended receptors. It should be noted that certain elements of design-related information are currently being finalised, and, in some cases, suppliers / contractors have yet to be appointed. Therefore, some design-related information in this application is subject to change. Any changes to the proposed discharge activities within the scope of this permit application will be communicated to the EA.

3.1 Scope and sources of effluent

Works on the SZC project are taking place under the DCO granted by PINS. Construction is anticipated to take between 9-12 years and will be undertaken in planned phases. The CDO is to be implemented as part of the enabling works and site establishment programme (comprising all works necessary to prepare the MDS for the execution of the main civil works and marine works construction). Discharging from the CDO is anticipated to start from October 2026 and may last until up to approximately 2040; these dates will depend upon the progress of the wider construction programme. The EA will be kept informed of any changes to the proposed discharge activity commencement and cessation dates.

As described in the above sections to this supporting information document, this permit application relates to the discharge of seven effluent streams from the CDO to the North Sea in the Sizewell Bay area from the SZC project. The CDO is required as the various effluent streams cannot be discharged to public foul sewer (due to their location in proximity to the nearest sewer connection or because they are not treatable at standard sewage treatment works) or to inland freshwaters (due to the volume and composition of discharge streams). The decision was made to implement the CDO during the planning phase of the project and was agreed during the DCO examination phase. Specific requirements relating to the design (e.g., materials, dimensions etc.) of the CDO are not included in detail in this permit application as the application relates to the proposed discharge activities only.

As highlighted in the Non-Technical Summary, this permit application covers the following discharge activities and subsequent effluent streams only:

1. Discharge of treated surface water run-off from the MCA;
2. Discharge of groundwater from the MCA including water produced by the installation and development of wells;
3. Discharge of treated foul water from the MCA;
4. Discharge of treated foul water from the Eastern TCA;
5. Discharge of treated foul water from the Western TCA;
6. Discharge of treated water from the sweeper tip facility; and
7. Discharge of treated water from the Bentonite Plant

Other discharges, including but not limited to the following, are anticipated to be added to the CDO as additional effluent streams in the future, and will therefore be included in a permit variation application at an appropriate time. They are therefore excluded from the scope of this application.

- discharge of treated industrial foul water from M&T activities including grout batching, TBM cooling, general site water, shaft and tunnel leaks, and tunnelling dewatering line;
- discharge from an inundation event (arising from an emergency tunnel dewatering event); and
- discharge of treated slurry from TBM activities.

Each of the above-listed activities included in this permit application are described in more detail further below.

This permit application does not relate to any aspects of the operational and/or decommissioning phase(s) of the SZC power plant itself. Other CWDA permit applications (in addition to this one) have been made and may be required in the future in relation to the SZC project. These are not within scope of this permit application.

3.1.1 Discharge of treated surface water run-off from the MCA

Surface water run-off will need to be managed within the MCA to ensure it is treated prior to discharge, as it will have the potential to pick up contaminants such as suspended solids (SS) and hydrocarbons from working construction areas. Activities taking place within the MCA will include but are not limited to construction of haul roads, access roads and perimeter roads, embankments, a cut-off wall (CoW), SSSI bridge crossing, compound areas, foul and surface water treatment plants, marine bulk import facility, beach landing facility and temporary vehicle parking areas.

A CoW is to be installed within the MCA to enable excavation of material to then construct the main development platform. This is where the reactors and other main buildings will be sited once construction is complete. The CoW will provide stability and protection to the main construction platform and the Sizewell Marshes SSSI, which are to the west and north of the MCA. The CoW will provide a hydraulic cut-off from groundwater to prevent water level change in the Sizewell Marshes SSSI.

Throughout the lifetime of the project the configuration of levels within the CoW will change frequently which will result in drainage of surface water being required in different parts of the MCA at different times during the works. To accommodate the changing drainage needs within the excavation (which is being referred to as the 'deep-dig' phase of the project), the drainage solution will facilitate multiple incoming connections from contractor-managed pumping infrastructure.

Constraints and operating rules for the incoming connections will be defined to prevent the downstream surface water systems from becoming overloaded. It should be noted that the overall permeability of the "deep dig" area will change over time as the excavation of different areas is completed and concrete is placed; this will be accounted for in the design of the perimeter drainage system.

The hardstanding areas outside of the CoW, the haul road, access road and compound areas, also need surface water drainage. In addition, an embankment gravity drainage system will be designed to intercept surface water flows from the embankment slope including the embankment access roads.

The surface water drainage strategy is anticipated to be delivered zonally across the project. Opportunities are limited within the MCA for the inclusion of a Water Management Zone (WMZ) due to spatial constraints and lack of infiltration potential; however, treatment and flow attenuation will be provided in other ways before water is conveyed to the CDO and discharged into the North Sea.

The MCA is split into two zones for surface water planning purposes[10]. Zone 1 is the inner zone (inside the CoW), and Zone 2 is the area of the MCA outside of the CoW. **Figure 3.1** below demonstrates the current demarcations between Zone 1 and Zone 2 in the MCA.

[10] NB: These are not 'water management zones'.

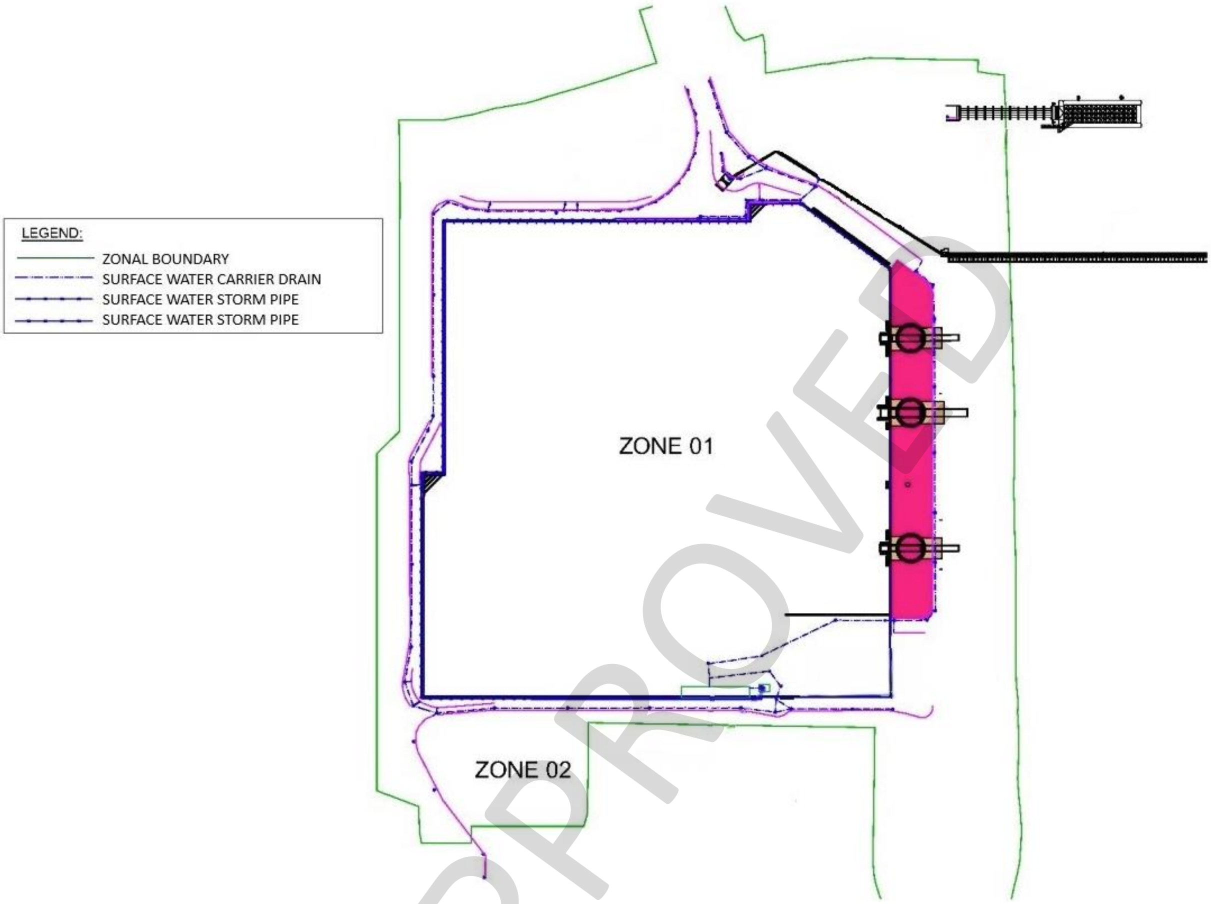

Figure 3.1 – Indicative locations of Zoes 1 and 2 within MCA

Source: SZC-EW0000-ATK-XX-HSZ-0102XX-NOT-CIV-900002, P01. Teamcenter Reference 101317324.

Figure 3.1 note: This figure has only been included here to show the current indicative locations of surface water zones 1 and 2 within the MCA.

Surface water in Zone 1 of the MCA will be managed through a series of temporary drainage / attenuation ponds, at locations to suit construction activities and areas. The exact locations of the attenuation ponds and other temporary surface water drainage features are still to be determined however, based on current surface water drainage design, a racked perimeter pressurised surface water drainage system will be installed around the perimeter of the MCA. Water will be pumped from the temporary drainage ponds to the pressurised perimeter system, which will then transport the water to a surface water treatment plant (known as the 'HSV' plant internally), which will treat the run-off to an acceptable quality for discharge into the CDO collection chamber and into the North Sea.

The surface levels within Zone 2 generally fall from the north to the south of the zone and a gravity network is required to drain the hard surfaces to an attenuation feature located close to the southern extent of the zone. The size of the attenuation feature is to be confirmed through hydraulic modelling; however, it is likely to be an open concrete tank. From the attenuation feature, the surface water will then be pumped along the western cut off wall back up to another attenuation feature. From this point the surface water will then be pumped to the surface water treatment facility, before discharging to the CDO collection chamber.

Surface water may also consist of waste potable, non-potable and surface water from activities including dust suppression, general cleaning of surfaces, vehicle cleaning, dewatering of road sweepings/silts or any other equivalent activity which can be agreed in writing with the EA.

Discharge of the above-described effluent stream is anticipated to commence in October 2026 (subject to project construction programme progress).

3.1.2 Discharge of groundwater from the MCA, including water produced by the installation and development of wells

Removal of groundwater from the area within the CoW, following its installation, will be required to drawdown groundwater levels to allow for a safe working environment. Dewatering for a subsequent period of time following the initial drawdown period will also be required to maintain the safe working environment. This latter period of dewatering is referred to as the 'maintenance phase'. The initial installation phase of construction works is being referred to as the 'deep dig' and it will require boreholes to be established inside the MCA excavation, within the boundaries of the CoW, to enable the dewatering to take place. Observation wells will also be installed outside of the CoW boundary.

The target groundwater level for the CoW installation is currently expected to be approximately one metre below the corresponding formation levels.

Three tunnel launch shafts (TLS) (North Intake Shaft, Outfall Shaft, South Intake Shaft) will also require groundwater control. The design of the dewatering wells for the TLS is the same as those within the CoW and it is intended that two wells shall be installed within each shaft. The target groundwater level for each shaft is approximately one metre below formation level and will be maintained throughout construction. The tunnel launch shafts will be formed with reinforced concrete diaphragm walls and will be excavated to formation level using industry standard methods. As they are sited within the CoW, groundwater ingress is not anticipated. Sumps at the base of each shaft will be used to pump any surface water from the shafts to the surface water treatment plant.

The current proposed groundwater control strategy can be summarised as follows:

- an array of abstraction wells to be installed within the MCA to lower the groundwater level in the crag deposits to at least 1 m below the maximum excavation level (as described above);
- the dewatering wells shall connect via flexible hosing to a ring main which may transport the groundwater to a suitable groundwater treatment facility if treatment is required. If treatment is not required, the groundwater will be pumped to a groundwater storage tank prior to discharge via the CDO. The location of the flexible hosing will be agreed with the relevant contractor(s) once appointed and can be adjusted as required;
- it is anticipated that the target drawdown levels will be achieved by pumping on 10 wells simultaneously however there is contingency in the design for additional wells to be pumped if required;
- there is significant redundancy in the design to allow for wells to be lost during construction within the MCA;
- wells that are not pumped within the MCA shall act as groundwater monitoring wells and shall be used as pumping wells if needed;
- pumping wells shall have an individual flowrate of 25 l/s giving a maximum anticipated flowrate during the drawdown phase of 250 l/s;

- once the target groundwater level is achieved, the groundwater control system shall enter the maintenance phase. Total flow rates are anticipated to be 25 l/s to 50 l/s and should only require a small number of wells to be used;
- groundwater monitoring locations (wells) installed externally to the CoW; and
- the external groundwater monitoring wells shall include fully grouted vibrating wire piezometers with sensors installed in the crag deposits and the superficial deposits and standpipe piezometers. The aim of these is to identify any significant lowering of groundwater levels outside of natural variations which would indicate leakage from the CoW.

Flows of groundwater from the dewatering are currently anticipated to be up to 250 l/s over a duration totalling approximately five months, before reducing to an estimated maximum of 50 l/s throughout the maintenance phase. The 250 l/s is anticipated to be derived from approximately 10 dewatering wells each operating at 25 l/s. The dewatering is currently anticipated to begin at the earliest by March 2027. The maximum flow rate is limited by CDO infrastructure capacity. The maintenance phase is expected to last ~10 years (subject to project delivery requirements).

The groundwater discharge rates have been determined through a detailed process of numerical groundwater modelling. The model incorporated the construction of the hydraulic cut-off wall, the aquifer properties both inside and outside of the Main Construction Area (MCA), surface water features within the Sizewell Marshes and the North Sea and other infrastructure in the vicinity (Sizewell B). The model was based on numerous phases of ground investigation in-situ testing and pumping tests and a baseline model was carefully calibrated to pre-construction conditions. The required dewatering rates were determined to enable the target drawdown level within the MCA to be reached within a reasonable timeframe for construction before the rates were trimmed back to manage leakage through the cut-off wall only. The numerical groundwater model was developed over a number of years with detailed consultation with the Environment Agency and was submitted as supporting evidence within the DCO application.

3.1.3 Discharge of treated foul water from the MCA

Treated foul water from the MCA will also be discharged via the CDO. Similarly to the surface water drainage network, the design of the MCA foul water network is being delivered zonally. The MCA will be divided into two parts; facilities inside the CoW and buildings outside the CoW, referred to as Zones 1 and 2 respectively (as described above). Foul water from buildings in Zone 2 will be transferred below ground by a gravity network to nearby pumping stations and pumped to a package sewage treatment plant (STP, referred to as HAJ 1.1); see **Section 4** which covers treatment for further information. The treated foul water from the package sewage treatment plant will then be discharged to the CDO collection chamber for discharge to North Sea. The current expected maximum discharge rate for the sewage treatment plant HAJ1.1 is 24.8 l/s.

Due to the rapidly changing nature of the construction activity within Zone 1, a fixed foul water network would not be suitable. Any foul water resulting from Zone 1 will therefore require tankering to a suitable on-site or off-site treatment facility. Off-site transport will be completed using registered waste carriers and the foul water will be taken to a suitably licensed facility for treatment.

Discharge of the above-described effluent stream is anticipated to commence in October 2026 and is currently anticipated to last until ~2040 (subject to project delivery requirements).

3.1.4 Discharge of treated foul water from the TCA

Foul water will comprise of sewage from TCA buildings and facilities, including an accommodation campus. This will be treated by two separate STPs prior to discharge into a pumping station and then the CDO collection chamber.

As described above, the design of the foul water network is delivered zonally. The programme for foul water design delivery is split into milestones where each zone of the site is delivered according to a milestone. Some areas within the zones are given priority. Other areas, known as Service Plots, are areas to be designed by Plot Operators, for example the various contractor compounds across the site.

The TCA is split into three catchments: the western catchment which discharges to the HAJ 1.3 STP (also referred to as the Accommodation Campus), the eastern catchment which discharges to the HAJ 1.2 STP, and the southern catchment which discharges into a cess tank.

Foul water from buildings in the western catchment (the Accommodation Campus) will flow by gravity to the STP (HAJ 1.3). A foul water pumping station (FPS) is proposed to collect the flow from the relevant service plots and pump it to the gravity network towards the STP HAJ 1.2. The treated foul water from HAJ 1.3 will enter the treated foul water gravity network. This treated foul water gravity network collects treated foul water from STPs and transfers it to the 'pass forward pumping station' within the HAJ 1.2 facility, that lifts the flow across the SSSI bridge to the CDO collection chamber for final discharge to the sea.

Foul water from buildings in the eastern catchment will be transferred to the STP (HAJ 1.2) via gravity network and a rising main. The treated foul water from HAJ 1.2 will discharge to the 'pass forward pumping station' within the HAJ 1.2 facility and be pumped to the CDO collection chamber.

Given the low occupancy rate for the outlying buildings in the southern catchment, it is proposed to manage the foul water using a cess tank, with it transported via tanker to either an off-site treatment facility or to a suitable site treatment facility, to circumvent issues associated with low flow rates.

The maximum effluent discharge rate for the HAJ 1.2 sewage treatment plant is currently expected to be 4.5 l/s.

The maximum effluent discharge rate for the HAJ 1.3 sewage treatment plant is currently expected to be 20.7 l/s.

Due to the limited availability of water at the SZC site, there is a need for a foul water treatment plant to treat the foul water generated in the TCA area for further reuse on site for plant washes, dust suppression, foul water network flushing, irrigation, road sweeping, wheel washing, damping etc (subject to compliance with any relevant legislation) HAJ 1.3 will therefore treat foul water to a quality suitable for non-potable re-use. Final effluent from the treatment plant will be held in a storage tank for non-potable re-use. The final effluent will flow under gravity from the tank to a pumping station, from where it will be pumped to a suitable storage area. When the suitable storage area is at capacity, the final effluent will flow to a different pumping station, from where it will be pumped to be discharged via the CDO.

The FPS compounds are currently subject to final contractor design. This is to provide the contractors with an opportunity to innovate as required and enables the potential use of supplier package products. The design includes an allowance for a bunded area of hard standing for a tanker to park adjacent the facilities, to enable their use directly from tankers (in addition to foul water from the foul water network), building flexibility and contingency into the foul water management arrangements. Catchment occupancy is anticipated to vary from peak occupancy as the site works ramp up and down, therefore it is expected that the retention time shall vary with a risk of septicity developing in the network. Therefore, space has been provided at each pumping station for a chemical dosing unit to be installed with spare ducts for a feed-hose to the wet well and power supply to the kiosk provided. It is proposed that the network retention time and therefore septicity shall be monitored by site operatives, and they shall be responsible for the implementation of temporary dosing.

Discharges of the above-described effluent streams are anticipated to commence in October 2026.

3.1.5 Discharge of treated water from the sweeper tip facility

The sweeper tip facility is currently expected to be constructed within the TCA, and the effluent produced by the facility is anticipated to comprise waste potable, non-potable and surface water from activities including road sweeping and wheel washing. Road sweepers will collect surface water from roads and hard surfaces and deposit this water in the sweeper tip facility. Water is also expected to be deposited in the sweeper tip facility from other activities e.g. wheel washing. The final design of this facility is on-going and subject to contractor input. Due to the nature of the influent, treatment is expected to focus on suspended solids and oils/grease. The facility is currently expected to comprise of a compartmentalised concrete structure, with compartments separated by porous blocks. The effluent is to be collected in the initial compartment and then move via gravity through the facility with the concrete blocks providing a filtration function. Following appropriate testing and treatment, the effluent would then flow to the treated foul water network (outlined above) and into a suitable pumping station from where it will be pumped to the CDO collection chamber, prior to discharge to the North Sea. Please see the treatment section below for further details on treatment.

There are currently expected to be three road sweepers operating simultaneously. Each road sweeper is expected to carry a volume of 3000l, and each decant up to 4 times per day. Assuming a working day of 9 hours, this equates to 36000l over a 9-hour period, or ~1.2l/s. Given the development of the project over time and the potential for future changes, a conservative consideration is this rate could rise to 3l/s. At a rate of 3l/s over a nine-hour working day – this equates to ~97m^3/day.

This effluent may consist of waste potable, non-potable and surface water from activities including dust suppression, general cleaning of surfaces, vehicle cleaning, dewatering of road sweepings/silts or any other equivalent activity which can be agreed in writing with the EA. It is difficult to quantify expected flow rates for these specific sources of effluent.

Discharge of the above-described effluent stream is anticipated to commence in October 2026.

3.1.6 Discharge of treated water from the bentonite plant

The bentonite plant is currently expected to be constructed in the MCA. Bentonite, a naturally occurring clay, is widely used in construction projects due its properties. Bentonite pellets/powder will be mixed with water to form a slurry. Bentonite slurry (bentonite mixed with water) can act as a stabilising media when used in groundworks by exerting hydrostatic pressure on the surrounding ground. Bentonite slurry will be used for this purpose during the construction of the CoW and other structures. Once the slurry has fulfilled its role in the ground, it will be removed and transported (expected via pumping and/or tanker) to the bentonite plant. The slurry is typically treated and recycled through the plant, prior to the resultant wastewater requiring disposal. Please see the treatment section below for further details on the bentonite plant treatment processes.

Discharge of this wastewater via the CDO is anticipated to commence in October 2026. However, it is currently expected that the plant will begin operation in late 2025. Any wastewater produced by the plant prior to the CDO construction completion (expected in October 2026) will require disposal elsewhere e.g. via tanker to a suitably licensed facility and is not in the scope of this permit application. It is notable that the early operation of this plant will enable sampling to be carried out prior to the construction of the CDO. The results of this sampling will be helpful to inform management of the wastewater once the CDO is in place and can be shared with the EA if required.

More than one bentonite plant is expected to be in operation simultaneously. Following pre-application discussions with the EA on this topic, it is understood that provided the plants operate under the same processes, and the arising wastewater from the plants is combined prior to discharge to the North Sea, the effluent from more than one bentonite plant would constitute a single water discharge activity. A maximum flow of 400m^3/day is expected from this activity, based on four cutters (the machines which will be used to carry out the groundworks) in operation simultaneously, producing an expected maximum flow of 100m^3/day each.

3.2 Pathway – Combined Drainage Outfall (CDO)

The above-described effluent streams will all be combined in an onshore CDO collection chamber to be located within the MCA. The effluent streams will be pumped directly, via a series of pipelines as described above, into the collection chamber. The combined effluent will then be released under gravity from the collection chamber into the North Sea via the outfall pipeline, where it will be diffused from the marine dispersion head (indicated in **Figure 3.2** below).

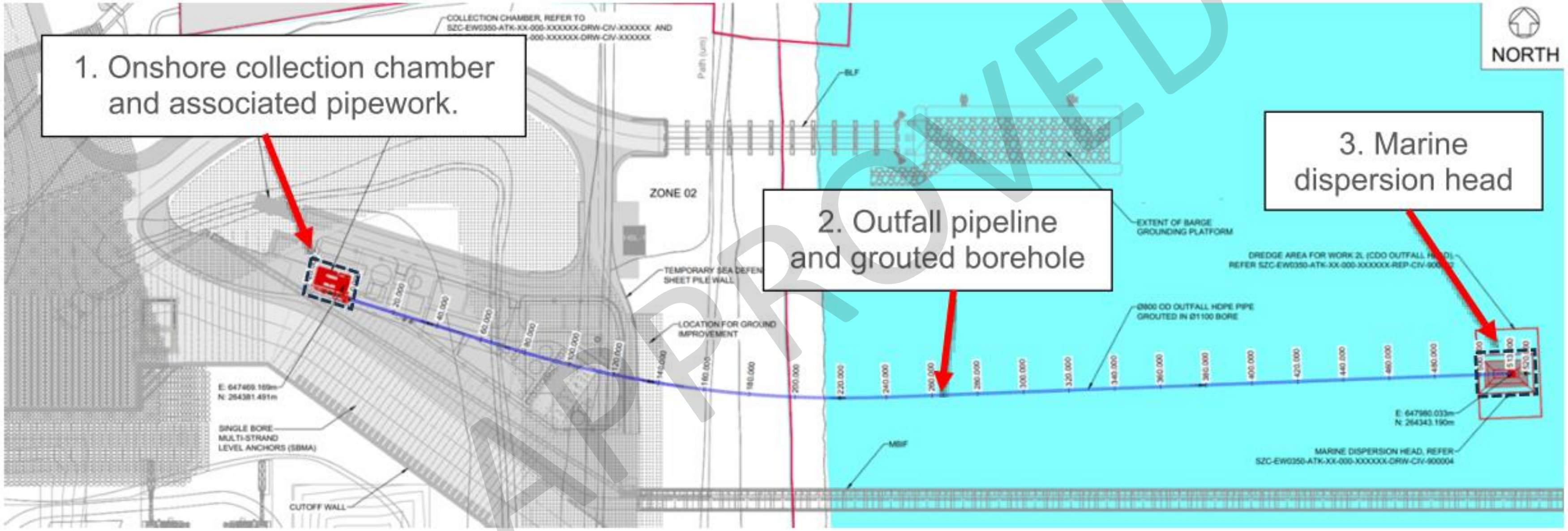

Figure 3.2 - Indicative Location Drawing of CDO infrastructure

Source: SZC-EW0350-ATK-XX-000-XXXXXX-REP-CIV- 900002, P02.09. Teamcenter Reference 101178848

Figure 3.2 note: This figure is to indicate the approximate locations of the CDO collection chamber, the outfall pipeline and the marine dispersion head (as labelled). Other annotations and structures in this drawing are not relevant to this application and are subject to change.

The main infrastructure elements of the CDO comprise:

- a reinforced concrete onshore collection chamber within the MCA which will receive effluent streams from across the MDS;
- the underground outfall pipeline which will take the combined effluent streams from the collection chamber to the North Sea (receptor); and
- a marine dispersion head, which will be located above the seabed at the end of the outfall pipeline in the North Sea and will disperse the flows.

It is proposed that the CDO will begin commissioning in October 2026 and become operational after this date. The minimum design life for the CDO and all associated infrastructure is 15 years from the start of its operation. It is designed to operate within the marine environment and both high and low extreme sea temperatures alongside other aspects which have been considered during the design of the CDO and its supporting infrastructure. This information has only been incorporated into this permit application where considered relevant to the proposed water discharge activities.

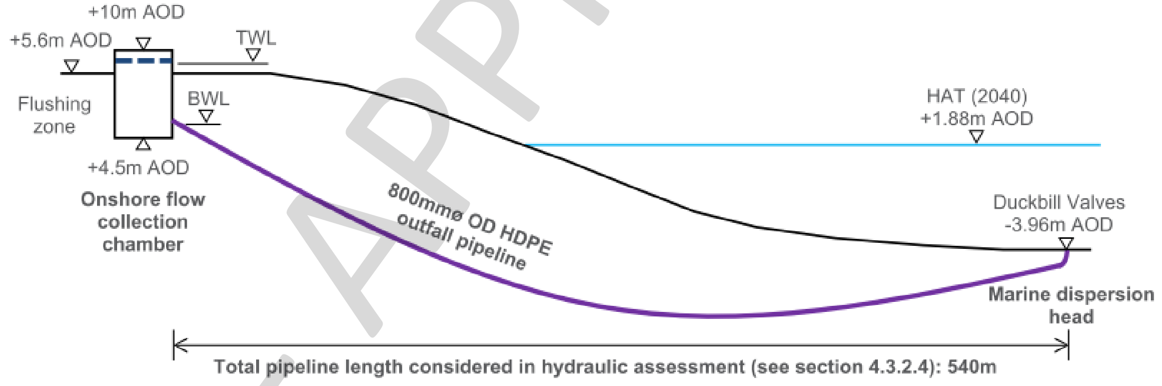

Figure 3.3 - CDO Hydraulic System Schematic

Source: SZC-EW0350-ATK-XX-000-XXXXXX-REP-CIV- 900002, P02.09. Teamcenter Reference 101178848

Figure 3.3 note: This figure is a basic schematic used to provide context behind the hydraulic performance and design of the system. The levels shown may be subject to change based on subsequent design changes and following contractor appointment.

The tidal levels were considered in the design of the CDO system, including the marine dispersion head, the design of which incorporates sea level rise due to climate change up until 2040.

3.2.1 Onshore Flow Collection Chamber (CDO Collection Chamber)

Effluent sources are to be pumped directly into a reinforced concrete onshore flow collection chamber (referred to within this permit application as the 'CDO collection chamber'). The chamber extends above the proposed ground level and operates as a header tank for the CDO to drive flows out to sea under gravity. Based upon the current chamber design, which may be subject to some changes, the incoming flows are retained in the chamber in two flushing cells until a desired water level is reached. The accumulated flows can then be released into the outfall pipeline at a velocity sufficient to limit sediment deposition in the outfall pipeline, limit marine growth and facilitate the remobilisation of any settled sediment. The flushing frequency depends on the inflow rate to the CDO chamber. In normal operating conditions for example, periods of lower flows will result in less frequent flushing of the system than periods of higher flows.

The primary function of the collection chamber is to collect and retain incoming flows before releasing them into the outfall pipeline under gravity. The chamber is rectangular and has three distinct zones: an inlet zone, a flushing zone, and an outlet zone. The inlet zone receives the pumped incoming flows through inlet pipework and dissipates energy. The flushing zone fulfils the primary function of the collection chamber, retaining incoming flows until they reach a sufficient volume and head to flush the outfall pipeline. The outlet zone discharges flow from the flushing zone into the outlet pipework and outfall pipeline.

The chamber structure will be formed from cast in-situ reinforced concrete. An access platform and stairs will provide access to the chamber's top for inspection, maintenance and monitoring purposes. The chamber contains mechanical penstocks and actuators to control the flow from the flushing zone to the outlet zone. Stop logs are provided for each flushing zone on the inlet weir, overflow weir and downstream of the penstock to isolate if required.

The inlet pipes to the CDO collection chamber will each have a sampling tap, to enable representative samples to be taken for water quality monitoring purposes as required.

The outlet zone has a bottom outlet which discharges flow into the outfall pipeline via the outlet pipework. The outlet pipework will include a sampling point for representative sampling of the combined effluent as required.

The detailed hydraulic design verified that the collection chamber provided sufficient hydraulic head to discharge retained flows into the North Sea at or above a self-cleansing velocity of 1.8m/s for most tidal conditions, meeting the hydraulic requirements of the CDO system. The minimum volume of water contained within the flushing zone, sufficient to displace the volume of water contained within the outfall pipe in a single flush, is 180m^3.

It is important to note that the CDO collection chamber does not need to be 100% full in order to discharge. This provides flexibility such that in periods of low input flow; to avoid longer periods of effluent retention, the chamber can discharge with a smaller volume. It is also important to note that long retention periods are not anticipated, as there is expected to be a groundwater input flow of 25-50l/s throughout the maintenance period of ~ten years (as explained in **Section 3.1.2**). Therefore, any risks associated with longer retention periods in the CDO collection chamber are considered minimal.

The current proposed location of the CDO collection chamber is to the northeast of the MCA between the surface water pumping station and the main haul road and is indicated in **Figure 3.2** above. Please note these locations may be subject to change.

3.2.2 Outfall Pipeline

The outfall pipeline will carry the final combined effluent discharge stream from the collection chamber to the marine dispersion head located in the North Sea in the Sizewell Bay area. The pipeline will comprise a high-density polyethylene (HDPE) pipeline, approximately 520 m in length, extending to a maximum depth of ~33 m below ground/seabed level. It will extend into the ground from the outlet pipework of the collection chamber before passing beneath the seabed. The outfall pipeline terminates at the marine dispersion head.

The pipeline entry and exit coordinates are as follows:

Entry (CDO Collection chamber):	E 647469 N 264381
Exit (dispersion head):	E 647980 N 264343

3.2.3 Marine Dispersion Head

The marine dispersion head will be sited above the seabed in the nearshore area of Sizewell Bay, which is located to the east of the MCA. The marine dispersion head is situated at the end of the outfall pipeline and diffuses outgoing flows into the North Sea. The pipeline will rise vertically through the marine dispersion head structure and terminate at a diffuser with four duckbill valves arranged in a horizontal cross at the end of the pipe to aid mixing and dispersion of the discharge. The duckbill valves will be non-return and will close upon cessation of the discharge flow to prevent seawater from entering the pipe. The pipeline is extruded beyond the borehole into a dredged excavation in the seabed. A concrete head structure which encapsulates the connection flange between the outfall pipeline and diffuser pipe work, will provide stability and restraint to the dispersion head. The structure sits atop a concrete blinding layer cast at the base of the dredge pocket. Rockfill is expected to be placed around the structure, providing lateral restraint to the structure and partially filling the dredge pocket. Rock armour is expected to be placed on top of the rockfill to provide scour protection for the pipe and structure.

The NGR for the marine dispersion head is TM 47980 64343.

The design process for the marine dispersion head considered a number of factors to ensure the suitability of the dispersion head and diffuser structure including tidal current, tide levels, sea temperature, seabed level variation, wave conditions and ground conditions.

It should be noted that some of the design and construction-related information regarding the installation of the CDO and accompanying features described above will be subject to finalisation and agreement with contractors / suppliers who are yet to be appointed. Therefore, some of the information provided above may be subject to change. The EA will be kept informed of any changes to the design / construction-related elements of the CDO that could affect the proposed water discharge activities.

3.2.4 Decommissioning

The CDO will be decommissioned after it is no longer needed or has reached the end of its design life (provisionally anticipated to be May 2041). Specific decommissioning plans are subject to change and will be finalised closer to the time of decommissioning. However, the end-of-life treatment is envisaged as follows:

- the pipework and equipment for the collection chamber will be recovered, recycled or resold (for re-use);
- the structure of the collection chamber will be broken down and transported to an appropriate concrete recycling facility;
- the marine dispersion head and associated infrastructure will be recovered and recycled; and
- the outfall pipeline will be grouted and left in situ.

3.3 Receptor – North Sea

The receptor proposed to receive the combined effluent from the CDO is the North Sea. As explained above, the outfall pipeline will extend into the ground from the outlet of the collection chamber before passing beneath the seabed and rising to the marine dispersion head. This is located approximately 300m from the shoreline. From here, the effluent will be discharged, via a four-duckbill diffuser structure, into the North Sea. Currently, the clearance from the seabed to the duckbill is expected to be ~2m.

As the marine head will have a diffuser, mixing will be enhanced upon point of discharge into the North Sea. This is anticipated to reduce impacts of the discharge plume on the seabed. The diffuser heads facilitate rapid mixing and will therefore help limit the area at the seabed that is influenced by the plume.

The Surface Water Pollution Risk Assessment undertaken as part of this permit application explains the anticipated impact on the receiving receptor in more detail (**Appendix B**).

3.3.1 Connection to Foul Sewer

As per the permit application form, Part B6, there is a requirement to consider whether the proposed discharge could be made to public foul sewer. The below table indicates the nearest known public sewer distance to the proposed outfall location.

Table 3.1 - Nearest (approximate) Sewer Distance

Location of Proposed Discharging Activity	Nearest (known) Sewer (m)
CDO (MCA)	2100 m

The discharge will ultimately comprise of process wastewater (trade effluents), surface water and groundwater. With the exception of foul water, this type of discharge is not typically accepted by sewerage undertakers as it will lead to an increase in flows requiring treatment that most existing sewerage systems in England are not designed for. Furthermore, most existing sewerage infrastructure does not have any extra capacity to take on additional, temporary, flows of discharge. The nearest sewer to the MCA is over 2000m away, which is a considerable distance to implement a new network of pipes to carry the discharge streams from the collection chamber to the sewer.

In the operational water discharge activity permit application, submitted in 2020 for the proposed SZC development (reference EPR/CB3997AD), it was determined (and accepted by the EA in their decision document for the operational water discharge activity permit for the facility, March 2023 Version 2) that installing several kilometres of pipeline and associated pumping infrastructure would be environmentally unsustainable (for the operational discharging). The same applies to the construction and commissioning related discharges, which are temporary only but still in place for a significant period of time.

3.3.2 Indicative Site Plan and indicative process flow diagram

To aid understanding of the infrastructure relevant to this permit application, **Figure 3.4** below identifies the current expected locations of the above-described infrastructure i.e. relevant treatment plants, CDO collection chamber, outfall pipeline and marine dispersion head. These locations are indicative and are subject to change as the construction methodology and wider programme progresses. Other identifiable features in this figure are not relevant to this permit application and should not be considered accurate. **Figure 3.5** below provides an indicative process flow diagram for the current anticipated CDO infrastructure relevant to this permit application. This process also may be subject to change as the construction methodology and wider programme progresses.

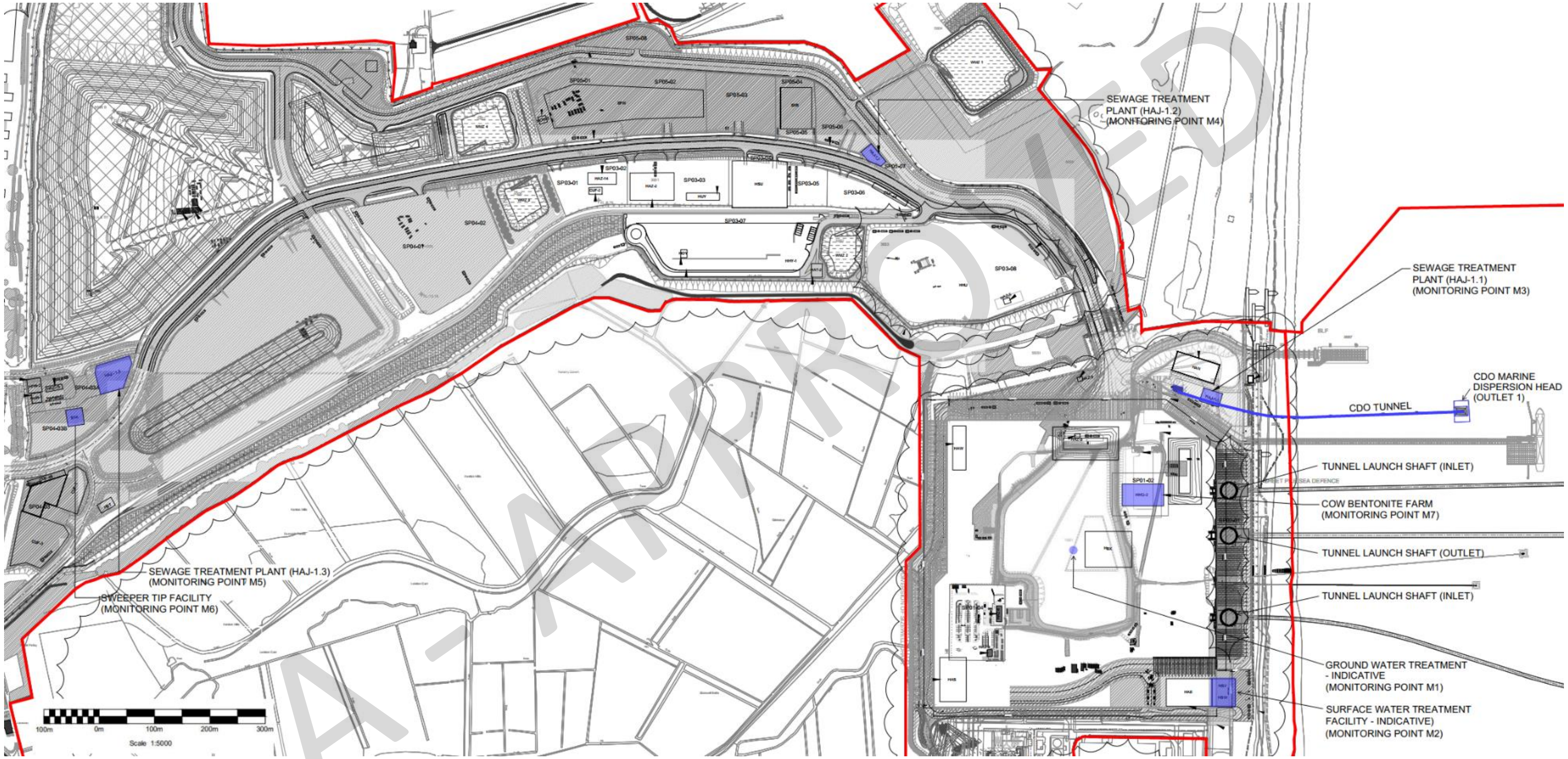

Figure 3.4 - Indicative Site Plan

Source: Construction Site Plot Plan P8.01 (draft including changes up to 10 July 2024). Teamcenter Reference 10105180. NB: Please refer to Section 6.3 for monitoring point NGRs – which are expected to be at the treatment plant/activity locations – identified on this plan

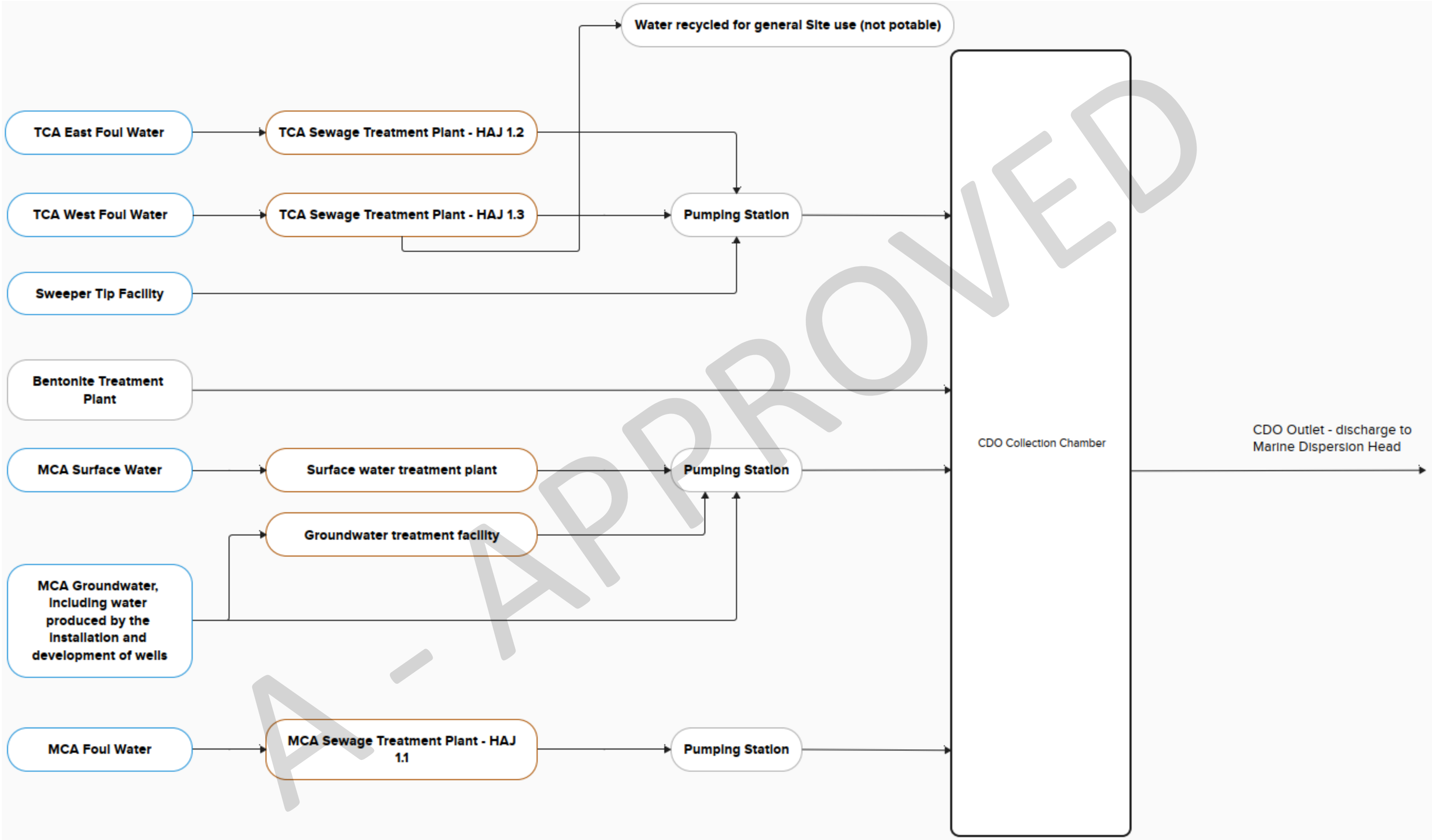

Figure 3.5 - Indicative Process Flow Diagram

NOT PROTECTIVELY MARKED

4 TREATMENT, FLOW RATES AND DISCHARGE VOLUMES

Table 4.1 below summarises the discharge activities detailed within this permit application.

Please note that throughout this section where the EA's Monitoring Certification Scheme, MCERTS, certificated equipment is referenced as potentially applicable, the certificate numbers will not be known until the final plants have been procured, after suppliers are appointed.

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Table 4.1 - Discharge activities – Summary Information

Discharge Stream	Discharge Activity Type	Source Reference	Site Location	Proposed Discharge Start Date and Duration	Maximum Discharge Rate (litres / second) and Maximum Discharge Volume (m^3 / day)	Summary of Discharge Source
Treated surface water	1.3.12 Trade and/or non-sewage effluent discharge and/or rainfall related discharges to surface water or groundwater with a volume greater than $5m^3$/day	MCA Surface Water HSV Treatment plant	MCA	October 2026 – ~2040	400 l/s $34,560m^3$/day	Discharge of treated surface water run-off from the MCA
Groundwater	1.3.12 Trade and/or non-sewage effluent discharge and/or rainfall related discharges to surface water or groundwater with a volume greater than $5m^3$/day	Discharge of groundwater from the MCA, including water produced by the installation and development of wells	MCA	2027 – ~2040	250 l/s (for five months) $21,600m^3$/day Then 50 l/s (maintenance period) $4,320m^3$/day	Discharge of groundwater from the MCA, including water produced by the installation and development of wells. The effluent will be treated by the suitable groundwater treatment plant if necessary
Treated sewage effluent	1.3.10 Sewage effluent discharge with a volume greater than $50m^3$ a day to surface water.	MCA treated foul water from HAJ 1.1 sewage treatment plant	MCA	October 2026 – ~2040	24.8 l/s 2143 m^3/day	Discharge of treated foul water from HAJ 1.1 sewage treatment plant

Discharge Stream	Discharge Activity Type	Source Reference	Site Location	Proposed Discharge Start Date and Duration	Maximum Discharge Rate (litres / second) and Maximum Discharge Volume (m^3 / day)	Summary of Discharge Source
Treated sewage effluent	1.3.10 Sewage effluent discharge with a volume greater than $50m^3$ a day to surface water.	TCA treated foul water from HAJ 1.2 sewage treatment plant	TCA	October 2026 – ~2040	4.5 l/s 389 m^3/day	Discharge of treated foul water from HAJ 1.2 sewage treatment plant
Treated sewage effluent	1.3.10 Sewage effluent discharge with a volume greater than $50m^3$ a day to surface water.	TCA treated foul water from HAJ 1.3 sewage treatment plant	TCA	October 2026 – ~2040	20.7 l/s 1789 m^3/day	Discharge of treated foul water from HAJ 1.3 sewage treatment plant
Treated water from the sweeper tip facility	1.3.12 Trade and/or non-sewage effluent discharge and/or rainfall related discharges to surface water or groundwater with a volume greater than $5m^3$/day	Sweeper Tip Facility	TCA	October 2026 – ~2040	3 l/s ~$97m^3$/day	Discharge of treated water from the Sweeper Tip Facility, consisting of potable, non-potable and surface-water
Treated water from the Bentonite Plant	1.3.12 Trade and/or non-sewage effluent discharge and/or rainfall related discharges to surface water or groundwater with a volume greater than $5m^3$/day	Bentonite Plant	MCA	October 2026 – 2036	4.7 l/s $400m^3$/day	Discharge of treated water from the Bentonite Plant

NOT PROTECTIVELY MARKED

4.1 Discharge of Treated Surface Water from the MCA

The MCA surface water strategy is outlined in **Section 3.1.1** of this supporting information document.

Due to the frequently changing nature of activities carried out in the MCA Zone 1 (inside the CoW), it is not practical to design a static drainage solution as drainage features may need to move as works progress. As described in **Section 3.1.1**, surface water will therefore be managed through a series of temporary drainage / attenuation ponds / features, at locations to suit construction activities and areas. In summary, surface water will drain via gravity to a series of attenuation ponds / features, from where it will be pumped to the relevant pumping station, and then onwards to the feed chamber of a surface water treatment plant (referred to as 'HSV').

It is worth clarifying that only the surface water from the MCA is being discharged to the sea (via the CDO) following treatment by the HSV. Surface water run-off from other areas including the TCA, is being managed separately and other CWDA permits are being applied for as appropriate.

With regards to treatment of the surface water, it is envisaged that the attenuation features will provide an initial level of settlement, prior to the water being pumped to a dedicated treatment plant.

The HSV is expected to consist of a modular above-ground package plant that can be easily decommissioned and removed from the site at the end of the construction phase of the project. The surface water will be treated using conventional processes to produce final effluent which can meet specified effluent limit values. The plant is expected to be of similar design to that used to treat surface water to be discharged via the TMO and is envisaged to be finalised and designed by a similar supplier. Please note there may be future potential to re-use treated surface water – however this is not in the scope of this application.

The MCA surface water treatment plant is anticipated to include (but not be limited to):

- an inlet pumping station to deliver all flows captured in the surface water drainage network in the MCA up to a feed chamber;
- feed chamber for flow balancing between mixing chambers;
- mixing tanks (for pH correction, coagulant dosing and flocculation, if required);
- lamella settlement tanks for clarification and associated desludging facilities;
- sludge holding tanks;
- centrifuge for sludge dewatering;
- supernatant collection chamber, pumping station wet well and pumping system;
- coagulant dosing system;
- pH correction dosing system;
- dewatering polymer dosing system; and
- washwater break tank and booster pumping station (for supplying potable water to chemical dosing areas, emergency showers etc.)

The treatment plant shall also have an above-ground connection that tankers can connect and discharge to manually should the need arise.

The sludge generated from the treatment process will undergo further dewatering, the sludge cake generated is to be stored and tested prior to being transported offsite for disposal by registered waste carriers to a suitably licensed facility. Supernatant formed during the sludge treatment is proposed to be recirculated to the head of the surface water treatment plant, meaning no sludge or supernatant from the desludging process will be discharged.

Provision will be made for a downstream sampling point which will enable a representative sample to be taken of the treated surface water run-off prior to this combining with other influent streams in the combined pumping station and eventually the CDO collection chamber. The current HSV performance specification sets out that provision should be made for draining the plant and / or recycling water into the treatment plant if water quality limits are not met. The plant has been designed for a minimum design life of 15 years. It will be decommissioned and removed once construction is complete and there is no longer a need to treat the MCA surface water and discharge via the CDO.

The amount of surface water generated will be dependent on rainfall levels, therefore microdrainage modelling has been undertaken to determine the likely expected volumes and required flow rates.

The HSV inlet pumping station has been designed for a peak inflow of 400 l/s. The maximum effluent flow rate from the HSV treatment system is therefore anticipated to be 400 l/s. The maximum daily discharge volume is expected to be 34560m^3/day. These figures have been calculated using microdrainage modelling, with a max flow incorporating a one in thirty-year storm.

In Zone 1 within the MCA (where it is not practical to design a static drainage solution) the construction contractor will be issued a performance specification report with maximum discharge rates. These rates will be included in the 400 l/s inflow rate stated above.

The NGR for the HSV and sampling point is currently expected to be TM 47546 63838, however this may be subject to change. The EA will be notified of any change.

The surface water treatment plant design must ensure that the failure of any single item of equipment does not cause a loss of supply or reduction in the ability to achieve Peak Maximum Capacity or put compliance at risk. All major and compliance critical equipment is to be installed with fully operational standby equipment. An automatic switchover between duty and standby equipment is also proposed. Wherever the system is to be designed in duty configuration only, the sizing of the unit/ equipment should be such that it meets the minimum design criteria with one unit out of service/ in maintenance. For the inlet pumping station a minimum of one standby pump shall be provided for every three duty/assist pumps. The entire package plant will be capable of conveying and treating 100% of the required capacity within the full design envelope. Suitable redundancy in dosing equipment shall also be maintained to minimise any risk to operation and compliance.

Table 4.2 below sets out the anticipated surface water run-off raw water, or influent, quality (that is the composition of the run-off entering the HSV). This has been estimated based on professional judgement and experience with similar construction projects and represents a conservative estimate.

Table 4.2 - Surface Water Run-Off Influent Quality

Parameter	Value
Flow	400 l/s
Total suspended solids	1000 mg/l
pH	10 - 11
Visible oil or grease	No significant trace

The current design performance specification for the HSV sets out the proposed final effluent quality of the treated surface water as detailed in **Table 4.3** below.

Table 4.3 - Surface Water Run-Off Effluent Quality

Parameter	Final effluent quality
Total suspended solids (TSS)	250 mg/l
pH	6-9
No visible oil or grease	No significant trace

It is anticipated that a coagulant and flocculant may be used if required, alongside pH dosing. The typical chemicals expected to be used as dosing agents are not listed as specific substances on the GOV.UK freshwaters specific pollutants and operational environmental quality standards spreadsheet[11]. It is worth noting that carry over of any dosing chemicals from the treatment plant system to the final discharge stream will be minimised. This is because any residue from the dosing chemicals will be bound (by the flocculant) and subsequently removed from the effluent stream along with the settled solids, prior to the discharge stream entering the CDO collection chamber (as described above).

Flocculants / coagulants bind together fine particles of suspended solids in a sludge (within the treatment system) which can then be removed for separate disposal (not discharged). The amount of dosing chemicals that may be required is entirely dependent on the level of TSS in the effluent, therefore it is not possible to provide an indication of how much would be used. In the circumstances that dosing is required however, it is acknowledged that a limit will likely be set in the permit for the relevant substances used. Material safety data sheets will be provided and available for the substances that could be used. It is not anticipated that the use of dosing chemicals as part of treatment systems will require a Specific Substances (or H1) assessment to be undertaken as the systems work in such a way that there should not be any carry-over of the dosing substances in the final effluent (which can be demonstrated by monitoring in accordance with permit conditions). This is due to the fact that any residue from the dosing substances will be bound (by the coagulant) and subsequently removed from the effluent stream along with the settled solids, prior to discharge.

External project evidence from a typical supplier of water treatment plants indicates that when dosing using a typical substance (ferric chloride) at a rate of 10mg/l, an input effluent with iron concentrations up to 0.5mg/l (dissolved) and 35mg/l (total), can be treated to outlet concentrations of less than or equal to 0.18mg/l (dissolved) and less than or equal to 0.99mg/L (total). This demonstrates the outlet total iron concentrations (less than 1mg/l) are ~35 times lower than the inlet, even after adding 10mg/l of ferric chloride. The decrease in total iron from inlet to outlet can be attributed to the removal of suspended solids – aided by the addition of the dosing substance. It is notable that the relevant Environmental Quality Standard (EQS) for dissolved iron is 1mg/l – therefore the evidence indicates that relevant treatment plants from a typical supplier operate such that dosing substances are suitably removed from the effluent stream.

The systems that are anticipated to be used are considered best practice and will have inlet monitoring to control the chemical dosing rates based on the exact composition of the discharge stream being treated. This will prevent over-dosing of the chemicals within the system and help to ensure minimal residual carry-over. The use and management of chemical dosing systems has been considered in further detail within the bespoke qualitative ERA that has been undertaken to support this permit application (**Appendix C**). Appropriate training will be provided to operatives on site responsible for management and maintenance of the systems.

It is anticipated that commissioning flows will be recirculated through the system where possible until the water quality is demonstrably compliant. A detailed commissioning plan will be developed when the specific plant design is finalised and can be shared with the EA in advance of commissioning if required.

[11] Surface water pollution risk assessment for your environmental permit - GOV.UK (www.gov.uk)

Figure 4.1 below shows a process flow diagram for the HSV surface water treatment plant.

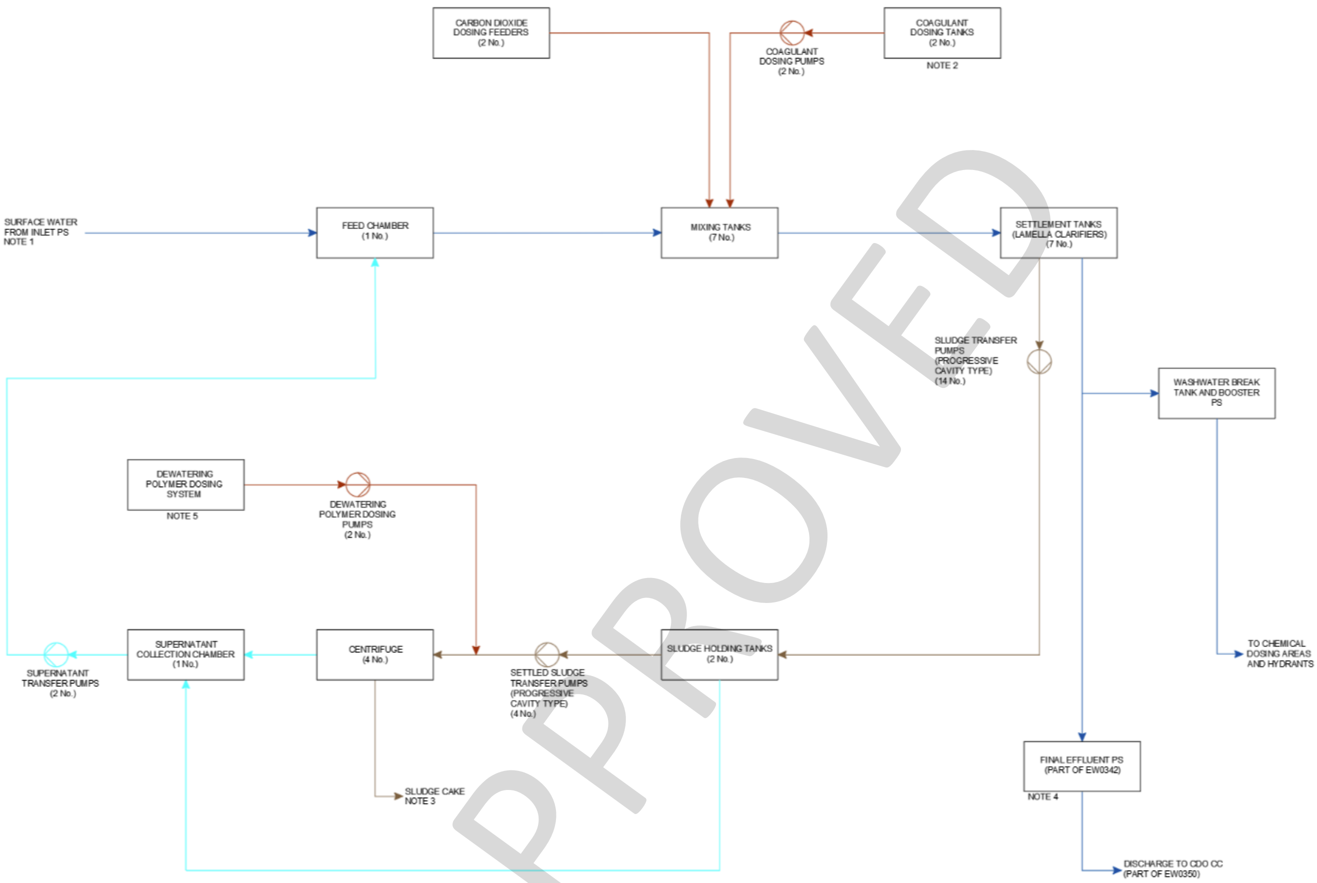

Figure 4.1 - Process diagram for Surface Water Treatment Plant

Source: SZC-EW0341-ATK-XX-HSV-XXXXXX-REP-UTI-900001. P1.06

4.2 Discharge of Groundwater from the MCA, including water produced by the installation and development of wells

The MCA groundwater control strategy is outlined in **Section 3.1.1** above. The maximum flow rate of groundwater from the MCA dewatering is anticipated to be up to 250 l/s, during the initial groundwater dewatering period (anticipated to last for a total of five months). Outside of this main dewatering period, also referred to as the 'maintenance period', the groundwater flow rate is estimated to be between 25 – 50 l/s. The 250 l/s is anticipated to be derived from 10 dewatering wells each operating at 25 l/s.

There is contingency in the design for additional wells to be pumped if required. It is not anticipated that this will result in flows above 250l/s, but it is recognised that if this is required then an update to the surface water pollution risk assessment may be required.

Analysis of site groundwater has been undertaken to help inform the groundwater management strategy. A series of pump tests were completed in 2020 with samples analysed for a suite of determinands including TSS. With the exception of an anomalous short-term peak (from three consecutive samples) the TSS was relatively stable in the remaining 27 samples and typically ≤100mg/l.

A surface water pollution risk assessment and marine modelling has been completed by CEFAS which assesses the impacts of the CDO discharge on the North Sea receptor, including the anticipated flows of untreated groundwater alongside other relevant flows. Nearfield modelling was undertaken and where mixing zones extend beyond the nearfield area, full-scale hydrodynamic modelling using the Sizewell calibrated and validated General Estuarine Transport Model (GETM) was undertaken. This full-scale modelling was undertaken for chromium and zinc. The full-scale modelling indicated that dispersion plumes for both determinands would remain localised and would not lead to significant impacts on water quality or biological receptors. Further detail can be found in the assessment in **Appendix B**.

The construction water discharge assessment is based on results from tests conducted in 2014 alongside the pump tests conducted in 2020. Some of the substances from the 2020 tests yielded results with elevated limits of detection (LOD) e.g. cadmium and mercury. The results are reported as 'less than' these elevated LOD. These elevated LOD were not targeted, and discussions with the analytical laboratory indicate these elevated LOD were potentially caused by suspended solids content in samples, impacting the sensitivity of the laboratory tests. These <LOD results are sometimes an order of magnitude higher than the positive results achieved for the same substances in the 2014 analysis, indicating that the true concentrations of these substances are likely to be more accurately reflected by the 2014 results than the 2020 results. Nevertheless, for conservatism, the <LOD results were taken forward in the water discharge assessment (using the LOD figures as if they were positive).

Using this approach, the annual load limits for cadmium and mercury would be exceeded by a peak groundwater flow (250l/s) during initial drawdown periods only. However, this approach is not considered to accurately reflect reality. As stated above, the 2014 results (with recorded positive values) are considered to more accurately represent the true concentrations of these substances in the groundwater. When these substances are modelled using the 2014 results, the annual load limits are not exceeded by this peak flow duration (or any other anticipated groundwater discharge flow/duration).

Based on the 2014 results and the fact that the 2020 results are <LOD and not quantified measurements, it is concluded that the average cadmium and mercury concentration of the groundwater will not lead to an exceedance of the respective significant load limits. To demonstrate the validity of this conclusion, a sampling and analysis programme will be developed such that groundwater effluent samples are routinely analysed for the relevant determinands. It is envisaged this programme will be set out in advance of commissioning the associated systems and plant, and its requirement could be included as a pre-operational condition in the permit.

Therefore, based on the Surface Water Pollution Risk Assessment outcomes, and the TSS results from the 2020 pump tests, the optimised strategic approach for MCA groundwater management is considered to be to implement a monitoring protocol such that groundwater flows are monitored for total suspended solids, for example by using an in-line TSS probe at an appropriate location of pipework, prior to discharge. Provided the TSS is below a proposed threshold of 250mg/l, the groundwater will be discharged to the pumping station before feeding into the CDO collection chamber and then discharged without treatment. Should the TSS rise above 250mg/l, the groundwater will be diverted, for example by using a diversion valve linked to the monitoring system, to a suitable groundwater treatment facility for treatment. This strategy will ensure that no groundwater will be discharged from site with TSS concentrations higher than what could be achieved through the groundwater treatment facility, while minimising any unnecessary and costly treatment of large volumes of groundwater.

Using this approach, under normal operating conditions, it is not anticipated that groundwater will require treatment prior to discharge. However, it is anticipated that groundwater produced very early in a well's construction is more likely to require treatment due to higher TSS. It may be possible to monitor the water quality from individual wells and direct any water which requires treatment from the well to a local treatment facility. This method would further minimise unnecessary treatment of groundwater. It is recognised that this method would require sufficient monitoring protocols to enable the determination of any individual well which is producing water which requires treatment.

The design for the suitable groundwater treatment facility (if it is required) has not yet been finalised and is subject to final contractor engagement. The treatment plant would have sufficient capacity to treat required groundwater flows and is expected to constitute a supplier package treatment plant.

The groundwater influent water quality parameters can be found in detail in the assessment in **Appendix B**. The treated groundwater effluent water quality parameters are the same as those for surface water and can be seen in Error! Reference source not found. above.

4.3 Discharge of Treated Foul Water from the MCA

4.3.1 Methodology Applied to Foul Water Treatment Calculations

The figures provided within this application for flow rates from foul water package treatment plants (PTPs) (see **Table 4.1** above) have been calculated using the daily flows and loads methodology that is typically applied to these types of discharges from sewage treatment plants (i.e. calculated by population equivalent). Experience from similar projects has also been incorporated where relevant. The figures are based on peak population numbers. Because the daily flows and loads will vary, they have been calculated at a high level (i.e. greatest population on site). Current designs are based on an assumption that food may be both prepared on site and served in canteens.

4.3.2 Calculation of Foul Water Volumes:

A Utilities Strategy has been developed throughout the design phase of the project which has underpinned the design and delivery of utilities required throughout the construction phase. The Strategy has been informed through an iterative demand profile, which has been updated through the design phase, and will continue to be so.

To inform the calculations for utilities required for foul wastewater treatment specifically, a Potable and Industrial Water Demand Strategy has been developed.

The demand profile for foul water has been produced. The below points summarise the methodology of the calculations used to produce this profile:

- a potable water mass balance across the MDS, and offsite associated developments, has been produced and used as an input to the demand calculations for foul water utility requirements;
- the output demand profile from this calculation set has then been utilised to inform the foul network flow rates over time;
- the foul demand profile is based upon the potable water demand profile which assumes the following values: accommodation 120l/head/day; site worker 35 l/head/day and office worker 50 l/head/day; and
- the foul water generated on site is calculated by assuming 100% of potable water used ends up in the foul water network, with 10% added to account for infiltration, so 110% of the potable water demand is estimated to be delivered into the foul water output.

4.3.3 MCA Foul Water Treatment - HAJ 1.1

There will be a foul water package treatment plant implemented to treat foul water arising from facilities and buildings within the MCA (referred to as ‘HAJ 1.1’). There will be an incoming gravity-fed pipe which transfers foul water to a terminal (or inlet) pumping station, from where the effluent flow is fed into the PTP. The PTP then discharges, via pipeline, the treated effluent to a pumping station. The pumping station transfers the effluent to the CDO collection chamber for discharge to the North Sea.

The proposed PTP process requirements for HAJ 1.1 are the same as described below for HAJ 1.2 (i.e., to be based on Moving Bed Biofilm Reactor (MBBR) technology). This will be finalised however once treatment plant suppliers have been appointed for the PTP design and operation.

HAJ 1.1 is expected to comprise a modular above-ground PTP that can be easily decommissioned and removed from the site at the end of the construction phase of the project. The overall treatment process is based on MBBR technology. The PTP is expected to include, but not be limited to, the following process elements:

- a terminal (or inlet) pumping station with 2no. submersible pumps (duty / standby);
- inlet screening where incoming foul water will enter the screen for removal of solids and fibrous materials;
- MBBR tanks along with MBBR blowers for aeration. The MBBR provides biological treatment and removes / reduces BOD and ammonia;
- lamella clarifier with desludging pumps for settlement of fully aerated effluent from the MBBR tanks. Settled sludge at the bottom of the clarifier is to be discharged to a sludge holding tank (for removal offsite). Dissolved air flotation may also be considered as an option for post-MBBR settlement;
- return liquor pumping station; and
- a flocculation stage may be required before final clarification (lamellas). Chemical dosing may be required but this is dependent upon the MBBR package technology supplier’s design.

Figure 4.2 below outlines the expected process.

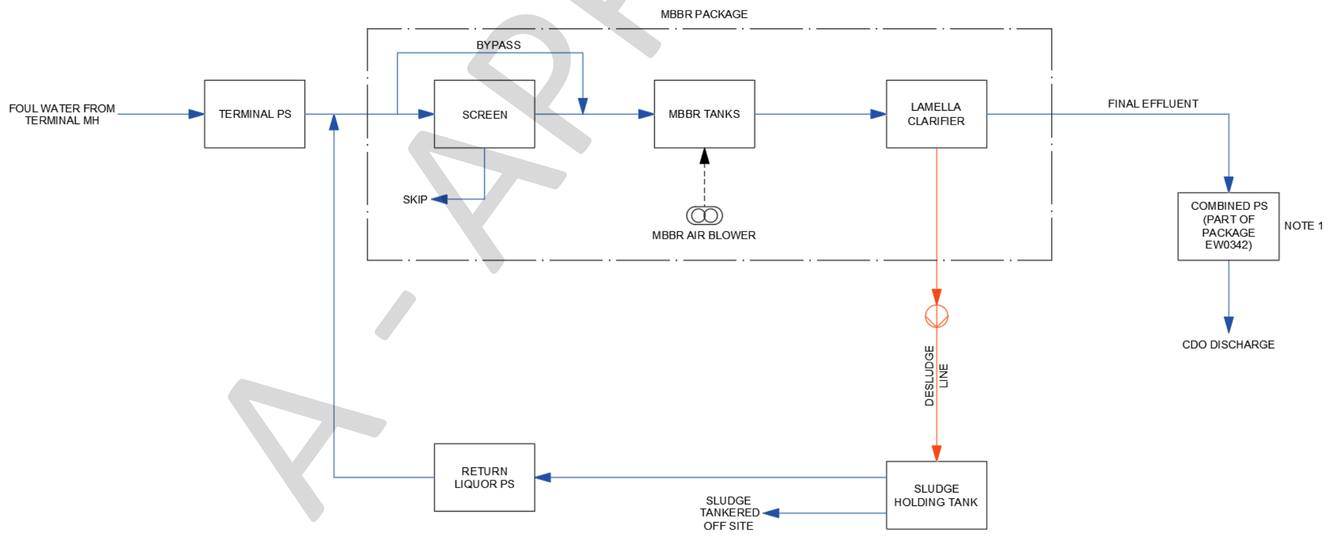

Figure 4.2- HAJ 1.1 Process diagram

Source: SZC-EW0341-ATK-XX-HAJ-XXXXXX-SPE-UTI-900001 P4.Teamcenter Reference 101265304

Table 4.4 below sets out the anticipated flow requirements for the HAJ 1.1 PTP.

Table 4.4 - HAJ 1.1 Incoming Flows

Package Treatment Plant	Population	Average Flow (m^3/day)	Average Flow (l/s)	Instantaneous peak flow (l/s)
MCA (HAJ 1.1)	6,255	708.4	8.2	24.8

The maximum flow rate from HAJ 1.1 to the CDO collection chamber is 24.8 l/s.

The maximum daily discharge volume from HAJ 1.1 to the CDO collection chamber is 2143 m^3/day.

This has been calculated based on the Potable and Industrial Foul Water demand calculations, using the methodology outlined above.

The anticipated NGR of the HAJ 1.1 treatment plant is TM 47552 64368.

Table 4.5 below sets out the anticipated influent water quality for HAJ 1.1.

Table 4.5 - HAJ 1.1 Influent Water Quality

Package Treatment Plant	Average SS Load (kg/day)	Average BOD Load (kg/day)	Average NH3-N Load (kg/day)
MCA (HAJ 1.1)	140	112	16.8

Table 4.6 below sets out the performance specification final water effluent quality from HAJ 1.1 (after treatment).

Table 4.6 - HAJ 1.1 Final Effluent Water Quality

Parameter	Upper Tier Value	Unit
BOD after secondary treatment	40	mg/l
SS after secondary treatment	250	mg/l
Ammonia as N (NH3-N)	60	mg/l

It is notable that the surface water pollution risk assessment in **Appendix B** concludes that the maximum ammoniacal nitrogen (Ammonia as N) content in the treated effluent could be up to 73.5 mg/L whilst still passing the Screening Test 5 and based on conservative mixing and un-ionised ammonia partitioning assumptions. Therefore, an upper tier ammoniacal nitrogen value of 60mg/l is proposed for the foul water treatment plants HAJ 1.1, HAJ 1.2 and HAJ 1.3. Performance specifications for the treatment plants state that a concentration of 20mg/l can be achieved by the proposed treatment methods. However noting that ammoniacal nitrogen concentrations up to 73.5mg/l pass the screening tests, and noting operational experience from Hinkley Point C construction site - a comparable project which has required permit variations to increase ammoniacal nitrogen concentrations from their equivalent plant, a final effluent value of 60mg/L for this parameter is considered appropriate to provide some operational flexibility for the treatment plant whilst minimising risk to the environment.

An upper tier value of 250mg/l for suspended solids is proposed for each of the foul water treatment plants HAJ 1.1, HAJ 1.2 and HAJ 1.3. While the treatment plants will be designed to achieve a final water quality of 60mg/l suspended solids, it is noted that 250mg/L is within the natural range of suspended solids expected at the discharge location, and a discharge at this concentration passes the screening assessment carried out (**Section 5.1** provides further detail on this point). 250mg/l is therefore considered an appropriate final effluent value for this parameter as it would pose a negligible risk to the marine environment whilst providing some operational flexibility for the treatment plant.

The discharge duration is currently expected to be from October 2026 – ~2040.

It is anticipated that commissioning flows will be recirculated through the system where possible until the water quality is demonstrably compliant. Where this is not possible, some commissioning flows may require removal via tanker for disposal off-site at a suitably licensed facility. A commissioning plan will be developed when the specific plant design is finalised and can be shared with the EA in advance of commissioning if required. Please note that different plant is expected to be commissioned at different times.

4.4 Discharge of Treated TCA Foul Water

This discharge stream comprises the following inputs:

- treated foul water from the Western TCA via PTP HAJ 1.3; and
- treated foul water from the Eastern TCA via PTP HAJ 1.2

Each of the sections below explains the above inputs in more detail.

4.4.1 Western TCA Foul Water Treatment - HAJ 1.3:

A PTP will be implemented to treat foul water originating from facilities and buildings in the western TCA, including the accommodation campus. HAJ 1.3 will also treat septic flows (cess) from welfare facilities.

HAJ 1.3 receives foul water flows by gravity into the HAJ 1.3 terminal pumping station. The terminal pumping station lifts the foul water from the TCA gravity network into the treatment plant. A tanker reception facility is also included to transfer septic flows from welfare facilities to the sewage network, and into HAJ 1.3 for treatment.

The final effluent from the treatment plant is stored in a final effluent storage tank for non-potable reuse on site. The flow from the storage tank gravitates to a treated effluent feed pumping station and is then pumped to the Water Resources Storage Area for storage prior to re-use. When the Water Resources Storage Area is at capacity, the pumps will be inhibited, and the storage tank will overflow to the HAJ 1.2 treated effluent pumping station and will then pass forward eventually to the CDO collection chamber to be discharged to the North Sea.

The treatment plant and the treated final effluent quality shall be suitable for non-potable reuse and shall not pose risks to the environment, human and animal health. The treatment plant is anticipated to comprise a modular above-ground PTP that can be easily dismantled and removed from site at the end of the project construction phase.

The final design of the treatment plant is yet to be confirmed with suppliers; however, a performance specification has been developed by the SZC project team to inform procurement requirements, alongside a technical note outlining the treatment process for non-potable water re-use. The foul water treatment plant is therefore anticipated to include, but shall not be limited to, the following process scope:

1. The terminal pumping station;
2. Reception facility for septic sewage tankers with Bauer connection and appropriate drainage;
3. Pre-treatment facility for septic sewage with a package pre-treatment for screening (including stone trap, screen, and screenings compactor);
4. Balancing tank equipped with mixing and aeration system and two submersible pumps to suit septic flows being fed into the HAJ1.3 inlet chamber;
5. The inlet works (consisting of screening facility with all associated ancillaries and skip) receiving raw flows lifted from the terminal pumping station and septic sewage from the balancing tank separately. There shall be a provision for a manual screen for emergency bypass/overflow condition;

6. Dosing and chemical storage facility of pre-precipitation & post-precipitation for phosphorus removal;
7. Dosing and chemical storage facility of alkalinity dosing to eliminate the risk of alkalinity deficit;
8. Primary settlement comprising of primary settlement tank feed chamber, lamella settlement tanks with plates, scraper mechanism and de-sludge facilities;
9. Biological treatment comprising of submerged aerated filter (SAF) distribution chamber, SAF units and Blower system supplying air required for biological treatment;
10. Secondary settlement comprising of Secondary Settlement Tank feed chamber, lamella Settlement tanks with plates and de-sludge facilities;
11. Tertiary Solids Removal Feed Pumping Station comprising of a wet well and valves slab, equipped with submersible pumps and associated lifting unit, pipework, valves etc.;
12. The Tertiary Solids Removal package plant includes a duty and a standby Tertiary Solids Removal stream each comprising of a Removal unit, Static mixer, Flocculation tank (with agitators), Backwash pump and de-sludge pump;
13. Disinfection unit with inline UV reactors;
14. Sludge holding tank with associated decanting arrangement, sludge mixing system and provision for tanker offloading;
15. Final treated effluent storage tank with tanker offloading arrangement;
16. Wash water booster pumping station for wash water supply to screen, washpactor, chemical area washdown, plant hydrant etc.;
17. Final effluent pumping station delivering flow to a suitable water storage area;
18. Return liquor pumping station wet well and associated pumping system;
19. Chemical bulk storage, make-up, safety shower/eye wash station and dosing systems;
20. All necessary control equipment for automatic unmanned control with remote monitoring via telemetry;
21. Access stairways and elevated walkways to process units;
22. Lifting plant and equipment;
23. Hardstanding areas, fencing, access and utilities within the pumping station and treatment plant compound;
24. Emergency generator provision; and
25. Manual sampling facilities and flow monitoring, using MCERTS where required.

Figure 4.3 below shows a process flow diagram for the HAJ 1.3 system.

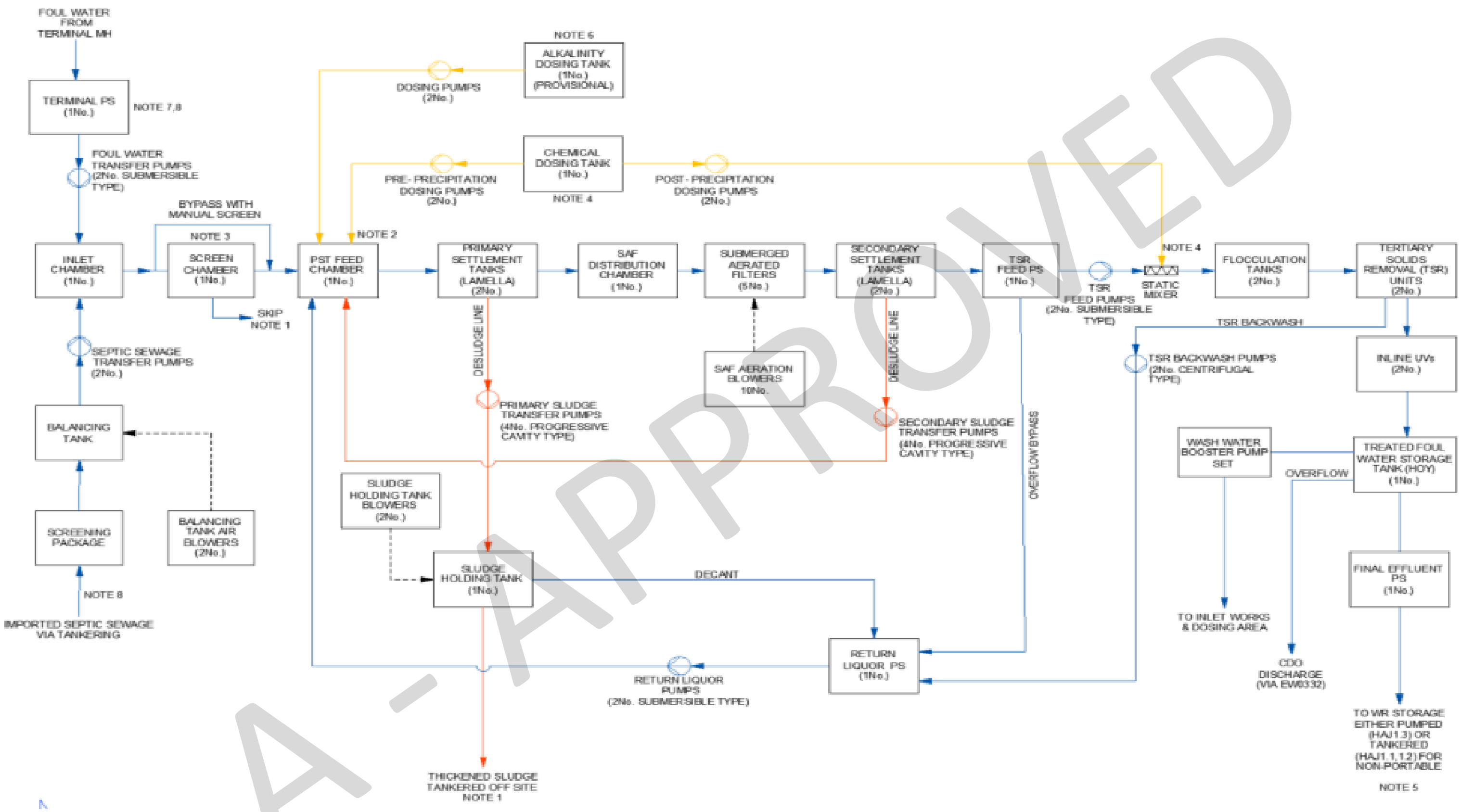

Figure 4.3 - Process diagram for HAJ1.3 System

Source: SZC-EW0341-ATK-XX-000-00XXXX-REP-UTI-900001, P01. Teamcenter Reference 101341786

At this stage, but subject to understanding wider permitting requirements beyond the scope of this application, it is anticipated that most of the treated foul water from HAJ 1.3 will be directed to a suitable storage area enabling the water to be re-used for activities like dust suppression. This is being proposed to reduce dependency on desalinated / abstracted water use during construction. There will however be a high-level overflow pipe from the PTP which will enable the transfer of treated effluent to the CDO collection chamber when the storage area has reached full capacity. The overflow effluent will be pumped to the HAJ 1.2 (see below) treated effluent pumping station, which then discharges to the CDO collection chamber. HAJ 1.2 is a separate treatment plant being utilised for treatment of foul flow from the rest of the TCA.

The maximum flow rate of treated effluent from HAJ 1.3 to the HAJ 1.2 pumping station is 20.7 l/s. The maximum daily discharge volume from HAJ 1.3 to the CDO collection chamber is 1789 m³/day.

Note that this will only be experienced when a suitable water storage area is at full capacity and the overflow from the PTP to the HAJ 1.2 pumping station and CDO collection chamber is being utilised.

NGR of treatment plant: TM 45521 64393.

Table 4.7 below sets out the anticipated influent foul water flow rates:

Table 4.7 - HAJ 1.3 Incoming Flows

Package Treatment Plant	Population	Average Flow (m³/day)	Average Flow (l/s)	Instantaneous Peak Flow (l/s)
TCA (HAJ 1.3)	4,482	588.5	6.8	20.7

Table 4.8 below sets out the incoming raw water quality of the influent (i.e., the composition of the foul water to be treated prior to re-use or discharge):

Table 4.8 - HAJ 1.3 Influent Water Quality

Package Treatment Plant	Average SS Mixed Load (kg/day)	Average BOD Mixed Load (kg/day)	Average Ammonia (NH3N) Mixed Load (kg/day)
TCA (HAJ 1.3)	338.2	247.2	34.8

Table 4.9 below sets out the proposed final effluent water quality that would be discharged to the CDO collection chamber (via the overflow system when a suitable water storage area is at full capacity) from HAJ 1.3.

Table 4.9 - HAJ 1.3 Final Effluent Water Quality

Parameter	Upper Tier Value	Unit
BOD after secondary treatment	40	mg/l
SS after secondary treatment	250	mg/l
Ammonia as N (NH3-N)	60	mg/l

It is acknowledged that any final discharge water quality parameters will need to be in accordance with limits set out in the environmental permit. Suppliers of the proposed treatment plants will be made aware of these (see **Section 7** below on Environmental Management System arrangements).

An upper tier value of 250mg/l for suspended solids is proposed the foul water treatment plants HAJ 1.1, HAJ 1.2 and HAJ 1.3. This is explained in **Section 4.3.3** above. It is understood that this concentration of suspended solids could inhibit the ultra-violet (UV) treatment function of the HAJ 1.3 treatment plant. However, it is important to note that the UV treatment function is in place to enhance treatment to enable the re-use of treated water. Treated water suitable for re-use will have separate water quality parameters and is not in the scope of this permit application. There may be times, for example, when treated water is not required for re-use e.g. in periods where there is sufficient supply of non-potable water from other sources. In these scenarios it may be considered appropriate to switch the UV treatment off for HAJ 1.3, and therefore the treatment plant would treat the water to a quality suitable for discharge (rather than re-use). Therefore, when water is being treated for re-use and the UV treatment is operational, the suspended solids concentrations will be lower. When the water is being treated for discharge, the upper tier value of 250mg/l for suspended solids is proposed.

As described further below in the section on Water Quality Sampling and Monitoring Arrangements, the HAJ 1.3 treatment plant will incorporate telemetry monitoring which can be used to record overflows and time durations, monitor the treatment processes, plant status, measure inflow and outflow of water. This will apply to all foul water PTPs to be implemented on site. The PTP will have a sampling point downstream, prior to the CDO collection chamber, to ensure treatment requirements are being met. Furthermore, the current performance specification requirements for the PTP state that provision should be made for draining and / or recycling water into the treatment plant if the discharge requirements are not met. The PTP supplier will be required to meet this, and any other requirements set out in the design performance specification.

The PTP will be intended to operate automatically with standby equipment as required that kicks in automatically. Training on the operation and maintenance of the treatment plant will be provided as appropriate.

It is anticipated that commissioning flows will be recirculated through the system where possible until the water quality is demonstrably compliant. Where this is not possible, some commissioning flows may require removal via tanker for disposal off-site at a suitably licensed facility. A commissioning plan will be developed when the specific plant design is finalised and can be shared with the EA in advance of commissioning if required. Please note that different plant is expected to be commissioned at different times.

The PTP will be decommissioned and removed from the site once construction is complete and the PTP is no longer required. The operating power station is expected to commission a long-term foul water treatment plant for its operation. The minimum design life for the PTP is 15 years. The supplier of the treatment plant, once appointed, will be responsible for incorporating any environmental action plan that might arise into their Construction Environmental Management Plan (CEMP) and method statements, as necessary. As explained further in **Section 7** below, the supplier will be required to provide final copies of documents for approval by the SZC Environment and Sustainability Team prior to works commencing.

4.4.2 Eastern TCA Foul Water Treatment - HAJ 1.2

There is proposed to be a second PTP (referred to as 'HAJ 1.2') located in the eastern part of the TCA to treat foul water from other buildings and welfare facilities, including the Common User Facility (CUF) buildings and contractors' compounds (essentially any aspects not covered by HAJ 1.3 described above). Foul water will flow, via gravity-fed pipeline, to a terminal pumping station wet well from where it will be fed into the treatment plant itself (the same as HAJ 1.3 above). The effluent from the PTP will flow to a final treated effluent pumping station, which will also receive overflow effluent from HAJ 1.3 as described above when the water storage area is at full capacity. It is then fed to the CDO collection chamber where it combines with the other flows incoming into the chamber prior to discharge into the North Sea.

HAJ 1.2 is expected to comprise a modular above-ground PTP that can be easily decommissioned and removed from the site at the end of the construction phase of the project. The overall treatment process is different from HAJ 1.3 however the design process treatment philosophy for HAJ 1.2 is based on MBBR technology – this is the same process as HAJ 1.1 and is described above in **Section 4.2.3**.

As per HAJ 1.3, all treatment plants require telemetry monitoring which can be used to record overflows and time durations, monitor the treatment processes, plant status, measure inflow and outflow of water. These will be implemented and utilised in accordance with MCERTS requirements where applicable.

The outgoing pipe from the HAJ 1.2 treatment plant will carry treated foul water effluent to a final effluent pumping station, which will then transfer the contents to the CDO collection chamber. There will be a sampling point downstream of the PTP, prior to entry into the collection chamber to enable a representative sample of the treated foul water to be obtained.

Figure 4.4 below outlines the treatment process.

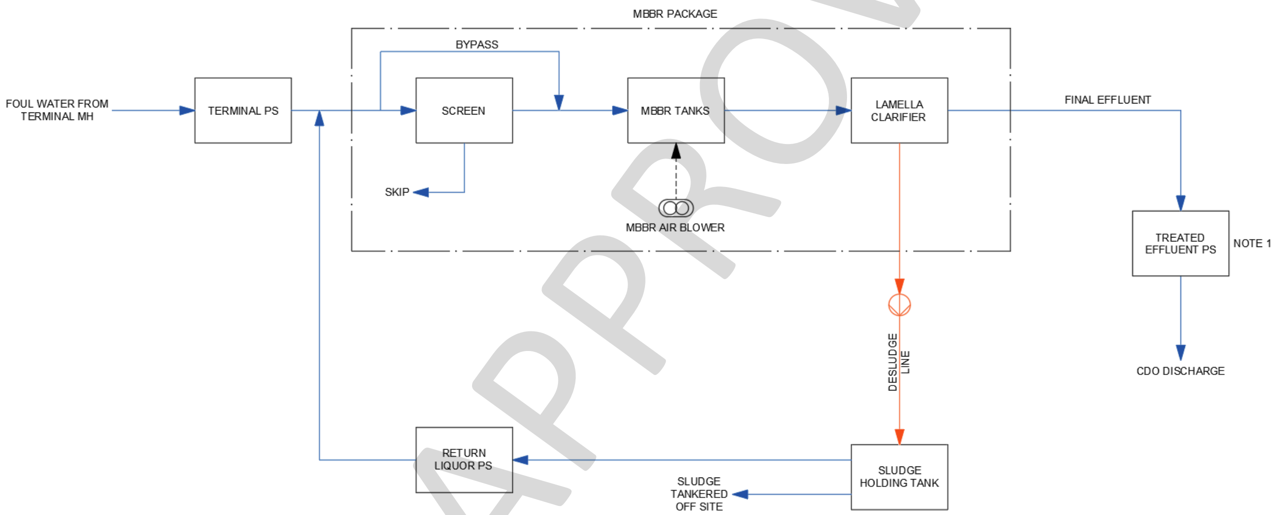

Figure 4.4 - HAJ 1.2 Process diagram

Source: SZC-EW0341-ATK-XX-HAJ-XXXXXX-SPE-UTI-900001. P4. Teamcenter Reference 101265304

The current expected maximum flow rate of treated effluent from HAJ 1.2 is 4.5 l/s. This will then combine with the treated effluent from HAJ 1.3 (when discharging) in the pumping station for HAJ 1.2, from where it will be pumped to the CDO collection chamber. The overall maximum daily discharge volume from the HAJ 1.2 treated effluent is 389 m^3/day.

The anticipated NGR of the HAJ 1.2 treatment plant is TM 46914 64804.

Table 4.10 below sets out the anticipated incoming influent flow rate to the PTP:

Table 4.10 - HAJ 1.2 Incoming Flows

Package Treatment Plant	Population	Average Flow (m^3/day)	Average Flow (l/s)	Instantaneous peak flow (l/s)
TCA (HAJ 1.2)	1,034	129.6	1.5	4.5

Table 4.11 below sets out the anticipated influent water quality for HAJ 1.2:

Table 4.11 - HAJ 1.2 Influent Water Quality

Package Treatment Plant	Average SS Load (kg/day)	Average BOD Load (kg/day)	Average NH3-N Load (kg/day)
TCA (HAJ 1.2)	11.1	8.8	1.3

Finally, **Table 4.12** below sets out the proposed final effluent quality for HAJ 1.2 (and also HAJ 1.1 which is described above).

Table 4.12 - HAJ 1.2 Final Effluent Water Quality

Parameter	Upper Tier Value	Unit
BOD after secondary treatment	40	mg/l
SS after secondary treatment	250	mg/l
Ammonia as N (NH3-N)	60	mg/l

It is anticipated that commissioning flows will be recirculated through the system where possible until the water quality is demonstrably compliant. Where this is not possible, some commissioning flows may require removal via tanker for disposal off-site at a suitably licensed facility. A detailed commissioning plan will be developed when the specific plant design is finalised and can be shared with the EA in advance of commissioning if required.

4.5 Discharge of treated water from the sweeper tip facility

The sweeper tip facility is currently expected to be constructed within the TCA, and the effluent produced by the facility is anticipated to be treated water from activities including dust suppression, general cleaning of surfaces, vehicle cleaning, dewatering of road sweepings/silts or any other equivalent activity which can be agreed in writing with the EA. The final design of this facility is on-going and subject to contractor input but will be an industry standard design.

The facility is currently expected to comprise of a compartmentalised concrete structure, with compartments separated by porous blocks. The effluent is to be collected in the initial compartment and then move via gravity through the facility with the concrete blocks providing a filtration function. It is likely the filtered solids would be disposed of as waste; being transported offsite for disposal by registered waste carriers to a suitably licensed facility. There may be scope in future to treat the filtered solids for re-use on site under the appropriate regulatory arrangements, however this is not in the scope of this application.

It is expected that the effluent will be sent for further settlement including oil/water separation. Within this system it is considered likely there will be a facility to enable the addition of coagulants/flocculants if required, alongside pH dosing if required. It is expected the pH dosing may be carried out using carbon dioxide. The specific coagulants/flocculants are to be confirmed at the final design stage, with input from the construction contractor. As explained in **Section 4.1**, the carryover of flocculant dosing agents is not anticipated due to the fact that any residue from the dosing substances will be bound and subsequently removed from the effluent stream along with the settled solids, prior to discharge. Provision will be made for spot sampling of the effluent for pH, total suspended solids and visible oil and grease, prior to discharge to the CDO collection chamber. In the event that sampling or visual monitoring identifies unsuitable effluent for discharge, provision will be made for the effluent to be re-treated through the system or disposed of elsewhere e.g. via tanker to an off-site suitably licensed facility. Following appropriate treatment for suspended solids, the effluent would then flow to the treated foul water network (outlined above).

Following treatment, the effluent will be pumped to a pumping station, from where it will be pumped to the CDO collection chamber, prior to discharge to the North Sea.

Table 4.13 below sets out the proposed final effluent quality for the sweeper tip facility.

Table 4.13 - Sweeper Tip Facility Effluent Water Quality

Parameter	Upper Tier
Total suspended solids	250 mg/l
pH	6-9
No visible or grease	No significant trace

The maximum effluent discharge rate is anticipated to be 3l/s from this facility. This is an assumed figure based on industry standard sweeper tip facilities.

Discharge of the above-described effluent stream is anticipated to commence in October 2026.

It is anticipated that commissioning flows will be recirculated through the system where possible until the water quality is demonstrably compliant. Where this is not possible, some commissioning flows may require removal via tanker for disposal off-site at a suitably licensed facility. A detailed commissioning plan will be developed when the specific plant design is finalised and can be shared with the EA in advance of commissioning if required.

4.6 Discharge of Treated Water from the Bentonite Plant

The bentonite plant is expected to consist of a de-sanding and de-silting unit, alongside a centrifuge. In the de-sanding/de-silting unit coarse solids are removed. The larger particles (such as sand, gravels and silts) are removed into a suitable container. The bentonite slurry is then passed through a decanter system, which uses a centrifuge to separate the finer solids. It's expected that a flocculant will be added in the decanter system. The specific flocculant chemical will be identified closer to the start of commissioning the plant; following final design and with supplier input. The separated particles are then removed directly to a suitable container. The separated solids will then be transported for disposal at a suitably licensed facility, or there may be some potential for re-use in the future. The potential disposal/re-use of these solids is not in the scope of this permit application. As explained in **Section 4.1**, the carryover of flocculant dosing agents is not anticipated due to the fact that any residue from the dosing substances will be bound and subsequently removed from the effluent stream along with the settled solids, prior to discharge.

Following treatment, the treated water can either be re-cycled if suitable (and used again as bentonite slurry), or will be pumped to the CDO collection chamber, prior to discharge. Provision will be made for spot sampling of the treated water for pH, total suspended solids and visible oil and grease, prior to discharge to the CDO collection chamber.

Table 4.14 below sets out the proposed final effluent quality for the treated water from the Bentonite Plant.

Table 4.14 - Treated water quality from the Bentonite Plant

Parameter	Upper Tier
Total suspended solids	250 mg/l
pH	6-9
No visible or grease	No significant trace

Discharge of the above-described effluent stream is anticipated to commence in October 2026.

The maximum flow rate from the Bentonite plant is expected to be ~4.7 l/s, or 400m³/day.

The anticipated NGR of the Bentonite plant is TM 47399 64197.

4.7 CDO Discharge Summary Durations and Peak Flows

Table 4.15 below summarises the CDO discharges included in this application, along with their expected durations and peak discharge rates. Note these durations and rates are based on current expectations and are subject to change as the project progresses.

Table 4.15 - Summary of CDO Discharges - Timeframes and Peak Flow Rates

Effluent Source description	Start of Discharge	End of discharge	Peak discharge rate (l/s)
MCA Surface Water	October 2026	~2040	400
MCA Groundwater (initial dewatering)	2027	2027-2028	250
MCA Groundwater (on-going dewatering)	2027-2028	~2040	50
MCA Treated sewage effluent HAJ 1.1	October 2026	~2040	24.8
TCA Treated sewage effluent HAJ 1.2	October 2026	~2040	4.5
TCA Treated sewage effluent HAJ 1.3	October 2026	~2040	20.7
Sweeper Tip Facility – Treated waste potable/surface water	October 2026	~2040	3
Treated water from Bentonite plant	October 2026	~2036	4.7

NB: None of the proposed treatment methods are anticipated to influence the temperature of the discharge or receiving marine environment (as no thermal components are involved). As stated in application Form Part B6 (**Appendix A**), the maximum temperature of the discharge is dependent on ambient temperature.

4.8 General Construction Pollution Prevention Measures

Applicable guidance will be followed to ensure generic pollution prevention measures are implemented throughout the duration of the proposed construction works and discharge activities where appropriate.

Relevant guidance will include for example:

- GOV.UK Guidance on Pollution Prevention for Businesses[12]
- GOV.UK Guidance Protect Groundwater and Prevent Groundwater Pollution[13]

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[12] Pollution prevention for businesses - GOV.UK (www.gov.uk)

[13] Protect groundwater and prevent groundwater pollution - GOV.UK (www.gov.uk)

- Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites[14]
- Sizewell C Project – Code of Construction Practice [16]

The Sizewell C Project – Code of Construction Practice provides a clear and consistent approach to the control of SZC construction activities on the main development site and the associated development sites, to minimise impacts on people and the environment, and will be adhered to throughout the project.

[14] Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (publishing.service.gov.uk)

BEIS-Round-2-Code-of-Construction-Practice-1.pdf

5 SUPPORTING RISK ASSESSMENTS AND MODELLING

The following supporting assessments and modelling have been undertaken to support this permit application for the proposed discharge activities:

- a Surface Water Pollution Risk Assessment and subsequent marine modelling, including CORMIX and GETM (described further below) by CEFAS, in accordance with the GOV.UK guidance for Surface Water Pollution Risk Assessments[1] (formerly H1 assessments) (**Appendix B**);
- a qualitative ERA for a bespoke permit application to consider the proposed discharge activities from a source-pathway-receptor approach, in accordance with the GOV.UK guidance for Risk Assessments for your Environmental Permit[2] (**Appendix C**);
- an updated Water Framework Directive (WFD) Assessment (**Appendix E**).

Refer to **Appendices B, C, D** and **E** for each assessment in full, complete with any further relevant supporting documentation. These should be read in conjunction with this main supporting information document.

The approach undertaken with regards to the supporting assessments and modelling was agreed with the EA during pre-application meetings to ensure that the most adequate and appropriate methods were utilised and to ensure that the assessments considered all potential pollutions risks from the proposed discharge activities.

In addition to the assessments listed above and summarised further below, a HRA and CRoW assessment will be undertaken by the EA in relation to the proposed discharge activities. As agreed with the EA, relevant background information to inform these assessments has been collated in an 'information package' which is provided in **Appendix D**.

5.1 Surface Water Pollution Risk Assessment

CEFAS were commissioned to undertake a risk assessment and marine modelling in accordance with the GOV.UK guidance for Surface Water Pollution Risk Assessments[1] to coastal waters. This specifically considers the potential impacts of the proposed discharge activities on the North Sea (the receptor). The overall purpose of the assessment has been to identify potentially hazardous substances in the proposed discharge and determine if, in the concentrations they will be discharged at, they pose a risk to the environment and to evaluate the magnitude of potential impacts. Potentially polluting discharges have been assessed against relevant EQS values, both annual averages (AA) and maximum allowable concentrations (MAC).

The report in **Appendix B** details the proposed groundwater dewatering and treated foul water discharges to the marine environment anticipated during the construction period of SZC and provides a risk assessment to inform this permit application. The report considers four scenarios, encompassing worst-case discharges for metals and un-ionised ammonia:

1. Peak groundwater discharge at 250 l/s – worst-case for metals (and groundwater substances); This has been termed Case A.
2. Peak groundwater discharge at 250 l/s plus treated foul water (treated sewage) at 50 l/s = 300 l/s. (Note: applies only to the un-ionised ammonia assessment, as dilution of the metals in the groundwater would decrease the concentration of metals meaning this scenario is less precautionary than Case A for groundwater). This has been termed Case A1.
3. Post peak groundwater discharge at up to 50 l/s groundwater. This has been termed Case B.

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4. Post peak groundwater discharge at up to 50 l/s groundwater combined with maximum treated sewage discharges of up to 50 l/s treated sewage = total flow 100 l/s. (Note: applies only to the un-ionised ammonia assessment, as dilution of the metals in the groundwater would decrease the concentration of metals meaning this scenario is less precautionary than Case B for groundwater). This has been termed Case B1.

The report does not assess other discharges included in this application (surface water, treated water from the sweeper tip facility and treated water from the bentonite plant) as they are not considered worst-case for potential contaminants.

Section 4.2 of this report summarises the modelling approach taken in the assessment and outlines relevant conclusions.

Applying the EA's screening tests for discharges to estuarine and coastal waters showed that arsenic, cadmium, nickel and mercury all pass the screening and therefore do not require detailed assessment. Consideration of ammonia discharges (as un-ionised ammonia), during both the peak dewatering period and the main construction period with treated sewage flows, also passed the screening tests.

Chromium, copper, iron, lead and zinc were examined further using modelling to characterise the extent of mixing zones (i.e., the area in which the EQS is exceeded). Nearfield modelling demonstrated that for copper, iron and lead the mixing zones would be highly constrained, with plumes exceeding respective EQS levels extending no further than 20 m from the discharge point. The nearfield modelling indicated that chromium and zinc mixing zones could extend beyond the nearfield area and therefore are best characterised by full-scale hydrodynamic modelling. The full-scale modelling indicated that dispersion plumes for both determinands would remain localised and would not lead to significant impacts on water quality or biological receptors.

The interaction of the CDO discharge with the desalination intake location was also considered. It was concluded that the CDO discharges would be unlikely to have a meaningful effect on the desalination assessment due to the very low levels of excess metals at the bed. Combined effects of simultaneous CDO and desalination plumes were considered, but due to the highly localised plumes resulting from the desalination plant discharge combined effects would be negligibly different to the CDO plume alone area. Full details can be found in **Appendix B**.

A screening assessment for suspended sediment discharges was also carried out. Screening Test 5 is passed under all scenarios considered, indicating that the suspended sediment in the discharge will disperse rapidly and is unlikely to pose a risk to the marine environment. As Screening Test 5 is passed, modelling of the discharge is not considered necessary. However, for additional assurance, the suspended sediment discharge was compared to the nearfield CORMIX modelling carried out in this assessment. This modelling shows that the dilution requirement is met within several meters of the discharge point. This further supports the conclusion of the screening tests that the suspended sediment discharge poses a negligible risk to the marine environment. It is also noted that the background suspended solids concentrations in the receptor vary considerably as a result of natural physical processes, and that 250mg/l (the maximum discharge concentration used in this application) is within the natural range expected at the site. It is notable that a surface water flow rate of 250l/s was used in this assessment as it is considered an upper estimate of an average flow (in line with surface water pollution risk assessment guidance), as opposed to the maximum flow rate of 400l/s (based on a one in thirty-year storm – as explained in **Section 4.1**).

5.2 Qualitative Environmental Risk Assessment for Bespoke Permit Application

In accordance with the GOV.UK guidance for undertaking risk assessments to support bespoke permit applications, a bespoke qualitative ERA has also been undertaken. This has considered the hazards and risks that could arise from the proposed discharge activities covered in this application.

It will be the responsibility of appointed contractor(s) to manage each effluent stream / treatment plant and provide a comprehensive ERA as part of their scope of works (refer to **Section 7** below which outlines management system arrangements). Refer to **Appendix C** for the qualitative ERA for the proposed discharge activities.

The approach undertaken for the qualitative ERA comprised the following stages:

1. identification of the hazards (defined as the activity or event with potential to cause environmental risk) which might be posed by the proposed discharge activities;
2. identification of receptors. The North Sea will be the direct receptor of the proposed combined discharge from the CDO outfall pipeline;
3. identification of the pathways or routes by which the hazard might come into contact with the receptor;
4. provide a summary of the potential harm that could be caused should contact occur;
5. impact assessment through consideration of the probability of exposure (likelihood of the risk occurring, hazard coming into contact with the receptor), the level of harm (consequence) that could occur and the subsequent magnitude of the risk (harm that could be caused). The below sub-paragraphs explain the ratings used in the impact assessment;
6. description of the expected mitigation (or control) measures that are likely to be implemented to reduce the risk, noting that final control measures will ultimately be dependent upon the appointed contractor methodologies; and
7. residual impact (after mitigation measures have been implemented).

The criteria used for the impact assessment as part of the ERA is defined in the below table. The nature of these assessments, being qualitative, is that they are subjective, and the methodology and criteria used to complete the ERA can therefore vary. The criteria developed and applied to this ERA has been based on the professional judgement and expertise of the SZC permitting team responsible for this application.

Table 5.1 - Qualitative Environmental Risk Assessment Criteria

Impact Assessment Rating	Criteria
Probability of Exposure	***Defined as the likelihood of the receptor(s) being exposed to the hazard.***
High	Exposure is probable. Direct exposure is likely with no distance or barriers between hazard source and receptor.
Medium	Exposure is possible. Barriers to exposure are less controllable.
Low	Exposure is unlikely. Several barriers exist between hazard source and receptor to mitigate against exposure.
Very Low	Exposure is very unlikely. There are effective, multiple barriers in place to mitigate against exposure.

Impact Assessment Rating	Criteria
Consequence	***Potential level of harm that could be caused to the receptor(s) if exposed to the hazard.***
High	Consequences are likely to be long-lasting and / or affect a large area or number of receptors. Effects require intervention to address and are difficult to reverse.
Medium	Consequences are likely to be medium-duration and / or affect a considerable sized area or number of receptors. Effects require intervention to address but are reversible.
Low	Consequences are short-term duration and unlikely to impact a considerable sized area or number of receptors. Requires some level of intervention to address.
Very Low	Consequences are minimal in terms of duration and have limited lasting effects. Requires no to little intervention to address.
Magnitude of Risk	*Determined by combining the probability of exposure with the level of the potential consequences – refer to the below Magnitude Rating Grid Box. The below explanations provide a summary of what the magnitude means from a practical perspective. These very much depend on the hazard and risks identified.*
High	Identified risks will require stringent monitoring and formalised recording / reporting. Reportable to external stakeholders (e.g., regulators).
Medium	Identified risks will require some level of regular monitoring and recording or reporting. Not necessarily reportable to external stakeholders.
Low	Identified risks require some level of monitoring / checking but this is not necessarily reportable / recorded.
Very Low	Identified risk require minimal monitoring / checking.

The below grid box summarises how the overall magnitude has been determined for each identified risk hazard and risk within the qualitative ERA. Note that the ERA has been developed using a professional and subjective opinion; it is therefore open to some element of interpretation. However, the overall purpose of the ERA is to identify the key risks from the proposed discharge activities, in accordance with source-pathway-receptor methodology, and outline what control measures will therefore be implemented to reduce the overall level of risk. The level of consequence is adopted as the key indicator of overall risk magnitude to reflect a worse-case scenario.

Table 5.2 - Bespoke ERA Risk Magnitude Rating

Probability of Exposure (below) / Level of Consequence (right)	High	Medium	Low	Very Low
High	High	High	Medium	Low
Medium	High	Medium	Medium	Low
Low	Medium	Medium	Low	Low
Very Low	Medium	Low	Low	Very Low

5.3 Water Framework Directive Assessment

The WFD is a European directive that imposes legal requirements to protect and improve the water environment. Compliance with the WFD is relevant to activities in the marine environment up to 1 nautical mile out to sea and therefore the proposed discharge activities that are the subject of this permit application[15].

A WFD Compliance Assessment was produced for the project at DCO stage (May 2020)[16]. This assessment considered whether the discharge from the proposed CDO could give rise to effects that would be in contravention to the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (SI 2017/407) (WER) based on the design information and baseline data available at the time. The DCO was granted by the Secretary of State for Business, Energy and Industrial Strategy on 20th July 2022.

A WER Compliance Assessment has been produced to support this permit application and can be found in **Appendix E**. This assessment uses the 'Clearing the Waters for All' (2023) guidance developed by the Environment Agency for the assessment of activities within transitional and coastal waters. This guidance separates the assessment into three stages, as follows:

- Stage 1 Screening: This stage identifies the activities to be assessed, and which water bodies could potentially be affected by each activity;
- Stage 2 Scoping: This stage identifies whether there is a pathway for effect associated with the activities for any of the water bodies identified in Stage 1; and
- Stage 3 Detailed assessment: This stage determines whether any activities that have been put forward from Stage 2 have the potential to cause deterioration and whether this deterioration will have a significant non-temporary effect on the status of one or more quality elements on a water body scale.

The screening stage confirms that there is only one activity to be assessed; the combined discharges in this permit application via the CDO.

The scoping stage demonstrates that the combined discharges could potentially affect the biological and chemical quality elements in the Suffolk coastal water body. Additionally, several protected areas are within two kilometres of the CDO. These elements were therefore scoped in for further consideration in the detailed assessment stage.

The detailed assessment follows the methodology used in the surface water pollution risk assessment (outlined in **Section 5.1**) and concluded that the combined discharges included in this permit application, via the CDO, is assessed as being compliant with the requirements of the WER.

[15] https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters

[16] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010012/EN010012-002239-SZC_Bk8_8.14_Water_Framework_Directive_Part_2_of_4.pdf

5.4 Habitats Regulation Assessment (HRA) and Countryside and Rights of Way (CRoW) Information Package

As explained in **Section 2**, a HRA and CRoW assessment were undertaken as part of the DCO planning requirements for the wider SZC project. However, to inform this permit application and the proposed discharge activities associated with the CDO, more specific information is required to enable the EA to assess the impact of the activity on surrounding features. The information needed to support the assessments is provided as a package in **Appendix D** to this supporting information document. This has been provided in accordance with advice and guidance provided by the EA during pre-application discussions and has considered the potential risks and impacts from the proposed water discharge activities specifically in relation to the following risks:

- turbidity;
- toxic contamination;
- siltation;
- physical damage;
- pH;
- nutrient enrichment;
- changes in thermal regime;
- changes in salinity regime;

Please refer to **Appendix D** for the full HRA / CRoW information package.

6 MONITORING AND SAMPLING ARRANGEMENTS

Monitoring will be undertaken for each proposed discharge activity and its resultant effluent stream. This is expected to be required for certain discharge effluent quality parameters, namely those included in the proposed final effluent quality tables in **Section 4** above, as well as for flow.

For the purposes of this supporting information document, the term 'monitoring' is considered to represent methods of either visual or continuous monitoring of the discharge effluent, e.g. where continuous monitoring is implemented as part of treatment systems. 'Sampling' is considered to then represent where physical samples of the discharge effluent are obtained, e.g., grab samples, and are then either tested on-site or off-site at a United Kingdom Accreditation Service (UKAS) accredited laboratory (subject to permit requirements).

Monitoring and sampling arrangements in relation to the proposed discharge activities will ensure compliance with the relevant limits and conditions that are set out in the environmental permit, for example what parameters need to be monitored and how often. However, this section of the supporting information document is intended to set out the current design-recommended proposed monitoring and sampling arrangements for the discharge activities based on the performance specifications that will be provided for procurement of the treatment plant suppliers and to contractors for managing the effluent streams going into the CDO. Once appointed, the contractors will be responsible for adhering to any permit requirements regarding monitoring and sampling arrangements. SZC will develop suitable monitoring and sampling arrangements and if required will communicate with the regulator. If appropriate, compliance audits with MCERTS requirements will be implemented.

Because there is the potential for the proposed arrangements to change once suppliers / contractors have been appointed, it is proposed that details of any final monitoring and sampling arrangements (where they do differ to the below proposed arrangements) are made available to the EA where requested, for example in a monitoring and sampling plan specific to each effluent stream. Any final monitoring / sampling arrangements set by suppliers / contractors will be subject to review by the relevant SZC project team (e.g., SZC Site Environment and Sustainability Team) to ensure all requirements of the SZC EMS, alongside the permit, will be sufficiently met.

The discharge monitoring / sampling arrangements will be implemented in accordance with the principles outlined in the EA guidance listed below:

- Developing a management system (2016)[17]
- Monitoring discharges to water: environmental permits (published 11 June 2020)[18]
- Site-Specific Quality Numeric Permit Limits: Discharges to Surface Water and Groundwater[19]

[17] Environment Agency (2016) Develop a management system: environmental permits - GOV.UK (www.gov.uk) [Last updated 03/04/2023] (Available online)

[18] Environment Agency (2020) Monitoring discharges to water: environmental permits [Last updated 24/11/2022] (Available online)

[19] Environment Agency (2020) Monitoring discharges to water: environmental permits [Last updated 24/11/2022] (Available online)

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Any requirements set out in the permit will be transferred into pertinent construction-related environmental management practices and documentation and communicated to relevant on-site personnel. Contractor-specific arrangements, in conjunction with SZC Integrated Management System (IMS) requirements, will ensure effective arrangements are in place to monitor the discharge.

6.1 Effluent Stream Flow Rates and Volumes

Table 6.1 below summarises how each of the effluent stream flow rates will be controlled and what these will be limited to (maximum instantaneous flow rate). It also summarises the daily discharge volumes that could be experienced based on these flow rates and how the flow will be monitored.

Table 6.1 - Effluent Stream Flow Control and Monitoring

Effluent Stream	Maximum Instantaneous Flow Rate (l/s)	Maximum Daily Discharge Volume (m^3/day)	Proposed Flow Control and Monitoring Measures
Treated Surface water run-off from the MCA	400	34,560	Inlet pumping station with controlled pump rates. Telemetry monitoring. Pumping arrangements from attenuation features. Treatment Plant flowmeter – not expected to be an MCERTS flowmeter*
Groundwater from the MCA, including water produced by the installation and development of wells	250 (reducing to 25-50 during maintenance period following initial dewatering)	21,600 for initial dewatering phase 4,320 during maintenance phase	Max. flow rate dependent upon dewatering operations but can be controlled by pumping arrangements / no. of wells, when pumped, durations etc. Inline flowmeters connected to dataloggers expected to be used
MCA Treated Foul Water (HAJ 1.1)	24.8	2143	Telemetry monitoring. Controlled inlet flow
TCA Treated Foul Water (HAJ 1.2)	4.5	389	Telemetry monitoring. Controlled inlet flow
TCA Treated Foul Water (HAJ 1.3)	20.7	1789	Telemetry monitoring. Controlled inlet flow
Treated water from the Sweeper Tip Facility	3	97	Telemetry monitoring - not expected to be an MCERTS flowmeter*
Treated water from the Bentonite Plant	4.7	400	Re-circulation function and plant flowmeter – not expected to be an MCERTS flowmeter*

*There are not anticipated to be any significant concentrations of dangerous or priority substances added to the discharge from these activities, therefore it is not anticipated that MCERTs flow meters will be required for these discharge streams. However, it is acknowledged that the EA will assess each water discharging activity on a case-by-case basis.

6.2 Effluent Quality Monitoring and Sampling

6.2.1 Treated Surface Water Run-Off from the MCA – Treatment Plant HSV

Surface water run-off will be directed, via a series of attenuation features and other Sustainable Drainage Systems (SuDS) methods (where applicable), to a dedicated treatment plant referred to as 'HSV' within the project. Provision shall be made for a sampling point (for effluent quality) downstream of the HSV treatment plant, prior to onwards pumping of the treated surface water run-off to the CDO collection chamber. Inflow monitoring is also expected to be available if required. Provision shall also be made for retaining surface water on site and/or recycling water into the treatment plant if the effluent quality requirements are not met.

The performance specification for the HSV treatment plant confirms that online monitoring shall include any required flow meters or flow measurement equipment. Where required flowmeters shall be to MCERTs requirements.

Visual inspections of the surface water network (where accessible) will also take place, in particular to identify any issues associated with hydrocarbons (oil / fuel) which may leave visible sheens for example.

6.2.2 Groundwater from the MCA, including water produced by the installation and development of wells

As explained in **Section 4.2** of this report, it is proposed that groundwater shall be monitored prior to entry to any suitable groundwater treatment facility and also prior to discharge to the CDO collection chamber. This strategy is based on the conclusions of the Surface Water Pollution Risk Assessment and marine modelling and the results of the groundwater analysis completed to inform that assessment (also explained in **Section 4.2.2**). This evidence-based approach will ensure that large volumes of groundwater are not unnecessarily treated.

It is therefore currently proposed that TSS will be monitored e.g. by a TSS probe, at an appropriate point in the groundwater pipework i.e. prior to any groundwater treatment facility, connected to a diversion valve. The probe will provide monitoring such that if TSS is recorded above a certain threshold (to be set based on proposed final effluent quality limits as stated in **Section 4** earlier), it will automatically divert the flow to the suitable groundwater treatment facility. When the TSS is below that threshold, the groundwater will be pumped directly to a pumping station for discharge to the CDO collection chamber, and ultimately the North Sea. This threshold is to be determined but a precautionary threshold of 250mg/l would ensure that no groundwater would be discharged from the CDO with a TSS higher than what can be achieved by the groundwater treatment facility. Flowrate monitoring is currently anticipated to be achieved by inline electromagnetic flowmeters connected to dataloggers for automated readings and remote access. It is anticipated that each individual pumped well, alongside the final discharge (prior to pumping to the CDO collection chamber) is monitored in this way. All monitoring data can be presented in a portal in near real time, with access provided for relevant project staff. The dataloggers and monitoring dashboard will also provide alarm facilities to alert relevant staff to events such as power failure, high water level and low flow.

As explained in **Section 4.2** of this report, a sampling and analysis programme will be developed such that groundwater effluent samples are routinely analysed for the relevant determinands, including cadmium and mercury. The purpose of this programme is to demonstrate the validity of the conclusion made in **Section 4.2** of this report; that the results obtained from the 2014 groundwater analysis are more likely to reflect the true concentrations of substances in the groundwater, than those obtained by the 2020 pump test. It is envisaged this programme will be set out in advance of commissioning the associated systems and plant, and its requirement could be included as a pre-operational condition in the permit.

Visual inspections of the groundwater (where accessible) will also take place, in particular to identify any issues associated with hydrocarbons (oil / fuel) which may leave visible sheens for example.

6.2.3 Foul Water Treatment Plants HAJ 1.1, 1.2 and 1.3

The strategy, process and proposed treated effluent water quality of these three treatment plants are explained in **Section 3** and **Section 4** of this report. To summarise sampling arrangements, all treatment plants shall have a sampling point downstream of the plant, but prior to discharge to the CDO collection chamber to help ensure suitable plant performance and proposed effluent quality is being achieved. Final design will inform the specific locations of these sampling points, and the EA shall be informed once these locations are finalised.

Visual inspections of the foul water network (where accessible) will also take place, in particular to identify any issues associated with hydrocarbons (oil / fuel) which may leave visible sheens for example.

6.2.4 Sweeper Tip Facility

The strategy, process and proposed treated effluent water quality for the sweeper tip facility are explained in **Section 3** and **Section 4** of this report. It is anticipated that a monitoring and sampling facility will be installed at the outlet point of the treatment facility, prior to being sent to the CDO. TSS and pH monitoring is expected to be undertaken to indicate whether or not coagulant/flocculant and CO2 (for dosing) should be added to the effluent prior to pumping to the CDO collection chamber. This monitoring would operate continuously to minimise the risks of non-compliant effluent being pumped to the CDO chamber.

Visual inspections of the effluent derived from the sweeper tip facility (where accessible) will also take place, in particular to identify any issues associated with hydrocarbons (oil / fuel) which may leave visible sheens for example.

6.2.5 Bentonite Plant

The strategy, process and proposed treated effluent water quality for the bentonite plant are explained in **Section 3** and **Section 4** of this report. It is likely that a flocculant will be added at the centrifuge stage of treatment. The specific flocculant used will be confirmed when the plant design is finalised. It is anticipated that a sampling point will be installed at the outlet point of the plant to enable spot samples to be taken, alongside an appropriate flowmeter.

Visual inspections of the effluent derived from the bentonite plant (where accessible) will also take place, in particular to identify any issues associated with hydrocarbons (oil / fuel) which may leave visible sheens for example. Although it is noted that the presence of any oil/fuel in the effluent is not expected.

6.2.6 CDO Collection Chamber

During the pre-application process, the EA advised that the CDO collection chamber would not in itself represent a water discharge activity. This is due to the fact that the seven activities included in this application all occur upstream of the CDO collection chamber. These activities are linked to treatment plants and as this report explains, each have anticipated effluent water qualities.

However, for robustness of monitoring arrangements, and as detailed in **Section 3.2.1,** each inlet pipe to the CDO collection chamber will have a sampling tap, which will allow samples of each individual effluent stream entering the chamber (following treatment where appropriate) to be obtained. The CDO collection chamber outlet zone has a bottom outlet which discharges the effluent into the outfall pipeline via the outlet pipework. The outlet pipework will also include a sampling point for sampling of the combined effluent if required. It is initially proposed to take routine samples at the CDO Chamber outlet pipe (at a frequency to be determined) and analyse for the relevant parameters. These parameters will be based on the those used for the water discharge activities in the permit.

In the event of any concern that water quality parameters set in the permit may not have been met, the collection chamber inlet pipework sample taps would be used to identify the effluent stream likely causing the elevated results. Where multiple effluent streams combine in one inlet pipe, the upstream monitoring arrangements can help identify the specific source of the effluent causing elevated results. During operations it is considered unlikely the CDO outlet sample will ever be the first indication of an elevated result, due to the upstream sampling and monitoring arrangements already outlined. However, this capability increases the overall robustness of monitoring arrangements.

6.3 Proposed Monitoring and Sampling Locations

Access to the monitoring and sampling points will be provided and maintained in accordance with relevant safety considerations and site-specific accessibility requirements. The expected monitoring and sampling point locations, at the time of writing, are set out in **Table 6.2** below. These may be subject to change as final designs and construction sequencing methodology, including siting of treatment plants, are still in development at the time of writing this application. Therefore, final sampling point locations are expected to be confirmed and notified to the EA during the permit determination period.

Table 6.2 - Effluent Monitoring and Sampling Locations

Discharge Effluent Stream	Monitoring / Sampling Type	Sampling Location NGR
Treated surface water from the MCA	Spot samples	TM 47546 63838
Groundwater from the MCA, including water produced by the installation and development of wells	Continuous monitoring (where relevant) and Spot samples	TM 47327 64091
MCA Treated sewage effluent HAJ 1.1	Spot samples	TM 47552 64368
TCA Treated sewage effluent HAJ 1.2	Spot samples	TM 46914 64804
TCA Treated sewage effluent HAJ 1.3	Spot samples	TM 45521 64393
Treated water from the Sweeper Tip Facility	Continuous monitoring (where relevant) and Spot samples	TM 45462 64353
Treated water from the Bentonite Plant	Spot samples	TM 47399 64197

Any changes to proposed sampling locations will be communicated to the EA during the permit determination period / following permit issue (if granted) and requirements captured in relevant construction-related environmental management documentation and procedures to ensure site personnel are aware.

6.4 Effluent Quality Monitoring and Sampling Frequency

The frequency of any monitoring and sampling required in relation to the proposed discharge activities is anticipated to be set out in the permit. SZC initially propose to undertake monitoring of the parameters set out in **Section 4** at a frequency expected to be set in the permit.

If samples are required to be taken off-site for external laboratory analysis and testing; it is expected that the frequency and any additional requirements in relation to this will be set out by the EA as the regulator within the environmental permit. Consideration of this has been included however in this supporting information document.

In addition, there is also opportunity to carry out performance monitoring by analysing spot samples using standard laboratory techniques on site, once this functionality is available. It is expected that provision for this shall be made by the preparation of relevant work instructions for measuring e.g. pH, TSS, Biochemical Oxygen Demand (BOD) and ammonia. This capability can increase the robustness of arrangements and allows for the prompt analysis of relevant parameters in a sample, alongside the immediate telemetry monitoring and external laboratory testing.

Any additional monitoring and sampling requirements, including reporting arrangements, for example if there is a need to test for substances without emissions limits based on background water and groundwater conditions or due to the proposed use of dosing equipment, it is expected that these will be discussed with the EA during the permit determination period.

6.5 Monitoring and Sampling Methodology and Assurance

Sampling methods to be used on site are expected to be in accordance with the British Standard for Water Quality Sampling (BS EN ISO5667:2006); however, this will ultimately be dependent on conditions set in the permit. Final arrangements will be detailed in a monitoring plan, if required. Aspects of self-monitoring will be covered as required in the SZC EMS documentation and / or contractor construction related environmental management arrangements.

Testing will be conducted such that all parameters under the permit conditions are measured. The monitoring and measurement methods to be used will be agreed with the EA, where required. In-situ water quality testing may be required, for example using handheld electronic meters and field test kits. These may form a routine part of regular monitoring assessments if considered necessary (for example in relation to elevated suspended solids concentrations).

Analytical testing suites for water quality will be dependent on conditions included within the environmental permit. The basic suite of parameters that may need to be analysed within a laboratory for collected water samples might include pH, suspended solids, flocculant/coagulant (if dosing), Ammonia, BOD, relevant metals. Tests may be required for other parameters dependent upon site conditions or regulatory requirements. The need for, and arrangements to undertake if required, analytical testing will therefore be determined following permit issue.

As described above, sampling and testing is anticipated to be carried out in line with British Standard for Water Quality Sampling (BS EN ISO 5667:2006). It will also be conducted under a safe system of work and in accordance with any laboratory quality assurance procedures. Testing will be undertaken at a UKAS accredited facility where appropriate and will meet any MCERTS requirements. All sampling and monitoring equipment is likely to be subject to a programme of preventive maintenance. Records of all maintenance and calibration will be kept secure and made available to regulators as and when required.

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6.6 Reporting of Monitoring and Sampling Results

Results from the water quality monitoring and sampling will be made available as required to the EA, upon request and in line with reporting requirements set out in the environmental permit for the proposed discharge activities. Any non-conformances will be addressed as per the environmental permit conditions and SZC's internal EMS arrangements. Corrective actions and the implementation of a solution to ensure that the discharge remains in-specification will be agreed in conjunction with the advice of the EA, where required.

Please refer to **Section 7** below which summarises additional monitoring and environmental management system arrangements that will apply to the proposed water discharge activities.

7 ENVIRONMENTAL MANAGEMENT SYSTEM ARRANGEMENTS

7.1 Environmental Management System

SZC has an EMS that is certified to the BS EN ISO 14001:2015 management system standard. It is part of the wider IMS. The IMS forms a key pillar to SZC's environmental compliance model, alongside Leadership & Governance, Competency and Training.

The EMS provides a structured system of procedures, arrangements and associated processes and tools to ensure suitable and effective management of SZC's environmental aspects and impacts. The scope of the EMS includes planning, design, construction, future operation and decommissioning of the SZC nuclear power station. It includes approaches to training, competency requirements, management structure and emergency response. Relevant aspects of the EMS will be applied to the permitted activities proposed in this application as appropriate, in conjunction with any contractor implemented management system measures which are aligned to SZC's EMS and are reviewed and approved by the Site Environment and Sustainability Team.

Where new processes or procedures are identified as being required, for example in relation to specific requirements or conditions that may be imposed as part of an environmental permit, these will be developed by either SZC Ltd or the appointed contractor(s) and communicated to all relevant personnel.

There is an EMS Manual in place which summarises, in detail, the processes and procedures (and associated documentation), that constitute the full EMS, and how these ensure the organisation meets the relevant clauses set out in the 14001 EMS standard.

The SZC IMS Structure is presented below, and the EMS is integrated at each level.

Figure 7.1 – SZC IMS Structure

7.2 Construction Environmental Management Approach

There will be a requirement to ensure that the proposed activities set out within this application are undertaken in accordance with suitable management measures in place. Responsibilities for permit condition compliance are outlined in written arrangements between appointed contractor(s) and SZC. SZC Ltd will act as the Legal Operator and will therefore have overall control of the activities.

Relevant documents, such as the following, may be produced to show how SZC and its contractor(s) will manage, and control construction related activities:

- **CEMP:** The appointed contractor, those responsible for undertaking the construction works and any associated permitted activities will be required to produce and adhere to a CEMP which incorporates permit conditions as appropriate. The CEMP will be submitted by the contractor, prior to work commencing, for review and approval by competent SZC personnel. The CEMP shall act as a live document and be reviewed periodically and updated as necessary during the execution of the works. The bespoke ERA produced as part of this permit application may be used to cross-check and / or help to inform key contractor considerations on-site;
- **Compliance Matrix:** A permit-specific compliance matrix will be developed which outlines responsible persons for each permit condition and the arrangements that support compliance;
- **other Contractor Management Plans, Procedures and Method Statements**: Other documents may be prepared as necessary to deliver environmental control, for example, contractor and sub-contractor Risk Assessment and Method Statement (RAMS) and Safe Systems of Works; and
- **any other relevant plans/monitoring and sampling records as identified under the EMS or bespoke documentation identified from the permit**.

7.3 Organisation

The EA guidance 'Develop a management system: environmental permits', does not specify that a standalone water discharge activity is required to demonstrate how it will meet all of the below EMS requirements at permit application stage, however the following information is hoped to demonstrate where considerations in accordance with this guidance have still been made as part of the project as best practice.

7.3.1 Management Structure

The details of SZC Ltd.'s overarching leadership and governance structure are presented in its Company Manual. The importance of environmental leadership has been embedded at all levels of the SZC project and its EMS, with ultimate accountability sitting with the Board of Directors. Roles and responsibilities specifically in relation to environmental management are set out in the EMS Manual.

Sizewell C Limited's core environmental capability is embedded throughout all levels of the project:

- contractors and sub-contractors working on SZC's behalf have a responsibility for ensuring their works are carried out in accordance with environmental requirements;
- the SZC Delivery team, which consists of Project Managers and Construction Managers, have a responsibility to oversee the works and ensure that they are carried out in an environmentally compliant manner;
- the SZC Site Environment and Sustainability team have a responsibility to inspect the works, review environmental deliverables and ensure that the works are carried out in compliance with the permitted activities;

- the SZC Environmental Services and Assurance Function will provide assurance of the activities as part of their assurance programme; and
- Independent Nuclear Assurance provide independent, objective assurance on environmental activities.

7.3.2 Training and Competency

For construction activities to be undertaken, multiple forms of training will be deployed by competent instructors and records of all training attended will be maintained. The primary objective of this training shall be to ensure that environmental protection is implemented across the site, delivered to off-site and on-site operatives. Training and competency may include:

- **toolbox talks**: to be delivered as considered appropriate to relevant personal on a regular basis. These are expected to inform site personal of relevant environmental requirements relating to the permit as well as general on-site environmental considerations and topics such as Pollution Prevention and Waste Management;
- **pollution prevention / spill training**: Emergency spill response training will be delivered. Spill response training will involve appropriate use of spill kits and equipment and the steps to follow during an emergency spill response. It will also set out key roles and responsibilities;
- **site induction programmes**: Inductions will be provided by SZC and contractors. Part of the induction programme will cover environmental sensitivities and requirements/conditions of any permits, licences and consents;
- **environmental awareness training:** all site personnel will have or are due to participate in a Site Environmental Awareness Training Course which includes the Code of Construction Practice (CoCP) and environmental sensitivities of the site. This will ensure a basic awareness level of environmental issues; and
- **Bespoke training relevant to the permit as deemed appropriate**.

Additionally, the project has established an 'environmental baseline' which identifies all the posts within the SZC organisation that are considered competent from an environmental perspective, via the use of Role Training Profiles.

7.3.3 Environmental Emergency Response

The EMS Manual states how environmental emergency preparedness and response is to be embedded into the project.

There is an Environmental Emergency Preparedness and Response standard which specifies best practice to be used by SZC to ensure readiness for dealing with any accident or emergency arising on the site. Alongside the standard sits the Establish, Maintain and Develop Emergency Preparedness and Response procedure which provide a strategic approach for deploying the organisation's Emergency Preparedness and Response policy.

A contractor's CEMP shall include an environmental incident response procedure or plan. A draft of the CEMP will be subject to SZC approval prior to any construction works commencing on site. This will be required to have taken into consideration the proposed activities set out within this permit application.

7.3.4 Site Infrastructure Plan

Relevant project design diagrams and drawings have been included throughout this Supporting Information Document. Additional site layout drawings and construction plot plans may be developed and be available (upon request) at a later date as the relevant programmes continue.

7.3.5 Site Operations

The contractors appointed to manage the discharge activities included in this application will be required to implement control measures and procedures as appropriate to ensure the activities do not impact adversely upon the environment. Contractors will work in accordance with the Sizewell C EMS procedures set out in **Section 7**. Permit-specific requirements will be communicated through the permit handover process.
The site will be subject to regular environmental auditing by the SZC Environmental Services and Assurance Team, as well as project-wide ISO 14001 surveillance and re-accreditation audits, carried out by an external company. Activities relating to the proposed water discharge activity will be incorporated into the scope of these audits where considered necessary.

7.3.6 Site and Equipment Maintenance Plan

All treatment plants and CDO infrastructure relevant to this permit application will be subject to regular inspection and maintenance as necessary. Operation and maintenance of the treatment systems has been considered in the environmental risk assessment produced to support this permit application. Any faulty or defected systems will be replaced as soon as practically possible. It will be the responsibility of the SZC Environment and Sustainability Team and construction contractors (once appointed) to determine a suitable routine inspection regime which will incorporate consideration of the drainage system and discharging activity aspects.

7.3.7 Monitoring

Monitoring and/or sampling will be undertaken in accordance with any set environmental permit conditions. These are anticipated to set out the type, method and frequency of monitoring required along with parameter limits, as explained in **Section 6** above.

If the sampling or monitoring results/inspections indicate an issue with any discharge, the activity will be stopped at the earliest opportunity (as soon as identified and as soon as safe to do so). If appropriate for the specific treatment plant, effluent shall be recycled through the plant and re-monitored until compliance can be demonstrated, prior to discharge. Further sampling may be undertaken where considered necessary prior to discharge operations re-commencing to be absolutely certain the discharge is not resulting in pollution to the receiving environment.

7.3.8 Contingency Plans

The relevant contractors will follow relevant contingency plans which will be signed off by the SZC Environment and Sustainability team.

7.3.9 Accident Prevention and Management Plan

As set out in **Section 7.3.3**, there is an environmental emergency preparedness and response standard which is to be embedded into the project and will be implemented for all activities associated with this permit application.

7.3.10 A Changing Climate

Although the water discharge activities included in this permit application are temporary features of the project, climate related risks have been considered in the design of the CDO infrastructure. For example, the tidal levels were considered in the design of the CDO system, including the marine dispersion head, the design of which incorporates sea level rise due to climate change up until 2040.

Possible climate related risks which could impact proposed discharge activities have also bene considered in the supporting bespoke qualitative ERA (**Appendix C**). Furthermore, the SZC CoCP sets out a requirement that CEMPs must consider measures to manage extreme weather events which may be derived from a changing climate.

More generally, the wider project has been subject to a climate change assessment as part of the DCO requirements. This is publicly available information. From a corporate perspective, the organisation has committed to making a substantial positive contribution across a range of environmental, social and governance aspects through the project. This incorporates SZC's 'Net Zero Excellence' approach which, as well as helping to deliver net zero for the UK in the most cost-effective and reliable way possible, is also about creating net positive outcomes against a number of the United Nations Sustainable Development Goals.

7.3.11 Complaints Procedure

There is an established complaints handling process in place as part of the wider SZC project; this will apply to any complaints which might be received in relation to the proposed discharge activities. Complaints, and the process to address these, are managed by the SZC Communications team. Timelines for acknowledging and addressing complaints with the public are also set out in the SZC Deed of Obligation.

7.3.12 Keeping Records

Pre-existing document control procedures will apply to all documentation and records required to be retained by SZC in relation to the proposed discharge activities, for example permit monitoring records. Documents are maintained within Teamcenter across the project which ensures every document uploaded to the system is allocated a specific reference number and retains review, approval and version history.

7.3.13 EMS Review Arrangements

There is an Environmental Management Review Terms of Reference procedure in place as part of the EMS. This sets out the EMS review process that is to be undertaken, including who needs to be involved and how often reviews should be conducted.

In terms of the permit application development and review process that has been undertaken, this supporting information document has been subject to a Permit Project Plan as part of the internal development process for the application itself. This forms part of the SZC Ltd EMS and is a requirement for all permits, consents and licences to follow.

This supporting information document has been subject to internal review processes to ensure that the relevant personnel (from an organisational perspective) have input or reviewed the document as required, depending on their specific role and responsibilities within the wider project framework.

7.3.14 Site Closure

All treatment plants and infrastructure relevant to this application are currently considered to be temporary and will be decommissioned in a safe manner. Once the CDO is no longer required to support wider site activities then it is expected the infrastructure will no longer be required and will be decommissioned.

The permit will be surrendered upon cessation of the proposed discharge activities within this application and within future variations.

8 CONCLUDING REMARKS

This document has been produced to support the environmental permit application that is being made by Sizewell C Limited for proposed water discharging activities that are anticipated to be required as part of the early construction phases associated with the SZC proposed development. It has been prepared with input and review from all relevant technical disciplines.

This document will be submitted to the EA, alongside the required GOV.UK permit application forms, and should be used during the regulatory determination process only.

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