



Retford Circular Economy Project Environmental Statement Addendum - Volume 3 Technical Appendices

Technical Appendix 9.3: Revised Drainage
Management Plan

January 2024

Project No.: 0695864

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CONTENTS

1. INTRODUCTION 1

1.1 Background..... 1

1.2 Site Context 1

1.3 The Amended Proposed Development Infrastructure..... 1

2. PROPOSED GROUNDWATER DRAINAGE DESIGN 2

3. PROCESS & CONTACT WATER 3

3.1 Water Treatment Plant..... 3

4. PROPOSED SURFACE WATER DRAINAGE DESIGN 4

4.1 Main Processing Site 4

4.2 Maintenance / Haul Road 4

4.3 Restoration Strategy 4

5. CONCLUSION 6

APPENDIX A FIGURES

1. INTRODUCTION

1.1 Background

This revised Drainage Management Plan (DMP) forms an Appendix to the Environmental Statement Addendum (ESA) Volume 1, Chapter 9 Hydrology, Hydrogeology and Flood Risk for the Retford Circular Economy Project (RCEP) comprising the extraction of PFA contained in former disposal lagoons, progressive restoration, processing and export. In particular, the revised DMP reflects the amendment to the method of extracting the PFA within the Main Extraction Area (Area A), i.e. 'wet working' rather than pumped dewatering of the extraction void.

1.2 Site Context

The Site is located approximately 400 m south of Lound, 380 m south-east of Sutton-Cum-Lound and 670 m north-west of Retford.

The main section of the Site, Area A, is comprised of former PFA disposal lagoons that have been reinstated for agricultural use (low quality grazing land). The area to the south of the former lagoons includes the Bellmoor Industrial Estate where the Main Processing Site (Area C), would be located.

The area comprising the former PFA lagoons is raised with vegetated embankments around its perimeter and largely comprises grassland for grazing, of relatively poor quality. This area has historically been subject to a significant amount of sand and gravel extraction and is therefore not alien to extractive industries, with Area C having been used until recently for the processing and export of won resources and remaining in industrial use to this day.

Area A is split between the 'Low-Rise' to the east (7.5 – 11 m Above Ordnance Datum, AOD) and the 'High-Rise' to the centre and west (17 – 19 m AOD).

The Site is also well screened owing to a combination of topography and existing vegetation, including tree planting and hedgerows along its perimeter and woodland blocks and hedgerows in the surrounding area.

1.3 The Amended Proposed Development Infrastructure

As presented on Figures 1 and 2 in Appendix A of this document, the Amended Proposed Development includes, amongst other things:

- Main Processing Site (Area C);
- Maintenance / Haul Road;
- Conveyor;
- Main Excavation Area (Area A);
- Settlement/Filter Ponds;
- Water Treatment Plant; and
- Soakaway Ponds.

2. PROPOSED GROUNDWATER DRAINAGE DESIGN

There would be no active dewatering of groundwater as part of the Amended Proposed Development. During excavation within Area A there would be a small volume of perched water flowing into the void from the surrounding PFA. It is proposed that excavation would be undertaken by wet working and any inflows into the excavation would be left in situ. This includes any surface water runoff from exposed PFA material or direct rainfall into the excavation.

An example of how wet working might be configured is shown illustratively in Figure 3, Appendix A of this Drainage Management Plan.

If necessary, bunds would be constructed around the perimeter of the active area in order to segregate overland flows (clean water) from surrounding grassland areas from the water in the active excavation; although for the most part the combination of the existing lagoon embankments and the retention of high levels around the Site perimeter would fulfil this purpose. Currently surface water infiltrates and runs off, and the surface water scheme would seek to maintain this passive drainage approach where practicable.

Excavated material would be placed adjacent to the excavation and any water within the PFA would be allowed to drain naturally back into the excavation. It is proposed that this activity would take place within the micro-phase from where the material is extracted, therefore there is no abstraction or transfer of groundwater. The extracted PFA is then transferred to Area C by enclosed conveyor where any remaining moisture is removed by the enclosed proposed drying plant.

3. PROCESS & CONTACT WATER

In accordance with the drainage disposal hierarchy outlined in the CIRIA SuDS Manual¹ it is proposed that the discharge of any residual water draining from the PFA and water that has come into contact with PFA (contact water) at Area C, together with any condensate from the drying plant (process water), would be via:

- Pumping to settlement ponds, a water treatment plant and soakaway ponds in Area A, to be constructed in LR P1 and LR P 2 along the southern boundary of the Site where the PFA is relatively shallow (up to 1 m thick); and/or
- Pumping to settlement ponds/tanks and a water treatment plant in Area C, before discharge to a watercourse;
- Direct tanker disposal (sent to an appropriately licenced off-site treatment facility); or
- To sewer.

The above options are shown in Figure 1 and Figure 2 at Appendix A.

The soakaway ponds in Area A would be constructed by excavating through the PFA and into the underlying sandstone.

During the site optimisation stage it is envisaged that process and contact water would be collected in the settlement pond/tank at Area C, where it would be tested for any contamination. Further detail on testing carried out to date and proposed further testing is set out under 'Water Treatment Plant' below. Prior to the selection of treatment and agreement of discharge limits with the EA, effluent may be tinkered for off site disposal at an appropriately licenced off-site treatment facility.

3.1 Water Treatment Plant

The water treatment plant, if selected as the treatment and discharge option, would be situated in Area A and/or Area C. The Applicant has undertaken monitoring of groundwater quality upgradient of the Site, within the underlying sandstone aquifer, and within the PFA for comparison with Environmental Quality Standards and Drinking Water Standards.

Based on the results of chemical analysis, the Applicant has estimated what is considered the worst-case required removal efficiency for contaminants predicted to be present to identify potential treatment solutions capable of producing a discharge water that could be discharged to groundwater consistently meeting either Environmental Quality Standards (EQS) or Drinking Water Standards (DWS), whichever is the lowest.

An indicative footprint for the water treatment plants is shown on Figure 1 and Figure 2 in Appendix A.

Final selection of the treatment technology and optimisation of the treatment process would be undertaken once formal discharge limits have been established and agreed with the Environment Agency via the bespoke Permit Application process for discharge to groundwater. Note that it may be that a water treatment plant is not necessary if water is to be discharged direct to sewer and/or disposed of using tankers, or if the water meets relevant standards without treatment.

4. PROPOSED SURFACE WATER DRAINAGE DESIGN

4.1 Main Processing Site

The outline drainage management strategy for the Main Processing Site is presented in Figure 2.

The Main Processing Site would be constructed on the same footprint as part of the existing Bellmoor Industrial Estate and, subject to a detailed condition survey, would utilise the same drainage system that outfalls to an unnamed watercourse, which is a tributary of the River Idle.

A review of Severn Trent asset drawings for the road system in the immediate vicinity of the Site did not identify any existing surface water or foul sewers and it is therefore proposed to improve the existing outfalls and use these to discharge clean “non-contact” water to the tributary of the River Idle.

If required, additional below ground storage and interceptors would be retrofitted into the existing drainage system local to ancillary buildings, processing plant and car parking areas to ensure that there is no adverse impact on the quality and quantity of drainage entering the receiving watercourse.

4.2 Maintenance / Haul Road

It is anticipated that the maintenance / haul road, which links Areas A, B and C, would be constructed using a mixture of compacted material including sandstone won from excavation within the working area and imported clean material that is deemed suitable for road construction. This material would be placed in layers and compacted. The surface of the maintenance / haul road would be unsealed and therefore is considered to be semi-permeable. It is therefore likely that there would be a proportion of surface runoff in an extreme storm event that would exceed the greenfield runoff rate. This excess volume would be stored in an unlined ditch system running parallel to the maintenance / haul road. Runoff from the road surface in an extreme storm event would flow over the edge of the road and into the ditch system.

If upon further, more detailed analysis of the maintenance / haul road drainage there is deemed to be a requirement to control potential sediment runoff, then there is scope to incorporate semi-permeable check dams to encourage ponding and settlement within the ditch system.

A number of mitigation measures would be put in place to avoid cross contamination of surface runoff by traffic using the maintenance / haul road:

- Wheel wash on Area C and mobile jetwash. This would ensure debris from the Area C is not deposited on the maintenance / haul road by traffic; and
- Dust management to ensure that PFA dust would not be blown onto the maintenance / haul road.

4.3 Restoration Strategy

It is proposed to provide a new and permanent network of unlined field ditches as Area A is progressively restored. The ditch network would have a gentle flow from north to south across the Site, and to the north-east, where water would join the wider hydrological network.

Ditches are a Nottinghamshire Priority Habitat. Within the restoration strategy they would aid drainage of the restored landform and act as field boundaries in wet grassland. Additionally, they would provide a mechanism for water level management, such as seasonal flooding of wet grassland. These ditches are shown on the Updated Indicative Restoration Masterplan (Figure 7.12), Volume 2 of this ESA.

The ditch network would drain to a discharge point, likely on the northern boundary of the Low-Rise area, into the existing drain to the north of the Site. It is also proposed to drain a proportion of surface water from restored areas into a storage pond(s) within the filter pond area within Area A, for use in operations on-site, including in water bowsers and dust suppression.

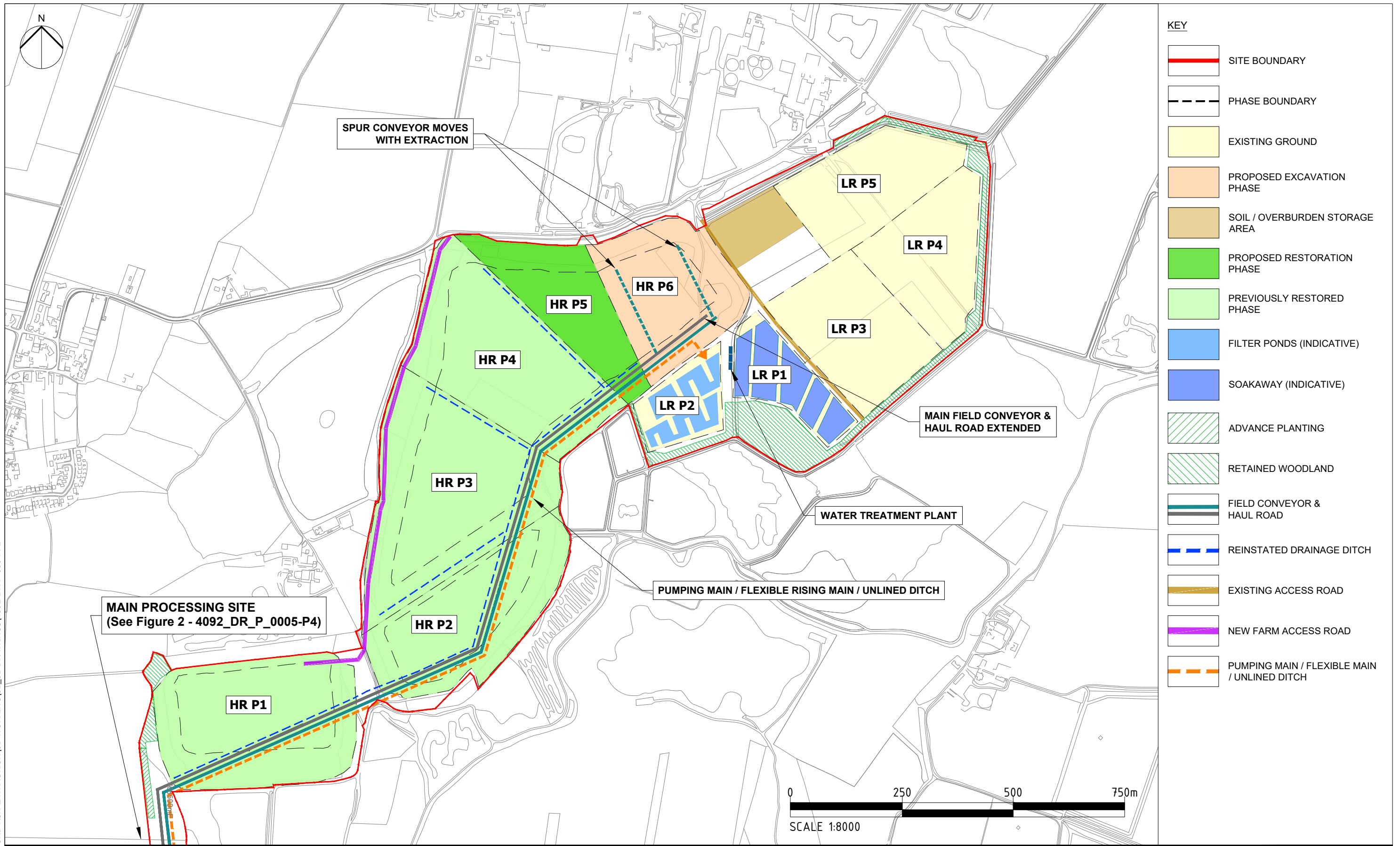
The aforementioned storage pond(s) may also be connected by unlined field ditches to parts of Area A that are yet to be extracted from (the existing grazing land), to increase the volume of surface water that is able to be collected for use on-site during operation.

5. CONCLUSION

This revised DMP provides a high-level overview of the surface water and groundwater management measures at the Site, associated with the Amended Proposed Development. Pre-application discussions with the Environment Agency with regards to the discharge permit that is required are ongoing and further dialogue is planned, following which a more detailed drainage plan would be produced. The further detail referred to in this DMP would be secured by planning conditions and/or permits/consents to be issued by the Environment Agency.

APPENDIX A FIGURES

Plot Date : 12 December 2023 14:59:42
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Client	LOUND HIVE LTD

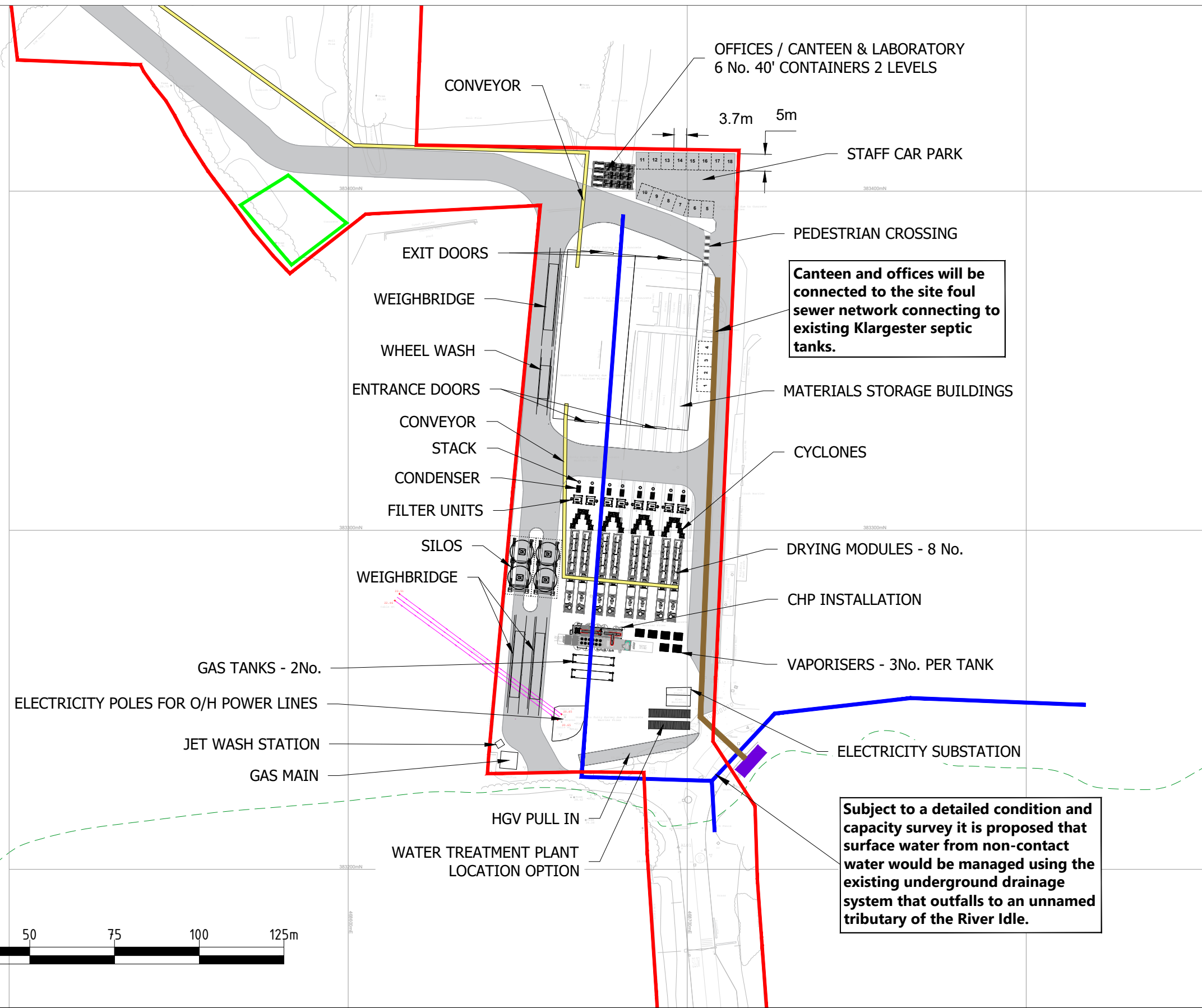
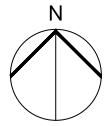
Drawing Title	FIGURE 1 OUTLINE DRAINAGE MANAGEMENT PLAN
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Purpose of issue PRELIMINARY			
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KEY	
	SITE BOUNDARY
	EXISTING PUBLIC RIGHT OF WAY
	EXISTING HV ELECTRICITY LINES
	EXISTING UNDERGROUND DRAINAGE FOR SURFACE WATER MANAGEMENT
	EXISTING FOUL WATER DRAINAGE PIPE
	EXISTING SEPTIC TANKS
	PROPOSED SETTLEMENT POND TO MANAGE SURFACE AND PROCESS WATER

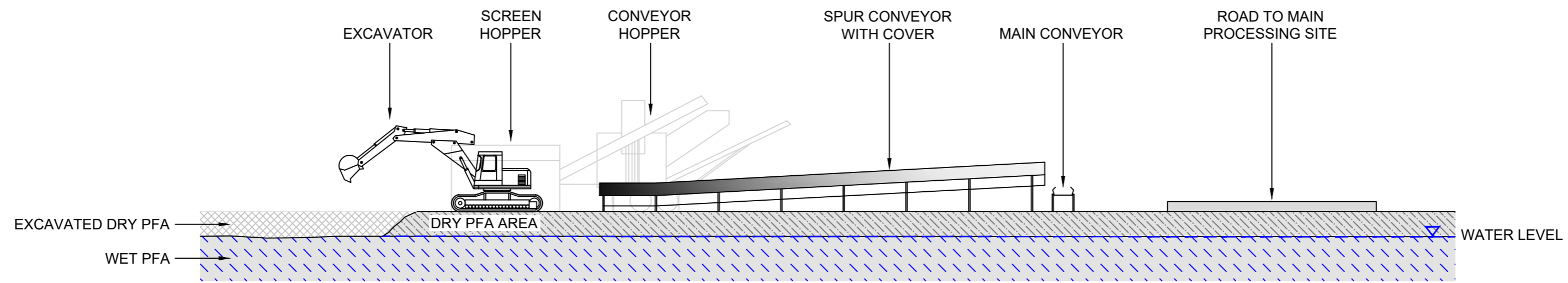
Canteen and offices will be connected to the site foul sewer network connecting to existing Klargester septic tanks.

Subject to a detailed condition and capacity survey it is proposed that surface water from non-contact water would be managed using the existing underground drainage system that outfalls to an unnamed tributary of the River Idle.

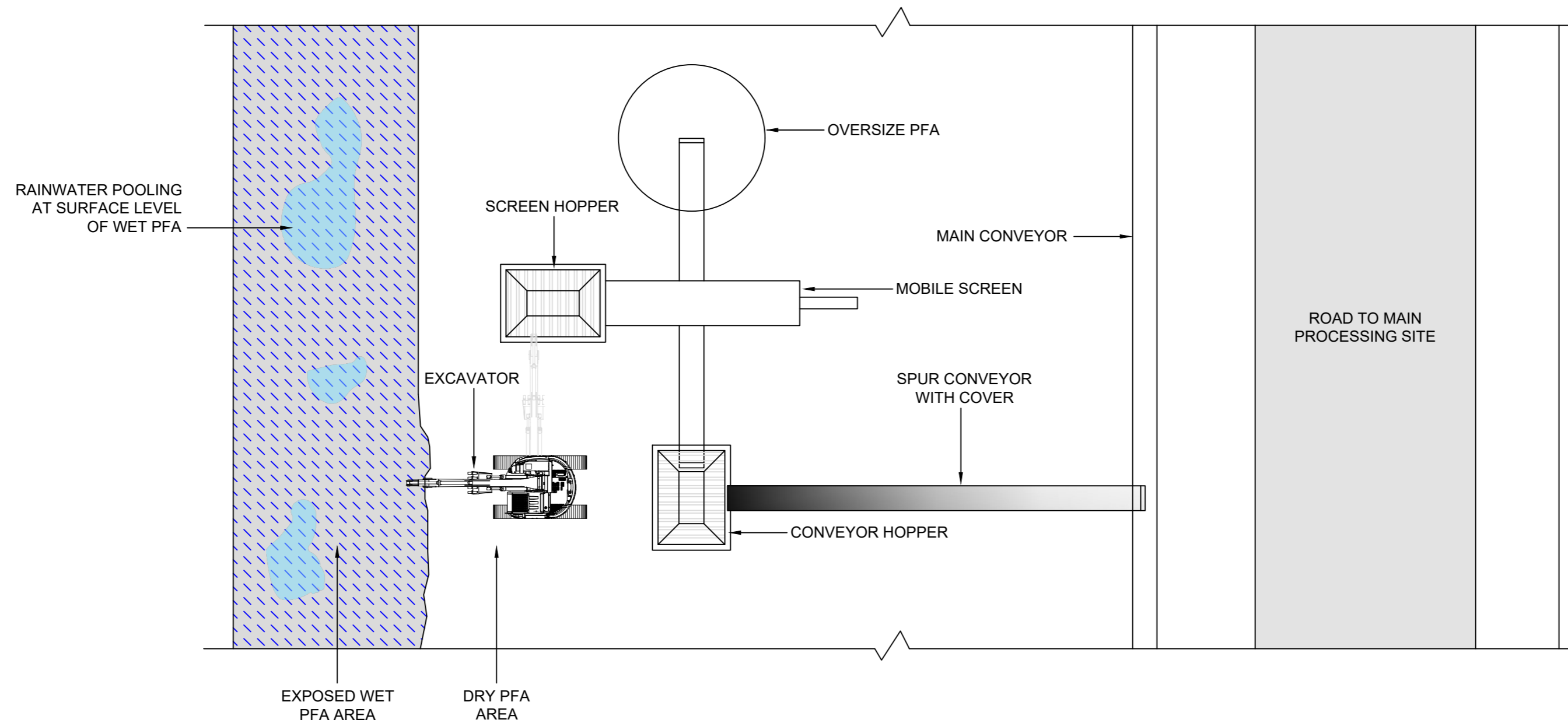


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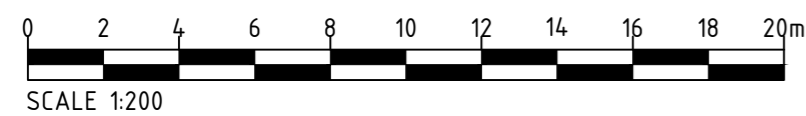
Project Title RETFORD CIRCULAR ECONOMY PROJECT	Drawing Title FIGURE 2 OUTLINE DRAINAGE MANAGEMENT PLAN (MAIN PROCESSING SITE)	Purpose of issue PRELIMINARY				THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ERM'S APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ERM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED	Environmental Resources Management (ERM)	
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SECTION THROUGH TYPICAL WET WORKING EXTRACTION METHOD
SCALE 1:200



PLAN SHOWING TYPICAL WET WORKING EXTRACTION METHOD
SCALE 1:200



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Drawing Title	FIGURE 3 PROPOSED METHOD OF EXTRACTION
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