FICHTNER

Consulting Engineers Limited

Kingmoor ERF

Fortum Carlisle Limited

Water management and drainage systems

ENGINEERING CONSULTING

Document approval

	Name	Signature	Position	Date
Prepared by:	Katie Hampton		Environmental Consultant	30/07/2021
Checked by:	James Sturman		Lead Consultant	10/08/2021

Document revision record

Revision no	Date	Details of revisions	Prepared by	Checked by
00	11/08/2021	First revision for Client	KLH	JRS

Contents

1 Introduction

1.1 Background

In response to the Schedule 5 request from the Environment Agency (EA), dated 24 June 2021, this document provides a consolidation of information relating to water systems and drainage systems proposed for the Kingmoor ERF. The following queries raised by the EA have also been addressed within this document:

1. Clearly describe all drainage systems on site taking into consideration where the water is sourced from, its use on site and how it leaves site.
    a. *Sections 2 to 4 below describe, in detail, the source of each water stream, its use on site, and how it leaves the site.*
2. Provide details of the source of the surface water that will go to Cargo Beck and confirm whether it is only 'uncontaminated' surface water going to Cargo Beck.
    a. *Section 2 provides detail of the sources of surface water that will have an eventual discharge to the Cargo Beck. It can be confirmed that only 'uncontaminated' surface water will be discharged to the Cargo Beck.*
3. Confirm the clean surface water system and dirty effluent water are totally separate systems.
    a. *It can be confirmed that the surface water drainage system will be entirely separate to the process drainage system.*
4. Provide clarify on whether the systems are sealed or contained.
    a. *As described in Section 1.2 below, all drainage systems (pipework, storage vessels) will be fully sealed unless otherwise stated (i.e., with the exception of discharge points off-site during normal operations, for example the attenuation pond discharge to the Cargo Beck, which can be isolated and 'sealed' if required).*
5. Use consistent wording to distinguish between sources type and routes of all waters.
    a. *As described below, the terminology and wording within this document has been revised for consistency.*
6. Provide clarity on what the Make Up and Neutralisation Tanks are.
    a. *The make-up tank (which can be seen on the site layout drawing) is purely an intermediary storage tank for boiler feedwater (i.e., it lies between the water treatment plant and the steam boiler). For simplicity, this has not been included within the Indicative Water Flow diagram, as it does not have any additional inputs or outputs.*
    b. *The neutralisation tanks are used to neutralise any acid waters produced at the water treatment plant, prior to reuse.*

The descriptions and terminology of the water management and drainage systems presented within this document and within the supporting drawings have been revised to be consistent. An updated indicative water flow diagram is presented below, which provides a visual overview of the flow of water and wastewater throughout the site (with a larger copy provided within Appendix A). Furthermore, the indicative drainage drawing as submitted in support of the response to the previous Schedule 5 (dated 31 March 2021) has also been updated to be consistent in terminology. The updated indicative drainage drawing is presented within Appendix A.

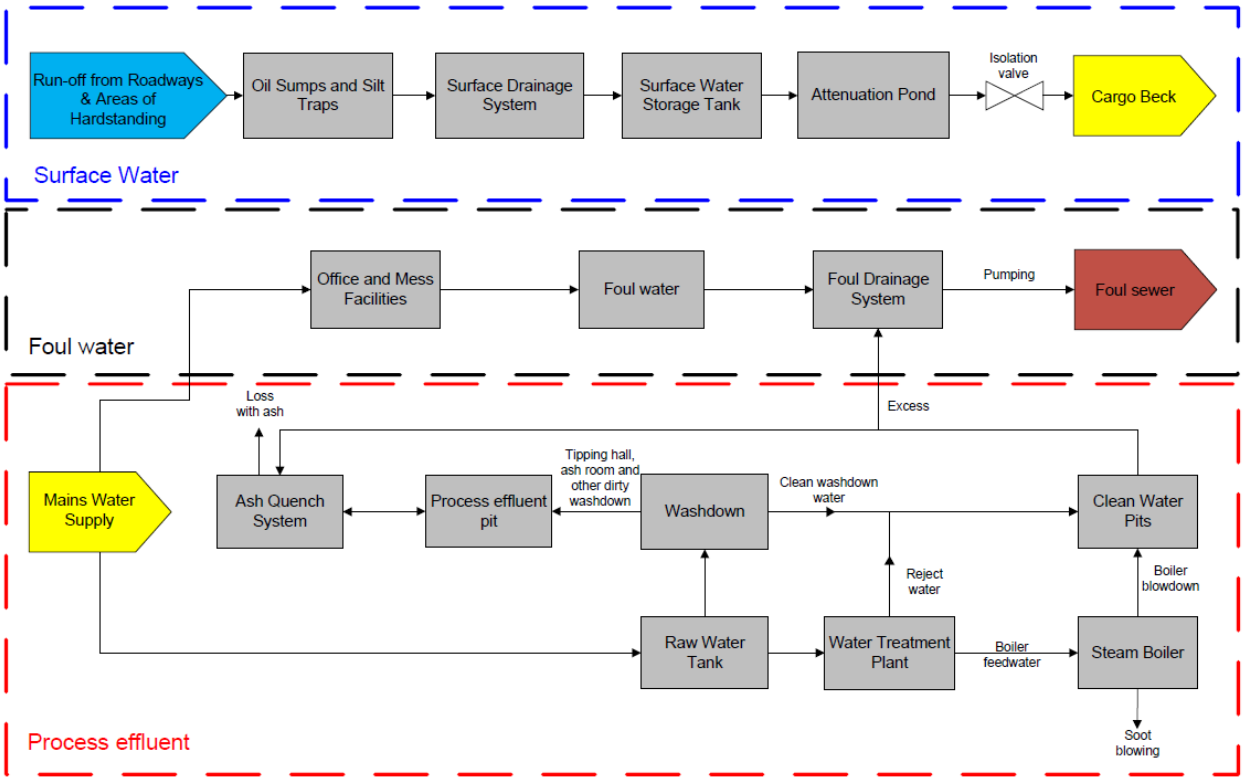

Figure 1: Updated Indicative Water Flow Diagram

1.2 Overview

The final layout of the drainage systems are subject to the detailed design of the Facility, but it is expected that the principles set out within this document will remain the same following completion of detailed design.

A detailed drawing presenting the final drainage arrangements for the site will be submitted to the EA upon completion of detailed design of the Facility. This will include for specific routes/pipework associated with each water stream and the locations/capacities of all above and below ground storage vessels.

There will be separate drainage systems for surface water, process effluent and foul water. All parts of the drainage systems (pipework, tanks, pits etc) will be sealed, unless stated otherwise. Furthermore, regular preventative maintenance will ensure that the integrity of the of the drainage systems are maintained throughout the lifetime of the Facility. Preventative maintenance will include for periodically emptying collector pits and undertaking visual inspections of the concrete or other material from which the pits are constructed. Should it be identified that damage has occurred to the structure, repairs will be undertaken to ensure that integrity is suitably maintained. These measures will ensure that liquids do not leak from the drainage pits/vessels and contaminate the underlying groundwater.

Sections 2 to 4 provide further detail on each of the following drainage systems at the site:

- surface water;
- process effluent; and
- foul water.

2 Surface water

Surface water will comprise runoff from buildings, roadways and areas of external hardstanding, and will be collected in the site surface drainage system. The site surface drainage system will connect to a surface water storage tank, designed for SUDS requirements (and with a capacity of around 840 m^3). The surface water storage tank will have a link to an attenuation pond, which will typically have an available capacity of around 355 m^3. In addition, in accordance with the flood risk assessment submitted with the planning application, a free capacity of 1,195 m^3 will be maintained for surface water storage.

Surface water will discharge from the attenuation pond to the Cargo Beck. The attenuation pond will be fitted with an isolation valve so that the discharge of surface water off-site can be inhibited in the event of an incident (e.g. in a fire event or significant spill event).

Certain areas of the site (such as vehicle movement areas) will be fitted with oil sumps and/or silt traps. These will clean/filter the surface water from these areas prior to it entering the wider site surface drainage system. Surface water from areas such as building roofs will not require cleaning/filtering before being discharged into the site surface drainage system.

The surface water drainage network and process effluent drainage network will be entirely separate drainage systems. Internal process areas will have links to the process drainage system and as such process effluent will not be discharged to the Cargo Beck. Therefore, only 'uncontaminated' surface water would be discharged offsite to the Cargo Beck.

The surface water drainage system will be a sealed system (tanks and pipework), with the exception of the discharge from the attenuation pond to the Cargo Beck. However, an isolation valve will enable this part of the surface water drainage system to also be sealed in the event of a spill or fire event, as shown in Figure 1.

3 Process effluent

Water used within the process, will be sourced from the mains supply and stored within a raw water tank before use. Washdown water will be supplied from the raw water tank.

Boiler feedwater will be first treated in a water treatment plant before use in the steam boiler cycle. An intermediary storage tank (or 'make-up' tank), between the water treatment plant and the boiler, will be provided to allow for balancing of the steam water cycle. Neutralisation tanks will be used to neutralise any acid waters produced at the water treatment plant, prior to reuse.

The raw water tank will have a capacity of approximately 2,400 m^3. Approximately 1,500 m^3 of this capacity will be available for firefighting purposes, with approximately 700 m^3 available for use within the process (either as washdown or treated in the water treatment plant to produce boiler feedwater). The remaining 200 m^3 capacity will allow for any air void in the tank when full.

As described within section 2.4.5 of the Supporting Information submitted with the EP application, under normal operations, process effluents will be re-used within the process. Therefore, under normal operations, there will be zero discharge of process effluents to sewer. Under certain events, such as the emptying of the boiler, the process effluents may be required to be discharged off-site to sewer. The process effluents generated at the site are described in further detail below.

As show in the indicative water flow diagram, refer to Figure 1, 'dirty' process effluents (such as dirty washdown from internal process areas) will be collected within the process effluent pit, prior to use in the ash quench system.

'Clean' process effluents (such as those resulting from boiler blowdown, and clean washdown water) would be stored in 'clean water pits' prior to reuse within the ash quench system. There will be an overflow to sewer in the event of excess effluents being generated (e.g. during emptying of the boiler).

The process effluent pit and the clean water pits will be impermeable to the liquid that is being stored. Any concrete structures will be designed in accordance with recognised standard '*Eurocode 2 – Design of Concrete Structures – Part 3: Liquid retaining and containment structures*'. During construction and commissioning, quality assurance checks will be undertaken to prove the structural integrity of the drainage systems.

As shown in Figure 1, the process drainage system will be a fully sealed system with the exception of those circumstances where it is required to discharge excess effluent from the clean water pits (i.e. the link to sewer).

4 Foul water

Water for domestic uses would be supplied directly from the mains water supply. Any resulting foul water from domestic uses (such as offices and mess facilities) would enter the foul drainage system, before being pumped to sewer.

The foul drainage system will comprise fully sealed pipework (with the exception of the link to sewer). As shown in Figure 1, the only interaction between the foul drainage system and process drainage system will be the combining of the effluents prior to pumping to foul sewer.

Appendices

A Indicative drainage drawing

ENGINEERING + CONSULTING

FICHTNER

Consulting Engineers Limited

Kingsgate (Floor 3), Wellington Road North,
Stockport, Cheshire, SK4 1LW,
United Kingdom

t: +44 (0)161 476 0032
f: +44 (0)161 474 0618

www.fichtner.co.uk