



Surface Water Management Plan

KERDIFFSTOWN LANDFILL REMEDIATION PROJECT



Revision and Amendment Status Sheet

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Tender Submission	

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APPENDIX A – CHECKLIST SHEET

1.0 INTRODUCTION

This Surface Water Management Plan has been prepared by Wills Bros Limited. This plan forms part of a comprehensive suite of environmental controls within the Construction Environmental Management Plan (CEMP) for the remediation phase of Kerdiffstown Landfill Remediation Project.

The Surface Water Management Plan addresses the potential adverse environmental effects resulting from encountering surface water during the construction of the Project. The principal purpose of this Plan is to highlight the minimum standards that must be complied with as well as best practicable options for management of surface water for the Project. The Surface Water Management Plan will be updated, with the necessary approval, throughout the course of the Project to account for changes to construction techniques or the natural environment and consent conditions. A copy of any revisions of a material nature will be passed to Kildare County Council and the Employers Representative for comment.

1.1 Objectives

Accordingly, Wills Bros Ltd will carefully plan works so as to minimise and mitigate surface water issues occurring on site. The Surface Water Management Plan will be revised as required to confirm/update the details of construction provided within the document (e.g. actions and control measures).

The main objective of this Surface Water Management Plan for the project will be to:

- Develop a strategy for surface water management ensuring that the site is compliant with relevant regulations and best practice at all stages.
- Identify the surface water issues on site during the works;
- Avoid adverse impacts and increased pollution risk to the Morell river;
- Highlighting the mitigation measures to be adopted in managing surface water runoff during the works;

1.2 Project Overview

The Project involves the remediation of the Kerdiffstown Landfill site and development of the site as a multi-use public park. This is to be achieved by clearing and reprofiling the existing site, installing an engineered capping system, improving the management of landfill gas, leachate and surface water and the provision of landscaped and recreational areas. The site is approximately 30 hectares in size and is located at Kerdiffstown, Naas, Co. Kildare.

1.3 Contract Overview

The Contract Overview (Scope of Work) for the Kerdiffstown Landfill Remediation Project includes the

following:

- Reprofiting of waste mounds to ensure the capping system works effectively and to facilitate the use of the site as a public park;
- Preparation and placing of a regulation layer in areas to be capped
- Installation of a permanent capping system across all existing waste areas to prevent rainfall infiltration, to manage surface water runoff, to reduce the production of leachate and to capture landfill gas;
- Installation of new systems to manage and control leachate and landfill gas which will include the construction of a dedicated landfill infrastructure compound and landfill gas flares (where extracted landfill gas is burned off);
- Construction of a leachate pipeline from the site, which will cross under the Morell river and N7 into Johnstown Pumping Station;
- Construction of a foul/wastewater pipeline connecting the site with Johnstown Pumping Station. This pipeline will run parallel to the leachate pipeline and will carry foul/wastewater from the site office and changing room building;
- Installation of surface water drainage to manage water on, and draining from, the site including surface water ponds and a surface water outfall point to the Morell River;
- Decommissioning of existing services, in particular an underground storage tank approximately 20m³ in capacity. There are also a large number of concrete structures (walls of former buildings) to be demolished;
- Processing of demolished concrete and other waste materials on site to produce engineering grade materials for re use on site;
- Development of a public park with multi-use sports pitches, car parking, a changing room building, children's playground and a network of paths across the site;
- Landscaping works across the site including grass seeding, planting of trees and shrubs, and ongoing maintenance period of the works.

1.4 Document Review

The Surface Water Management Plan will be regularly reviewed during the lifetime of this project and updated to reflect changing conditions on site. Changes will be made subject to review taking into consideration of the conditions on site, and how effective the measures are in managing surface water. Any changes will be agreed with KCC and ER in advance through the normal communication channels.

2.0 CONTACT DETAILS

Wills Bros Limited site management team will be responsible for ensuring that this Surface Water Management Plan is correctly implemented on site.

Contact details for Wills Bros Limited and Kildare County Council are provided below.

Contractor: Wills Bros Limited			
Address	Wills Bros Limited Ballylahan Bridge Foxford Co. Mayo		
Contact	<div style="background-color: black; width: 20px; height: 15px; margin-bottom: 5px;"></div> EHS Manager <div style="background-color: black; width: 20px; height: 15px; margin-bottom: 5px;"></div> EHS Officer	Mobile	<div style="background-color: black; width: 100px; height: 15px;"></div>
Telephone	<div style="background-color: black; width: 100px; height: 15px; margin-bottom: 5px;"></div> <div style="background-color: black; width: 100px; height: 15px;"></div>	e-mail	<div style="background-color: black; width: 100px; height: 15px; margin-bottom: 5px;"></div> <div style="background-color: black; width: 100px; height: 15px;"></div>

Client: Kildare County Council			
Address	Áras Chill Dara, Devoy Park, Naas, Co. Kildare, W9 X77F		
Contact	Ultan Downes KCC Senior Executive Scientist James Mulligan KCC Senior Executive Engineer	Mobile	0879559494 0863841655
Telephone		e-mail	udownes@kildarecoco.ie jmulligan@kildarecoco.ie

3.0 LIMITING CRITERIA

3.1 Surface Water Minimisation Requirements

The following requirements in accordance with the Works Requirements:

Earthworks Requirement: Appendix 6/7

Locations where treatment of formation is required

The Contractor shall keep the formation free from groundwater and surface water and shall undertake every reasonable means to ensure that the formation is protected from inclement weather.

Appendix 1/75AR: Compliance with the Industrial Emissions Licence

Item 8

In compliance with Condition 2.2.2.9 of P1063-01, the Contractor shall establish and maintain an environmental management documentation system which shall be subject to the acceptance of the Employer's Representative.

Item 10

In compliance with Condition 2.2.2.11 of P1063-01, the Contractor shall undertake routine (or as directed by the Employer's Representative) internal audits of the Contractor operations to ensure compliance with the requirements of P1063-01.

Item 15

In compliance with Condition 3.5 of P1063-01, the Contractor shall clearly label and provide safe and permanent protection / access to all existing and proposed on-site sampling and monitoring points.

Item 16

In compliance with Condition 3.6 of P1063-01, all Tank, Container and Drum Storage Areas shall comply with the following requirements:

- a) All tank, container and drum storage areas shall be rendered impervious to the materials stored therein. Bunds shall be designed having regard to EPA guidelines 'Storage and Transfer of Materials for Scheduled Activities' (2004).
- b) All tank and drum storage areas shall, as a minimum, be bunded, either locally or remotely, to a volume not less than the greater of the following:
 - i. 110% of the capacity of the largest tank or drum within the bunded area;
 - ii. or

25% of the total volume of substance that could be stored within the blinded area.

- c) All drainage from bunded areas shall be treated as contaminated unless it can be demonstrated to be otherwise. All drainage from bunded areas shall be diverted for collection and safe disposal, unless it can be deemed uncontaminated and does not exceed the trigger levels set for storm water emission limits under Condition 6.14 of IE Licence P1063-01.
- d) All inlets, outlets, vent pipes, valves and gauges shall be within the bunded area.
- e) All tanks, containers and drums shall be labelled to clearly indicate their contents.
- f) All bunds shall be uniquely identified and labelled at the bund.
- g) The Contractor will apply a leak detection system in accordance with BAT to all storage tanks, container and drum storage areas that contain liquid material other than water.

Item 17

In compliance with Condition 3.7 of P1063-01, the Contractor shall have in storage an adequate supply of containment booms and/or suitable absorbent material to contain and absorb any spillage at the facility. Once used, the absorbent material shall be disposed of at an appropriate facility. This shall be subject to the acceptance of the Employer's Representative in advance of disposal/removal from Site.

Item 18

In compliance with Condition 3.9 of P1063-01, the Contractor shall install and maintain silt traps and oil separators at the Site as follows:

- a) Silt traps to ensure that all storm water discharges, other than from roofs, from the installation pass through a silt trap in advance of discharge;
- b) An oil separator on the storm water discharge from yard areas. The separator shall be a Class I full retention separator.

Item 19

In compliance with Condition 3.10.2 of P1063-01, in the event of a fire or a spillage to storm water, the Contractor shall ensure that the site storm water shall be diverted for collection.

Item 20

In compliance with Condition 3.11 of P1063-01, the Contractor shall ensure that all pump, sumps, storage tanks, lagoons or other treatment plant chambers from which spillage of environmentally significant materials might occur in such quantities as are likely to breach local or remote containment or separators shall be fitted with high liquid level alarms (or oil detectors as appropriate).

Item 21

In compliance with Condition 3.12 of P1063-01, the Contractor is responsible for the provision of a catchment system to collect any leaks from flanges and valves of all over-ground pipes used to transport material other than water. Details of this system shall be subject to the acceptance of the Employer's Representative in advance of use.

Item 22

In compliance with Condition 3.13 of P1063-01, the Contractor shall ensure that all wells and boreholes shall be adequately sealed to prevent surface contamination. In addition, the Contractor shall, if and as requested by the Employer's Representative, ensure that specific identified wells and boreholes shall be decommissioned according to the UK Environment Agency. Guidelines "Decommissioning Redundant Boreholes and Wells" (or as otherwise may be agreed by the Agency). All wellheads shall be - adequately protected to prevent contamination or physical damage.

Item 23

In compliance with Condition 3.16 of P1063-01, the Contractor shall ensure that only natural gas or biodiesel (meeting CEN standard FN14214) shall be used in the boilers on site. In the event of an interruption to the supply of natural gas or biodiesel, an alternative fuel such as gas oil may be used with the prior approval of the Employer's Representative.

Item 24

In compliance with Condition 3.21 of P1063-01, the Contractor shall provide and maintain wheel cleaners at the facility that shall be used by all vehicles leaving the facility as required to ensure that no process water or waste is carried off-site. All water from the wheel cleaning area shall be collected for appropriate treatment, reuse or disposal. The Contractor shall provide details of this procedure to the Employer's Representative for his acceptance or otherwise.

Item 25

In compliance with Condition 3.23 of P1063-01, the Contractor shall maintain effective site roads to ensure the safe movement of vehicles within the facility. The Contractor shall maintain an impermeable concrete surface at the installation entrance area and the access road to the landfill infrastructure compound. The surfaces shall be concreted and constructed to British Standard 8 1 10 or an alternative as agreed by the Employer's Representative. The Contractor shall remedy any defect in concrete surfaces within five working days.

Item 26

In compliance with Condition 3.27.4 of P1063-01, the Contractor shall ensure that the surface water from all roads, hardstanding areas and all areas of the installation where surface water has the potential to become

contaminated shall be directed to the surface water retention ponds, unless where otherwise required to be directed to the leachate tank under the instruction of the Employer's Representative.

Item 34

'In compliance in with Condition 6.8 of P1063-01, the contractor shall, during remediation and construction works, take all reasonable steps, or otherwise as necessary, to prevent or, where this is not possible, to minimise;

- Emissions into the local surface water and groundwater environment

The following requirements are recommended in the Project Environmental Commitments and Residual Impacts Report. (Included in EIAR Chapter 4)

Item 4.3.4

Where material needs to be stockpiled within the site the appointed contractor will be responsible for management of the stockpiles in accordance with the '*Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (DEFRA 2009)*' to ensure that surface water and groundwater are protected from contamination.

As a minimum stockpile management will include:

- Visual screening for potential contaminated materials;
- Segregation of material suspected to be contaminated from clean materials;
- Stockpiling of materials at appropriate heights / batters to prevent potential instability;
- Protection of stockpiled materials from scour / erosion;
- The provision of adequate drainage to limit and control potential contaminated surface water runoff, including silt mitigation; and
- The avoidance of un-necessary trafficking / handling of stockpiled materials.

With the exception of top soil (or soil forming materials), stockpile heights will be restricted to a maximum of 4m to facilitate adequate management during the works.

A reduced stockpile height of 2m will apply to any top soil / soil forming materials to prevent possible degradation of soil structure.

4.0 MANAGEMENT MEASURES

4.1 Introduction

Wills Bros Ltd will have the following procedures in place in order to reduce the impact of surface water during the Contract of works.

Table 4.1 summarises the activity, management measures, responsibility during the works.

Activity	Management Measure	Responsibility
Toolbox talks	Toolbox talks and daily briefings will inform site personnel about surface water management measures.	Wills Bros Limited
Working Hours	Construction site working hours. Refer to section 3.3	Wills Bros Limited
Site Works	All reasonable and feasible surface water source controls will be investigated	Wills Bros Limited
Monitoring	Site monitoring to be carried out and keep records	Wills Bros Limited & Employer
Complaints	Should complaints be made regarding the effect of surface water from the work, they will be treated by Wills Bros Ltd in a constructive manner. KCC & ER to be notified immediately of any complaints.	Wills Bros Limited & Employer

4.2 Training and Awareness

The site induction, health and safety and environment training programmes will reinforce Wills Bros Limited employees and subcontractors the need for controlling environmental performance at each works location. Surface water management will be specifically addressed during the daily job briefings and toolbox talks.

4.3 Working Hours

Wills Bros Limited will comply with the working hours as set out in Appendix 1/13 programme of works 3.b of Volume A1 – Works Requirements. WBL hours are from 08.00 to 18.00 Monday to Friday. Depending on the works during the project, WBL will work to the hours outlined in the contract as shown below on Monday to Friday.

Day	Time
Monday to Friday	07.00 to 19.00
Saturdays	08.00 to 14.00
Sundays and Bank Holidays	No Work Permitted

Wills Bros shall gain prior written approval for any intended out of hours works in accordance with the Contract requirements.

Saturday work is not routine and will be;

- Co-ordinated with KCC and RPS
- Is on a “needs-must” basis

4.4 Internal Reviews

Mitigation Measure (in compliance with Appendix 1/75AR, Item 10)

Review of work practices and on-site equipment to identify where practices can be improved. This process will involve:

- Identifying the surface water issue particular to the localised area of works.
- Random audits will be used to proactively anticipate surface water issues and instigate a resolution process and to ensure that previously identified control measures continue to be implemented.

4.5 Communication

Communication with local residents and local community liaison groups will be coordinated with the KCC Landfill Site Management Team. Surface water issues during the works will be dealt with by WBL and both KCC and ER will be informed of the issues arising.

5.0 EXISTING SURFACE WATER MANAGEMENT CONTROLS

5.1 Current surface water and site drainage management

As stated in the EIAR, 2017, the current surface water runoff and site drainage management is summarised briefly in Table 5-1 below.

Table 5-1 Key Surface Water Characteristics

Zone No.	Zone Characteristics
1/1A	<p>Wastes in this area of the Site are uncapped although large areas are covered in vegetation. This zone is unlined and localised areas of free leachate are present within the wastes. Currently there is no surface water control within Zone 1 and rainfall largely infiltrates into the ground, runs-off to the surrounding ground or evaporates.</p>
2A/2B	<p>Much of these zones is covered by thick, reinforced concrete pads, which form an impermeable layer over the wastes and prevent direct rainwater ingress. The smaller area of wastes not covered by concrete allows rainwater to infiltrate in a similar manner to Zone 1 above. Leachate production in this area is already significantly reduced by presence of the concrete slabs.</p> <p>Currently, hard-standing surface water runoff from Zone 2A (from around the site office, former buildings and the site access road) drains into road gullies and flows through a settling tank makes it way down to the surface water lagoon in Zone 4.</p> <p>Foul drainage from the site offices currently drains to a septic tank which is cleaned out on a regular basis</p>
3	<p>This zone comprises a lined cell, which has been partially infilled with wastes, and this infilled area has been capped (temporarily) with a geosynthetic liner. Leachate is collected by pumps transferring the leachate to two tanks above the cell area for removal by road tanker, where the leachate is treated at Ringsend Wastewater Treatment Plant (WWTP). A new temporary capping was installed over this waste mass in 2016. Around this temporary cap, a ditch shape has been formed to collect surface water runoff from the temporary capped area, which transfers surface water to a surface water channel and to a surface water lagoon located in Zone 4. This lagoon has no outlet hence waters dissipate to groundwater.</p> <p>Due to a permeable horizon lying above a clay layer on the south slope of the cell, groundwater has been noted to build up behind the liner. This water is extracted via pin wells and drains into the surface water channel feeding the surface water lagoon.</p>
4	<p>Zone 4 contains the surface water lagoon, which is cut into the surface which is considered to include some waste deposits. Any leachate generated in this area is considered to be weak and discharges directly to groundwater.</p>

Figure 5-1 below shows a drone image captured which shows the existing the surface water measures in Zone 2. The image outlines the location of the septic tank near the existing site offices. Foul drainage from the site offices currently drains to this septic tank. The surface water is collected through a series of road gullies and flows through a stormwater tank. The image gives an indicative flow direction of surface water on site in Zone 2A. The ma Also, highlighted on the image is the outfall to the Morell river.

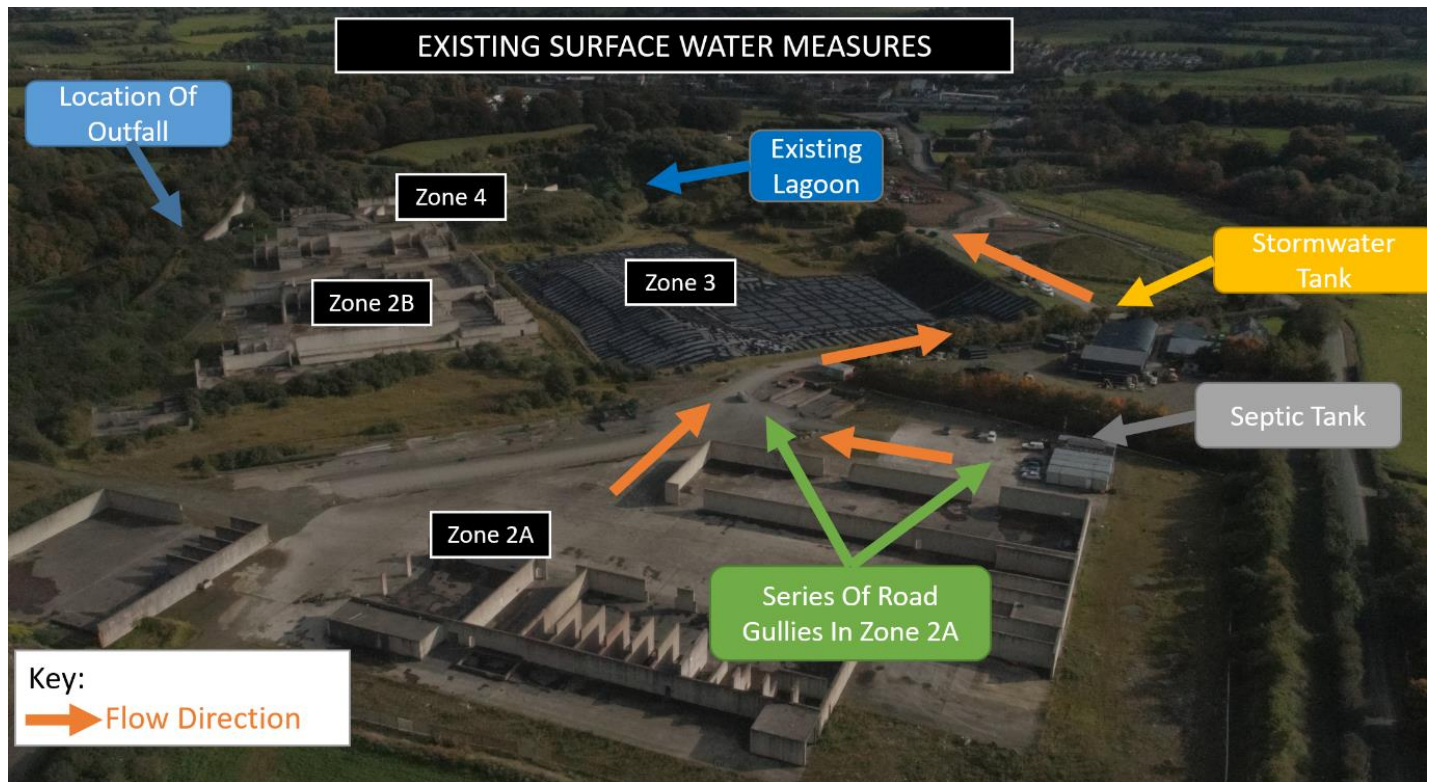


Figure 5-1 Existing Surface Water Measures Zone 2A

Figure 5-2 and Figure 5-3 below show the existing stormwater tank situated across the site road from the leachate tanks.

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Figure 5-2 Existing stormwater tank



Figure 5-3 Existing stormwater tank

Figure 5-4 below shows a drone image captured which shows the existing the surface water measures in Zone 3 and Zone 4 on site. The image indicates the flow direction of surface water. A surface water channel transfers this run off from Zone 3 and Zone 4 to a surface water lagoon located in Zone 4 and is shown below in Figure 5-5.

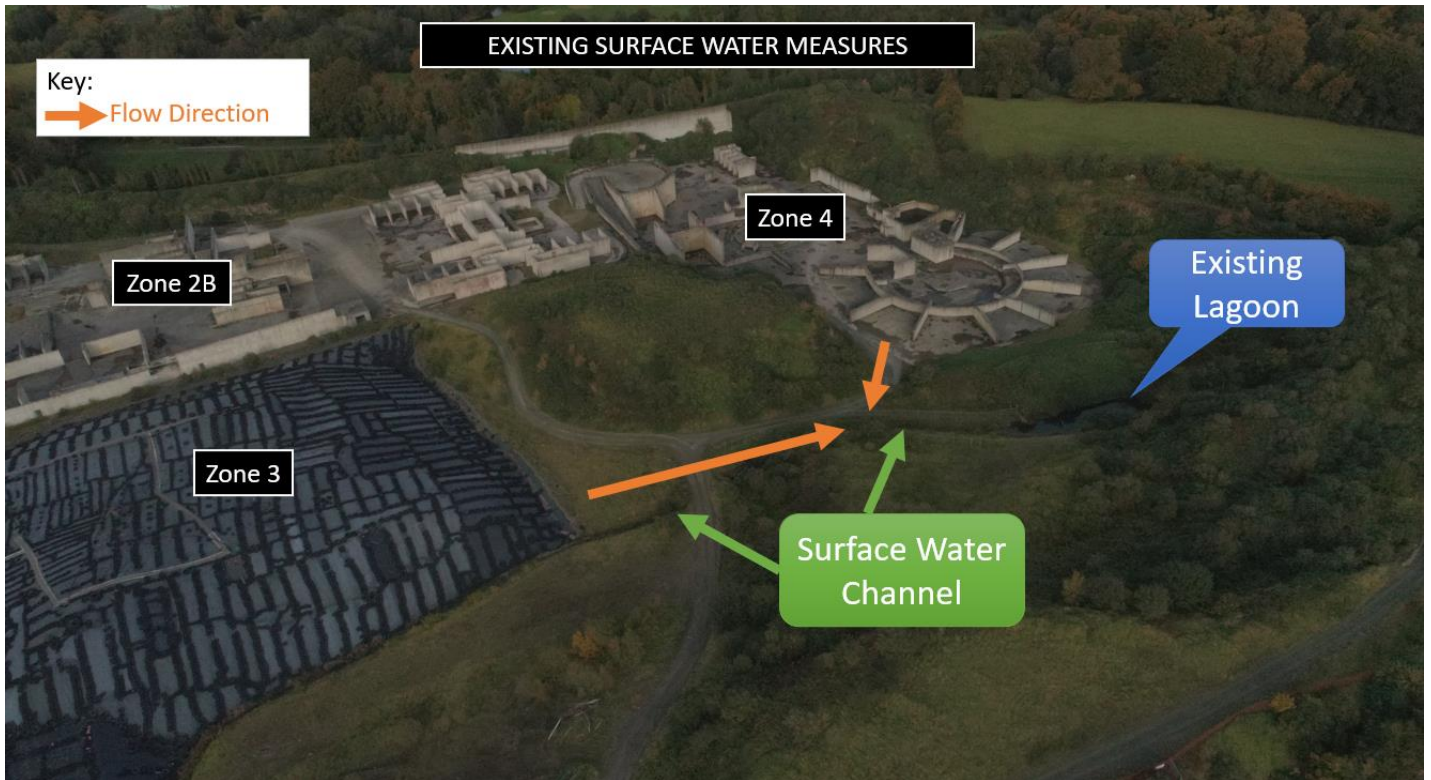


Figure 5-4 Existing Surface Water Measures Zone 3 & Zone 4



Figure 5-5 Existing Surface Water Channel Transferring to Surface Water to Lagoon

Figure 5-6 below shows a drone image captured which shows the existing the surface water measures in Zone 3 and Zone 4 on site. Around the temporary cap in Zone 3, a ditch shape highlighted and indicated in green has been formed to collect surface water runoff from the temporary capped area. This in turn transfers surface water to a surface water channel and to a surface water lagoon located in Zone 4. This lagoon has no outlet hence waters dissipate to groundwater.

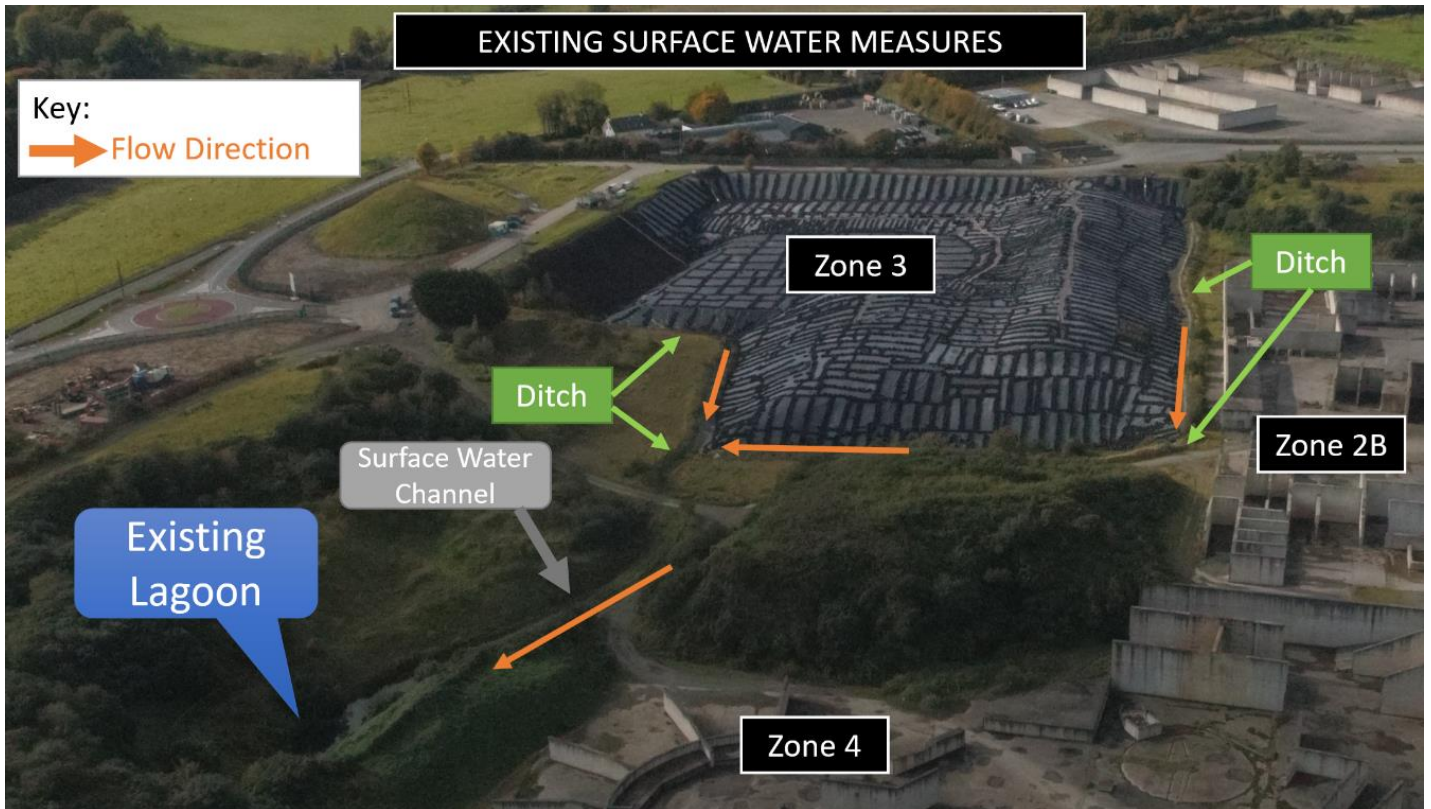


Figure 5-6 Existing Surface Water Measures Zone 3 & Zone 4

5.2 Existing Watercourses

Figure 5-7 below shows the existing watercourses close to the site. The closest watercourse to the site is the Morell river which lies to the north-east of the site. The Morell river generally flows northwards within 40m of the site boundary.

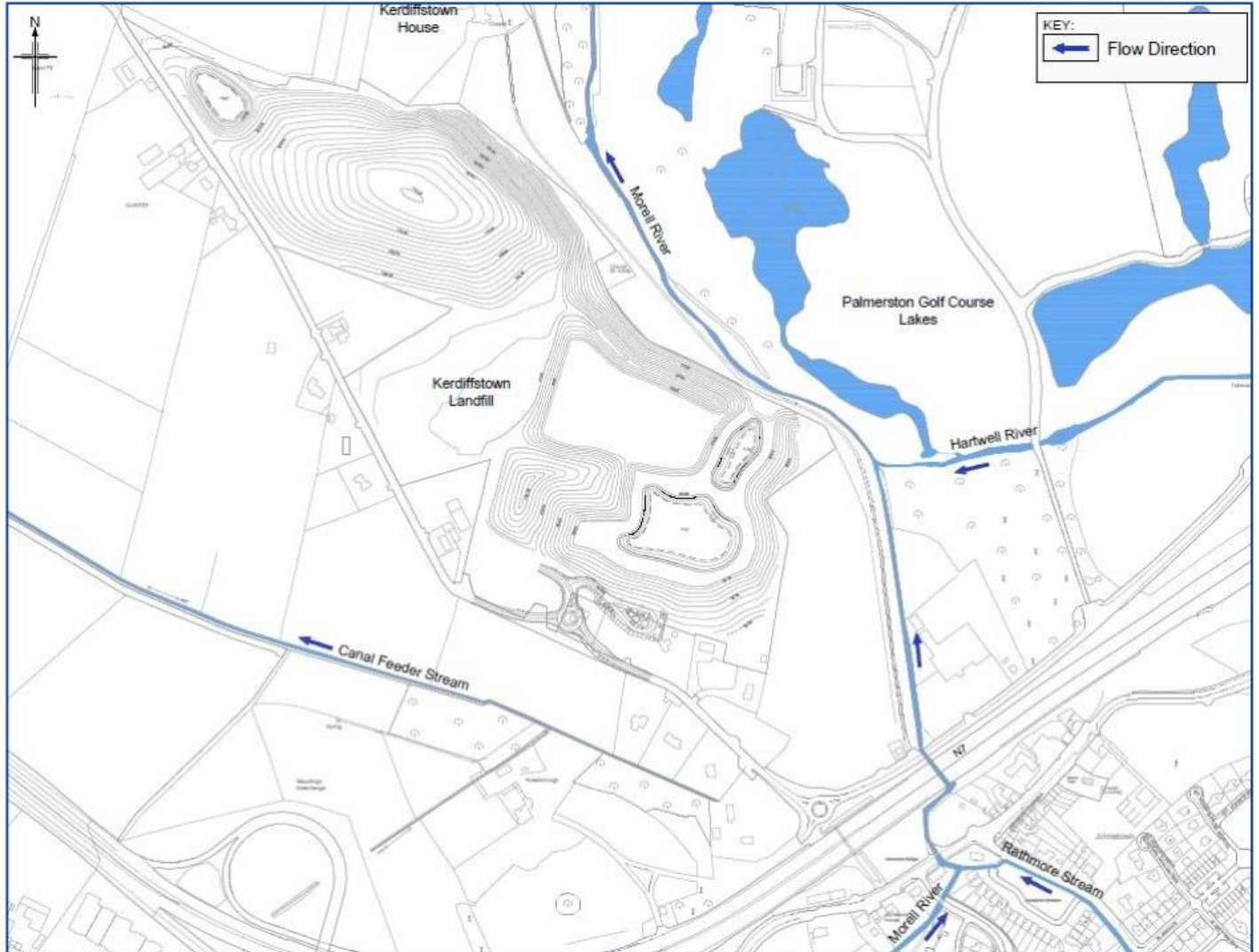


Figure 5-7 Existing Watercourses. Source: EIAR,2017

Figure 5-8 below shows the site zones set out for the Kerdiffstown site.

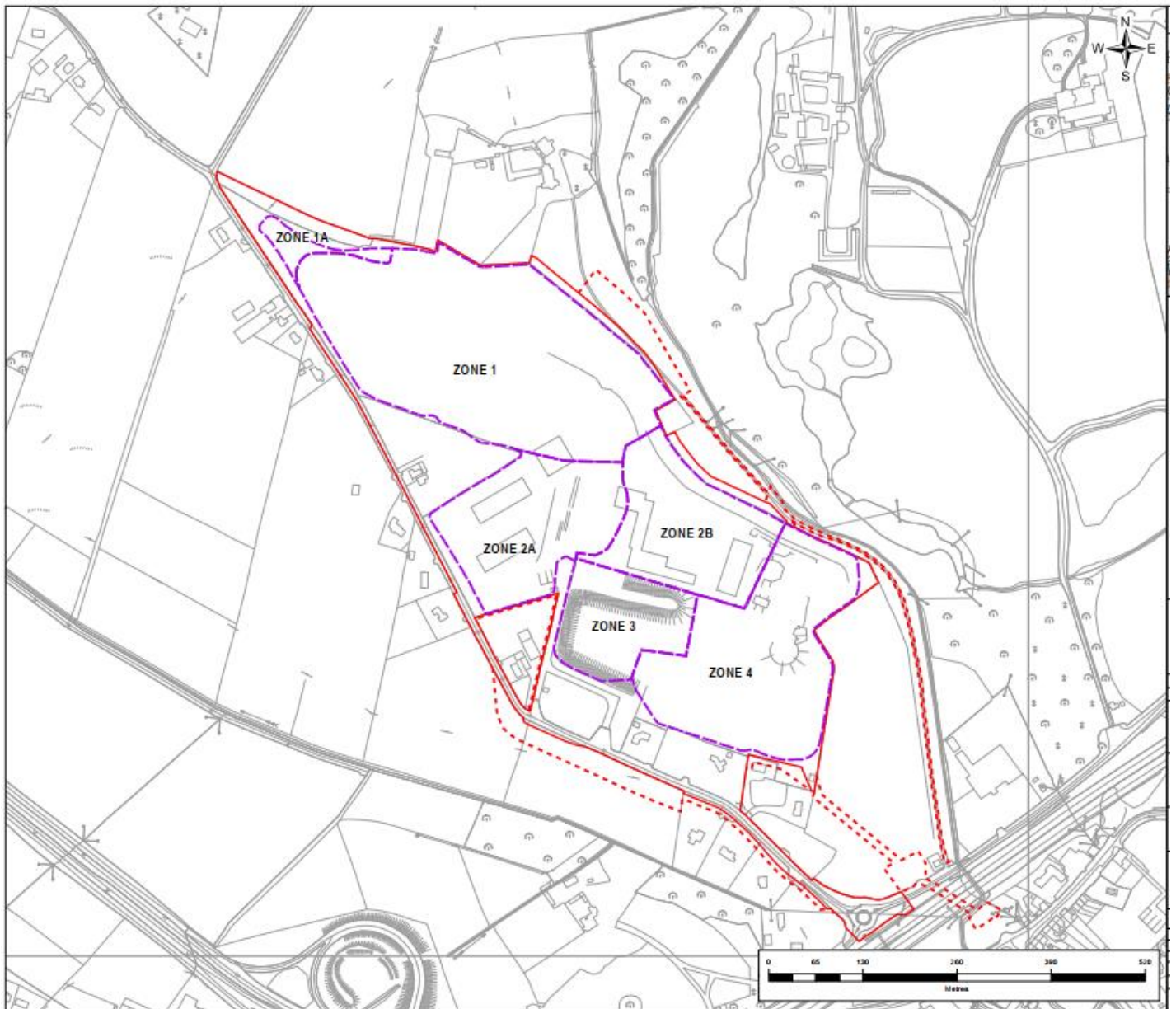


Figure 5-8 Site Zones

5.3 Existing and Proposed on-site sampling and monitoring points

Mitigation Measure (in compliance with Appendix 1/75AR, Item 15)

WBL will ensure the all existing and proposed sampling points will be protected during the works. All site personnel will be made aware of the sampling points and their environmental importance during the works. KCC will be undertaking monitoring during the works and WBL will ensure that all access routes will be kept clear to the sampling points.

5.4 Wells and Boreholes

Mitigation Measure (in compliance with Appendix 1/75AR, Item 22)

WBL will ensure that all wells and boreholes will be adequately sealed to prevent surface contamination. All wells and boreholes will be identified, and a buffer zone marked around each one prior to works commencing. All site personnel will be made aware of these during daily site briefings and toolbox talks highlighting their environmental importance to the project.

5.5 Principle Avoidance Measures

WBL will follow the general surface water management good practice measures required during construction and they are described in further detail in section 6. They are as follows:

- Establish drainage and runoff controls before starting site clearance and earthworks;
- Retain as much vegetation as possible; As initial site clearance will remove a substantial amount of vegetation, this will include boundary hedges and trees.
- Maintain vegetation corridors adjacent to watercourses (riparian zones). These act as a buffer strip and prevent pollution by suspended solids.
- Minimise the amount of exposed earth to reduce silt transportation.
- Delay clearing and topsoil stripping of each phase of work until ready to proceed;
- Silty water generated on site will be settled out as much as possible through drainage mitigation measures (silt traps, adsorption rocks etc) and channelled into designated areas on site, where approved.
- Protect watercourses (Morell river) with silt traps to prevent run-off silt entering them.
- Establish inspection and maintenance schedules for silt treatment systems.
- Establish vegetation or Hard landscaping as soon as practical on all areas where soil has been exposed. Failing this all exposed surfaces will be sealed by compaction with excavator to ensure no erosion can occur. A release trench will be dug and directed to a settlement pond in the vicinity of the works;
- Close and backfill trenches as soon as practically possible;
- Where monitoring parameters are found to exceed the standards, WBL will initiate and report on corrective action(s). This may necessitate the alteration of the environmental control measures and in turn the relevant construction method statement(s).
- All managers and workers on site must feel empowered to report pollution or any damage to silt treatment systems and allow for immediate repair.

5.6 Outline Surface Water Catchment Zones

Figure 5-9 below shows the outline surface water catchment zones as highlighted in the EIAR, 2017. The map

gives an approximation of the surface water captured, flow, collection, and discharge.

This approximation indicates that most of the surface water captured on the site, as shown as Catchment Zone 1, can flow by gravity via surface water drainage system to the southeastern area of the site, for collection into the ponds and discharge.

Due to topographic constraints a limited area to the northwest of the site (Catchment Zone 2) cannot be readily drained to the south east. An attenuation pond shall discharge to ground via a soakaway area to the north of the pond No.1.

Similarly, steep slopes to the north of the site (Catchment Zone 3) fall to a low level. Therefore, an infiltration tunnel will be installed to capture this run off and the tunnel will be perforated to allow infiltration through the bottom and sides.

Catchment Zone 4 represents an area of land currently comprising residential properties and gardens, which falls away from the site and is located outwith the licensed boundary containing no landfill infrastructure. As a result, Catchment Zone 4 does not form part of the site catchment or surface water management proposals.

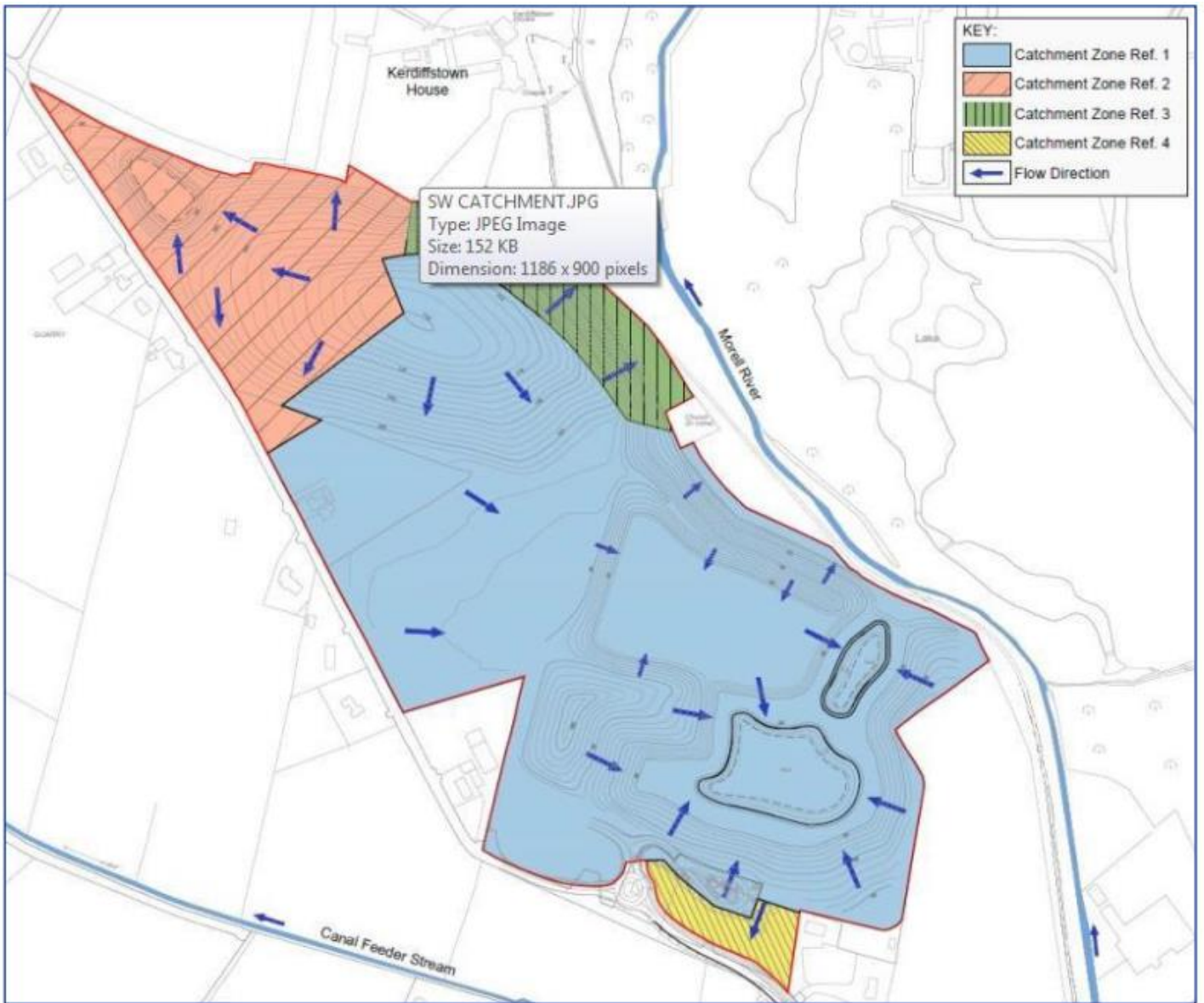


Figure 5-9 Outline Surface Water Catchment Zones

6.0 WATER MANAGEMENT ON SITE

6.1 Compound Surface Water Run-off

Mitigation Measure (in compliance with Appendix 1/75AR, Item 17 & Appendix 1/75AR, Item 19)

WBL are proposing to collect contaminated surface water run-off from the compound area. This essentially would be capturing oil, diesel and other contaminants on the existing concrete slab where the plant would be stored. This would act as another mitigation measure in collecting these contaminants as measures will be in place for the refueling area. Figure 6-1 below shows the outlet in the wall where a 2” downpipe will be installed, attached with a silt sock filled with micro-fibre. The yellow arrows indicate the flow direction of the surface water runoff. The excess run off will flow into the existing surface water system in Zone 2A.

In the event of a spill in the compound area or anywhere on site, the necessary protocols will be followed as per our Contaminant Spill Emergency Plan. A spill kit will be located in the compound with the appropriate absorbent materials within.

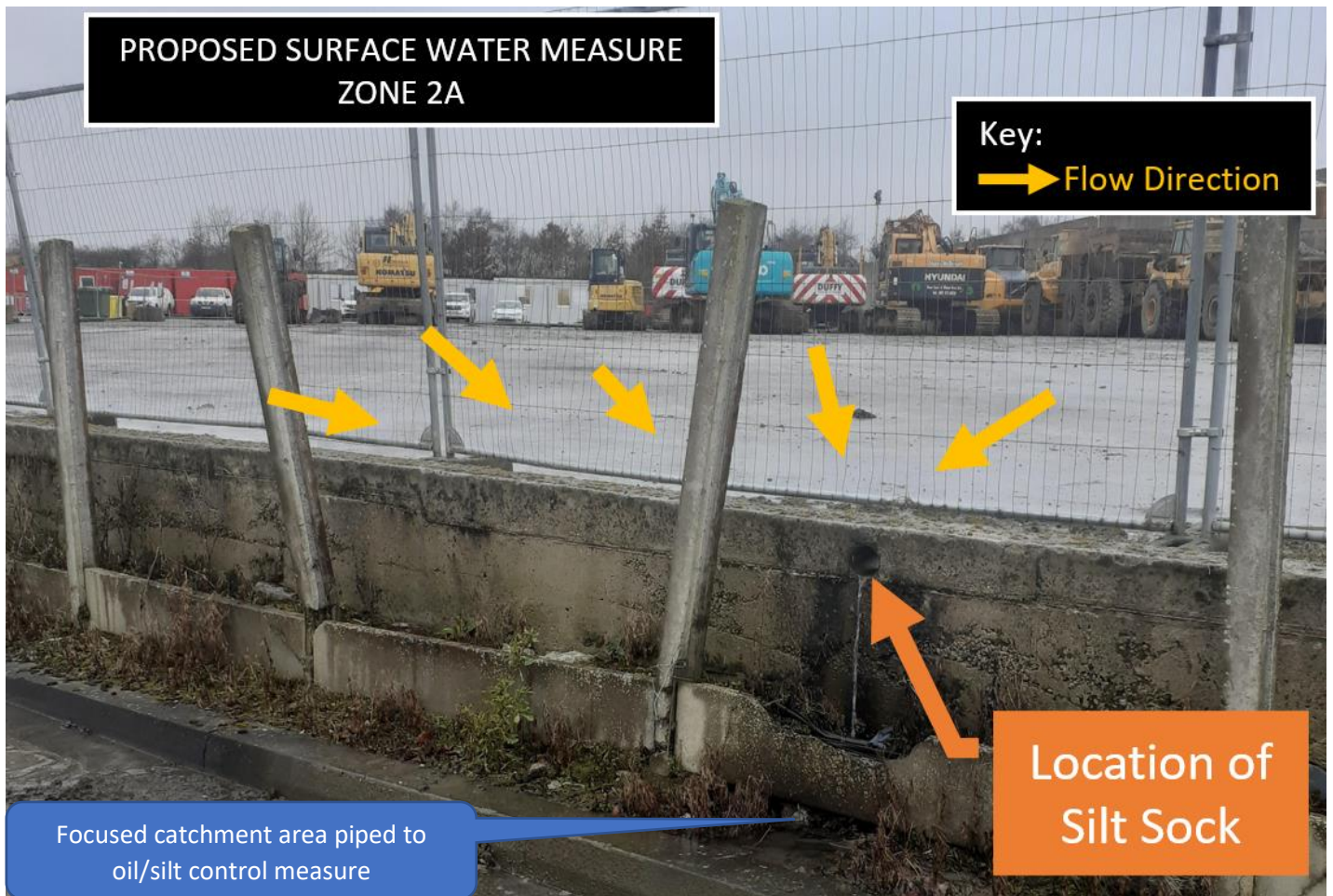


Figure 6-1 Proposed Surface Water Measure

6.2 Refueling Area

Mitigation Measure (in compliance with Appendix 1/75AR, Item 16)

All plant will be fueled at the start of the working day within the plant yard. The purpose of this plant yard is to have a dedicated, controlled area for refueling on site. This will ensure that refueling is contained within this area. Localised bunding for the re-fueling of items of machinery (pumps, generators, lights) where these items remain “in-situ” overnight will be used.

An EPA bund test will be performed to ensure that the area designated to contain any potential spillages is adequate. Water will be filled in the bunded area and reviewed after 24 hours to ensure no leakages are present. A test will be carried out every 6 months or at a time at the request of the ER/KCC to ensure the bunded area is complying and not leaking.

6.3 Mobile Fuel Bowser

Further to the dedicated refueling area in the compound and due to the size of the site, WBL are proposing the use of a mobile fuel bowser. This will save time for plant to be tracking up and down the site from the various zones. WBL are proposing the following measures for the mobile fuel bowser to be used on site:

- The mobile fuel bowser will be located in the plant compound area when not in use.
- The capacity of the mobile fuel bowser is 1,000 litres.
- There will be a spill kit on board.
- There will one designated WBL person to run the bowser and refill the plant on site. If this designated person is not available on the day, a deputy will be designated to fulfil the role.
- Mobile bowser will not go off designated haul roads or on soft ground. This will be to minimise the risk of the bowser becoming bogged down.
- Both designated persons will be aware and competent in the event of a spillage of the correct procedures to take.
- Where refuelling is to take place on the site, the driver will adhere to the site speed limits of 15km/hr, site TM Plans and site rules.
- All plant being refuelled shall switch off the plant and remove the keys as to isolate the plant when the operative is refuelling. All ignition sources will be removed from the refuelling location (no phones).
- The vehicle will be parked as safely as possible to the fill pipe for the bunded tank, or the plant tank. The driver will ensure that they are not causing an obstruction and will put out cones and signs to protect the vehicle and the hose. They will ensure they are not creating a trip hazard for other employees.
- Once the vehicle is in position the driver will pull out the delivery hose. The valve at the end of the hose will be securely closed to prevent any leakage of fuel. The driver will pull out a sufficient length of hose

to reach the storage. The driver will check the contents gauge or dip rod on the fuel tank and will estimate the quantity to be delivered. The driver will pre-set the meter for the amount required, this will be at less than the available capacity of the fuel tank.

- The driver will take the hose to the tank. After the hose nozzle has been securely connected to the fill pipe, the driver will start the pump.
- The driver will slowly open the valve and monitor the tank as the fuel is pumped into it. They will remain in attendance at the tank for the entire duration of the delivery and will be ready to close the nozzle and shut off the pump in the event of any emergency.
- When the preset amount is reached, the meter will stop the flow of product. The driver will then close the valve on the hose and remove it from the tank. In the event of an error in estimating the available capacity of the fuel tank, the fuel tank is fitted with an over fill device to prevent a spill.
- The driver will return the hose to the vehicle and then they will then engage the motor to rewind the hose onto the reel. They will print off a meter ticket for the plant operator.
- The driver will remove the cones and drive slowly back to the compound.

6.4 Spillage Controls

Mitigation Measure (in compliance with Appendix 1/75AR, Item 17)

In the event of a spill in the compound area or anywhere on site, the necessary protocols will be followed as per our Contaminant Spill Emergency Plan. A spill kit will be located in the compound with the appropriate absorbent materials within. WBL will ensure that adequate supply of oil booms will be readily available in the event of an oil spillage on or near a watercourse or anywhere on site to contain an oil spillage. Figure 6-2 below shows an example of an oil boom to be used during the works. This action will help prevent any infiltration of contaminants into the watercourse and drainage systems on site and surrounding areas.



Figure 6-2 Oil Booms (SSI Environmental)

Figure 6-3 below shows the proposed use of an oil boom in the existing concrete tank on site. The oil boom will capture oil or contaminants at this junction and prevent the discharge into the outlet pipe and reduce the infiltration into the groundwater from this area on.



Oil boom to be placed at inlet of existing concrete tank.

Figure 6-3 Oil Boom in Existing Concrete Tank

Figure 6-4 below shows an image of oily water which has being contaminated. WBL are proposing to use Bio-Versal product. This product is a very efficient product for oil problems in the environment and at the same time for directly averting danger and eliminating oil disasters on watercourses. Bio-Versal HC encapsulates oil particles and prevent them from sticking together. The product is pH-neutral and dermatologically safe. When used, Bio-Versal HC – oil – water mixture remains on the surface. The bioactivator contained in Bio-Versal HC ensures high accelerated biological degradation of the remaining oil residue and leaves H₂O and CO₂ as a result. This substantially reduces the potential danger from the oil. Bio-Versal HC is highly biologically

degradable and helps animals and plants to regain their natural environmental conditions.

WBL will use this product in the event of an oil spillage and oil issues arising on site.

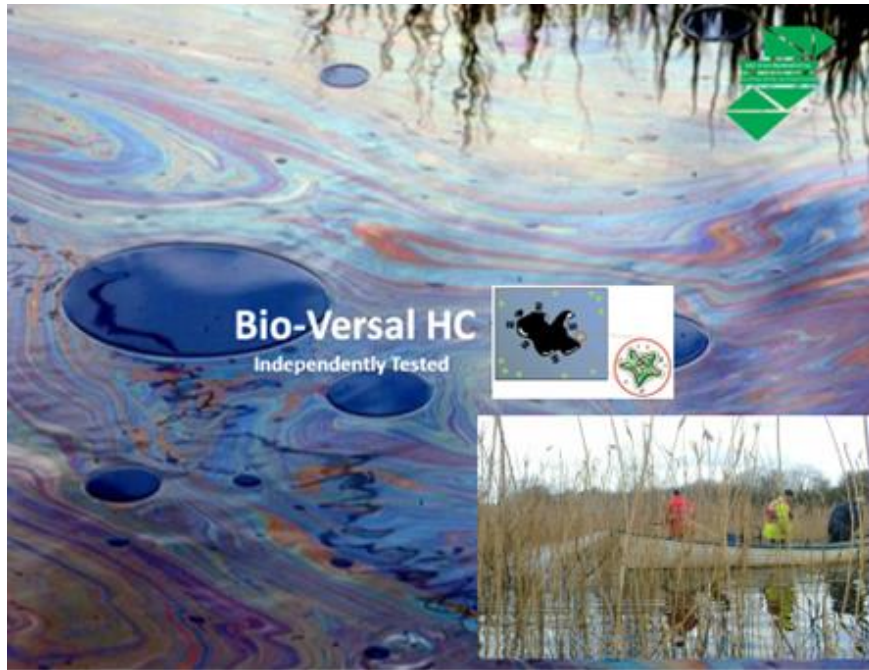


Figure 6-4 Bio-Versal HC

6.5 Site Haul Road

Mitigation Measure (in compliance with Appendix 1/75AR, Item 26)

The position of the site haul roads within the site will be planned to ensure that they are fit for purpose and are maintained to in a manner sensitive to the environmental issues relating to the site. It will be the responsibility of the site foreman to check for any signs of deterioration and bring these issues, as soon as possible, to the attention of the site management to further assess.

Depending on the location of the works within the site, there may be different factors to consider before installing a haul road however the core focus will be to install and maintain a safe access route for plant moving materials around site. There may be a need to incorporate pedestrian corridors as part of this network however these will be distinctly marked and separate from plant.

Where there are areas of slime developing works involving plant movement will stop until the issue is dealt with. If practical, and depending on the volume, the slime can be gathered up and brought to a designated area of the site where it is allowed to dry, these will be appropriately signed, however ever it would be the intension to keep this practice to a minimum. As this slime material is removed it will be replaced with clean material.

Plant operators will be briefed on the importance of staying on the haul road roads and to avoid travel on area that may jeopardize the use of potential use of that material as daily cover material.

Dust generated will also be monitored during persistent dry weather. Grey water taken from within the site, will be used to suppress using a tractor and bowser.

Silt netting will also be used as required to the edges of haul road to prevent migration of silt in sensitive areas.

6.6 Wheel wash Water Management

Mitigation Measure (in compliance with Appendix 1/75AR, Item 24)

WBL will install a wheel wash facility on site. This will be located on exit of the compound area before the security barrier. The gateman will ensure all vehicles leaving the site will be clean and this will be a requirement through the course of the remediation works. The wheel wash will collect any sediment and contaminants off the vehicle. A suitable system will be installed to manage the contaminated water and safe discharge of clean water back into the ground. An outlet pipe will be fitted with a silt sock filled with micro fibres, which removes oil from water. Water will be discharged to a suitable buffer zone. This mitigation measure will reduce any risk of contaminated water infiltrating down into the groundwater. Any silt, solids or contamination at the bed of the tank be sucked out by a pump and tankered to a licensed facility for treatment.

6.6.1 Existing wheel wash on site

At the existing wheel wash it is proposed that LGVs and staff vehicles can be washed down. Figure 6-5 below shows the amendments to existing wheel wash set up. A mobile tanker attached with a power washer will be located beside the existing wheel wash on site. The water can be collected in the tank and the sediment and contaminated material will settle at the bottom of the tank which later will be sucked out by a pump and tankered to a licensed facility for treatment. An outlet pipe will be fitted with a silt dewatering bag or silt sock filled with micro-fibres, which removes oil from water. Water will be discharged to a suitable buffer zone (geotextile lined pit) as shown below.



Oil & Silt De – Watering Sack

Contain Sediment and Oil Pumped out During Dewatering operations.

- Detains both oil and sediment, offering a combination of benefits not available in alternative dewatering bags.
- Standard and custom sizes available.
- Accommodates up to 4" discharge hoses.
- Helps comply with NPDES, 40 CFR 122.26 (1990) when used as Best Management Practice in Storm Water Pollution Prevention Plans.



Figure 6-5 Existing Wheel Wash Set Up

6.7 Rainwater Harvesting

Mitigation Measure (in compliance with CEMP Section 2.2, Item 8)

Installation of a rainwater harvesting system to provide sustainable water supply (supplemented where required by a mains connection) for flushing welfare and office toilets reducing water use quantities.

6.8 Water Management of Roads outside landfill

Mitigation Measure (in compliance with Appendix 1/72AR, Item 1)

Regular maintenance of public roads, including cleaning and sweeping (within 500m of the works areas), outside of the Site boundary to prevent deterioration of road surfaces. The water used for this operation will be extracted from the water collected during the rainwater harvesting system on site. Where this option is not viable, the tanker will be filled with clean water on site.

6.9 Stockpiling Controls

Mitigation Measure (in compliance with EIAR Chapter 4, Item 4.3.4)

To prevent possible contamination of clean materials by site wastes separate stockpiling areas for imported materials and site won materials will be established. Stockpiling arrangements are summarised in Table 6-1 below. Stockpile locations are retained on existing concrete hard-standing areas as far as practicable, to offer a separation to and protection of the underlying materials. A berm shall be installed around the stockpile to prevent runoff from leaving the area and storm water from other areas entering the stockpile area. Stockpiles shall not be placed near drains or watercourses. This will ensure that surface water to be potentially contaminated will be mitigated.

Table 6-1 Stockpiling Arrangements (EIAR)

Stockpiling Arrangements

Stockpile	Location	Uses
Existing sub-soil	Retained adjacent to existing site entrance.	Zones 1 and 4 capping
Imported 'clean' soils	Zone 2A	Zone 3 toe bund Zone 4 ponds bunds Zones 1 to 4 capping.
Crushed / screened concrete (aggregate)	Zone 2B	Gas wells, access tracks.
Site wastes (including fines from crushing of concrete)	Zone 2B	Infill to Zones 1 and 3 Export from site if classified as hazardous during waste classification

7.0 SURFACE WATER MANAGEMENT DURING WORKS

In January 2021, earthworks are to begin in zones 1 and 1A. As these works will have an impact on surface water, WBL will introduce measures to contain surface water during the works. We will adopt best working practices in dealing with potential issues that may arise during the works, in line with the mitigation measure outlined overleaf.

7.1 Identified surface water management scenarios

In terms of the various scenarios identified around the surface water management, these can be categorized under the following seven headings.

1. Rainwater falling at present on the uncapped site/Initial controls prior to works commencing

Mitigation measure (in compliance with Appendix 1/75AR, Item 34)

At present, the site is functioning as it was prior to construction commencing. The works planned by WBL for the foreseeable future, will not put any further pressure on the storm water system in place at present, it will be early April 2021 before the liner works begin and at this point additional controls will be in place, within phase one in particular, to deal with these eventualities. These are described in sections 2 and 3.

In terms of the final surface water connection to the Morell river in zone 4. It is the intention of WBL, and subject to further assessment and consultation and approval with Irish fisheries to avoid any direct surface water discharge to the adjoining Morell river until early in 2022. This will avoid the risk of contamination.

2. Water run-off from disturbed soils or waste during reprofiling works

Mitigation measure (in compliance with Appendix 1/75AR, Item 18, 26, Item 34)

Where there is a surface water run off risk with works associated in phase 1, there will be a requirement on the designated WBL people on site to monitor surface water run-off during the placement of low permeability soils. It will be daily requirements to be proactive in looking for signs of run-off, and to have accurate weather information for the week ahead so that the anticipated risks can be further assessed on site.

Where there is an occurrence of water run-off, the best option in dealing with it will be to ensure that

that water has a path down into the waste mass itself. This will eliminate the risk of contaminated water leaving the site. If there is any area of standing water for example, then a release trench will be cut with the excavator into the waste mass to allow the water to percolate away.

This approach will be further supplemented with the use of silt fencing, placed at the toe of the batter, as a section of cut and fill works area is entered. The fencing will be erected as far from the boundary of the site as practical not to affect the works.

Temporary separation bunds for the management of surface water will also be formed as needed, these will be useful for directing water to areas when good percolation has been identified on site.

During any heavy or prolonged rainfall, there is a likelihood of surface water on the disturbed soils or waste, which will potentially become contaminated. Depending on the location on site and suitability, a swale will be constructed in the appropriate locations. The surface water runoff will be channelled and lead to a settlement pond where the silt and contaminants will be held. An outfall pipe installed with a silt sock will discharge clean water from the pond.

3. Water runoff from the liner that has not been in contact with the waste mass.

Mitigation measure (in compliance with Appendix 1/75AR, Item 19, Item 34)

Where this situation presents, the focus will be on managing the uncontaminated water that falls on the liner. At this stage of the works there will be very little water falling directly on the waste body, and any that does will still percolate into the waste mass.

Where the water is falling directly onto the liner, it will find its way to the filter trench running along the toe of the liner in zone 1, and ultimately link into the infiltration tunnel to the north of zone 1 as below in Figure 7-1. This tunnel will be in place prior to any liner being installed and will be functional in terms of percolation but at the same time protected from the risk of being contaminated internally with silt. In this instance an assessment will be made on the best control measure to be put in place, however the use of suitable geotextile covering the inlet will be used.

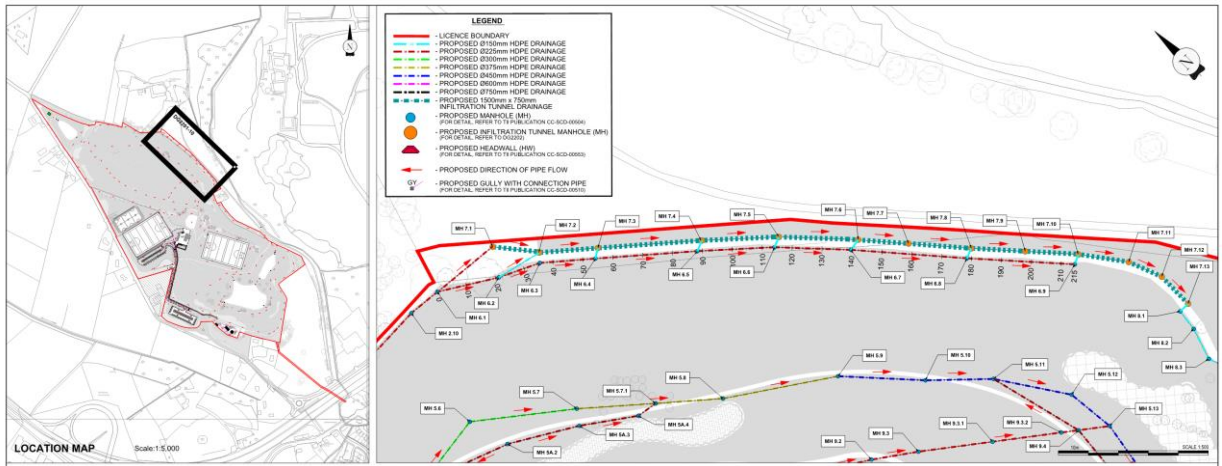


Figure 7-1 Infiltration tunnel Zone 1

The proposed soakaway tank in zone 1A, as below in Figure 7-2 will also be in place and utilised to take in clean water from the attenuation pond.

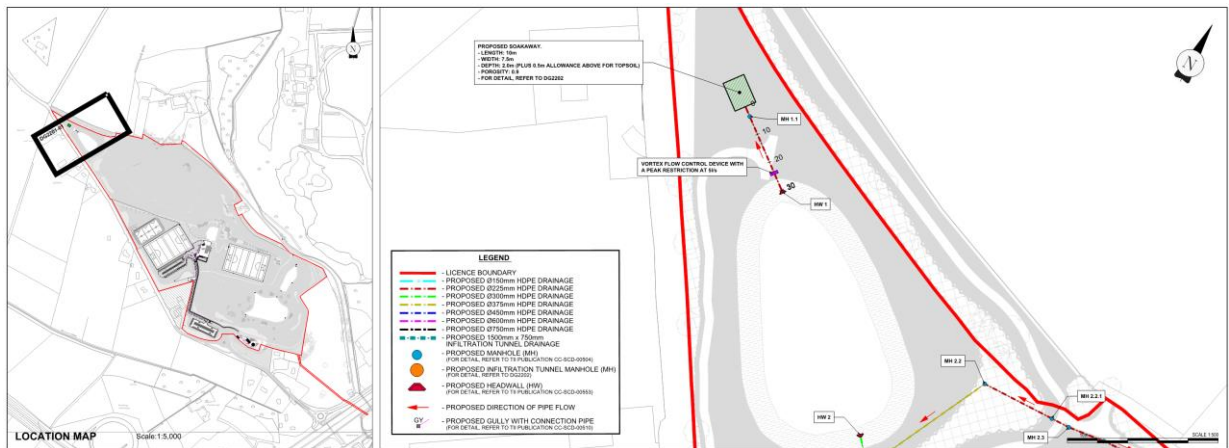


Figure 7-2 Proposed Soakaway

Figure 7-3 below shows the layout of Zone 1A and how the surface water runoff will be directed and captured in the attenuation pond and soakaway.

KERDIFFSTOWN PARK ZONE 1A



LEGEND

- Soakaway - 
- Surface Water Direction - 
- Attenuation Pond - 
- Temporary Pond - 
- Infiltration Tunnel - 
- Anchor Trench - 
- LINER - 

Note:

Liner installation in Zone 1A to be installed in conjunction with attenuation pond & soakaway. This will provide sufficient capacity for surface water run off in Zone 1A.

Figure 7-3 Zone 1A - Attenuation Pond with Soakaway

For water falling on the liner at the southern side of the cap in zone 1, there will be a suitably sized settlement pond constructed to deal with this run-off and be positioned in Tunney's field. In order to establish the best location the area be subject to further percolation testing, and the final position, detailing, and size of this settlement pond will be agreed on site to establish the optimum position to best suit the catchment run-off area for water from the liner. At present this indicative location of this settlement pond is shown below with reference to Figure 7-4.



Figure 7-4 Indicative location of settlement pond

4. What happens if the ponds overflow?

Mitigation Measure (in compliance with Appendix 1/75AR, Item 26 & Appendix 1/75AR, Item 34)

WBL will ensure that if ponds overflow will be acted upon immediately.

- The Foreman and/or Project Manager will be immediately notified if discharge is causing flooding.
- Remedial action will be taken immediately.
- A trench will be dug to allow excess run off to an approved location, dictated by circumstances on site.

- Where pumping is in operation it will be discharged to a suitable buffer zone, interceptor ditch, silt fencing, straw bales, ponds and/or a combination of a number of the listed items as deemed necessary.
- Runoff protection systems will be developed for all water-based controls to prevent damage to existing drainage and watercourse systems. In order to manage risks associated with ground/surface water temporary ponds shall be constructed as a first phase or works and all runoff shall be diverted via the ponds by pumping.

5. Open cut pipeline works towards the Morell river

Works are due to commence in the first quarter of 2021 of the open cut pipeline works towards the Morell river. Figure 7-5 below shows the plan view of the foul sewer to be constructed from the Landfill Infrastructural Compound to the Johnstown Pumping Station. The open cut pipeline will be installed from Landfill Infrastructural Compound as far as the scour value, where directional drilling will commence from here.

Mitigation Measure (in compliance with Appendix 1/75AR, Item 26 & Appendix 1/75AR, Item 34)

As previously mentioned, WBL will be carefully managing these works as to prevent any potential silt laden run-off to the Morell river. A number of measures will be employed where necessary, during the course of these works.

- A silt fence will be installed around the excavation to capture silt. The fencing will be erected as far from the boundary of the site as practical not to affect the works
- If the excavated area becomes flooded, a pump will be used to dewater the excavation and captured in a silt dewatering bag.
- Where pumping is in operation it will be discharged to a suitable buffer zone, interceptor ditch, silt fencing, straw bales, ponds and/or a combination of a number of the listed items as deemed necessary.
- However, if this option is not effective, a settlement pond will be constructed and lined with a geotextile and discharged in an approved location. This pond will be suitably sized.
- The settlement pond will have an outlet pipe attached with a silt sock to capture any remaining silt discharging.
- Temporary separation bunds for the management of surface water will also be formed as needed, these will be useful for directing water to areas when good percolation has been identified on site.
- An assessment will be made on the best control measure to be put in place.

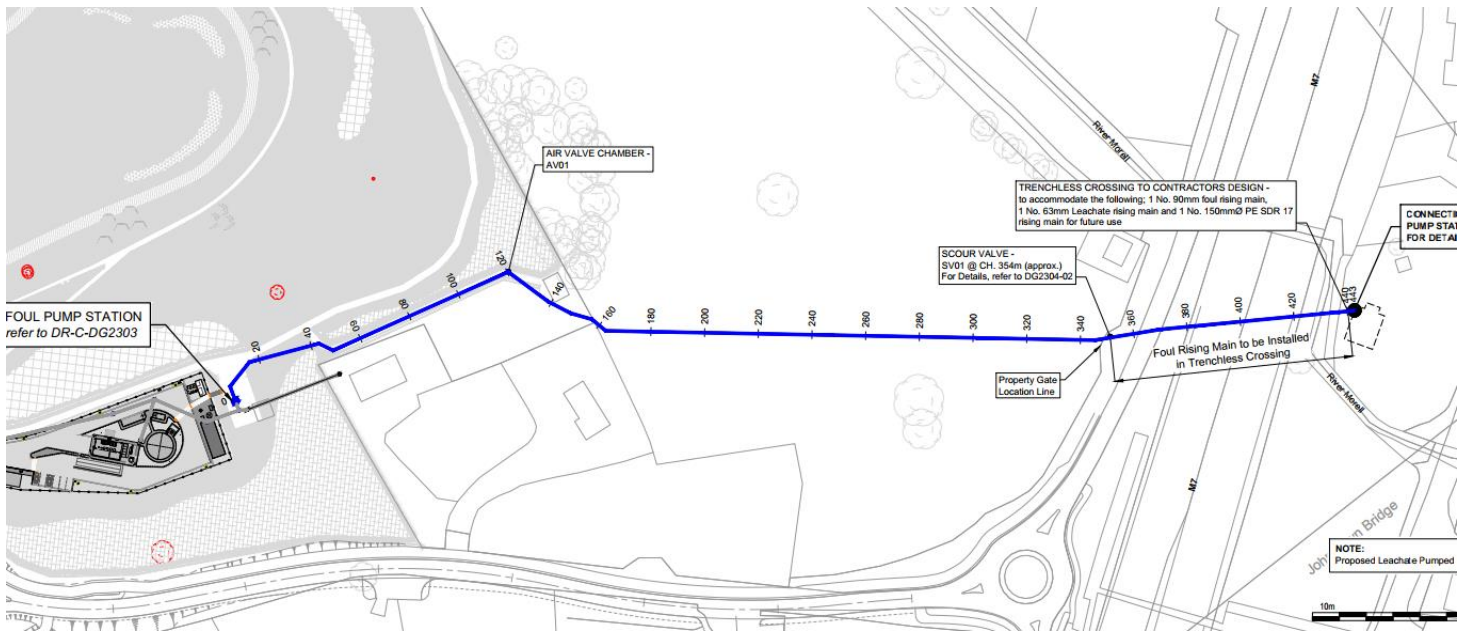


Figure 7-5 Plan view of foul sewage pipe

6. Potential for frac-out during directional drilling.

Directional bore operations under the N7 and Morell river will be undertaken by a specialist contractor. This work will have a potential to release drilling fluids into the surface environment through frac-outs (A frac-out is the condition where drilling mud is released through bedrock into the surrounding rock and sand and travels toward the surface). Because drilling muds consist largely of a bentonite clay-water mixture, they are not classified as toxic or hazardous substances. However, if released into water, bentonite has the potential to adversely impact fish and invertebrates. While drilling fluid seepage associated with a frac-out is most likely to occur near the bore entry and exit points where the drill head is shallow, frac-outs can occur in location along a directional bore.

Mitigation Measure (in compliance with Appendix 1/75AR, Item 26 & Appendix 1/75AR, Item 34)

Figure 7-6 below shows the plan view of the directional drilling under the N7 and Morell river. The launch pit is located at the north side of the N7 and away from the Morell river. Both the launch and reception pits shall be enclosed by silt fences and straw. A spill kit shall be on site and used if a frac-out occurs. Containment materials (straw, silt fencing, sandbags, frac-out spill kits, etc) shall be staged on-site at location where they are readily available and easily mobilized for immediate use in the event of an accidental release of drilling mud (frac-out). If necessary, barriers (straw bales or sedimentation fences) between bore site and the edge of the water source, shall be constructed, prior to drilling, to prevent released bentonite material from reaching the water. The bentonite product intended for use by the drilling specialist is as shown in Figure 7-7 below. This product is not classified as

environmentally hazardous.

WBL are in ongoing consultation with relevant bodies in relation to directional drilling. The specialist contractor will advise on the necessary mitigation measures including how frac-out will be dealt with. WBL will adopt these accordingly and will be incorporated into this plan.

Wills Bros Ltd – Kerdiffstown Landfill Remediation Project
 Surface Water Management Plan
 January – 2021

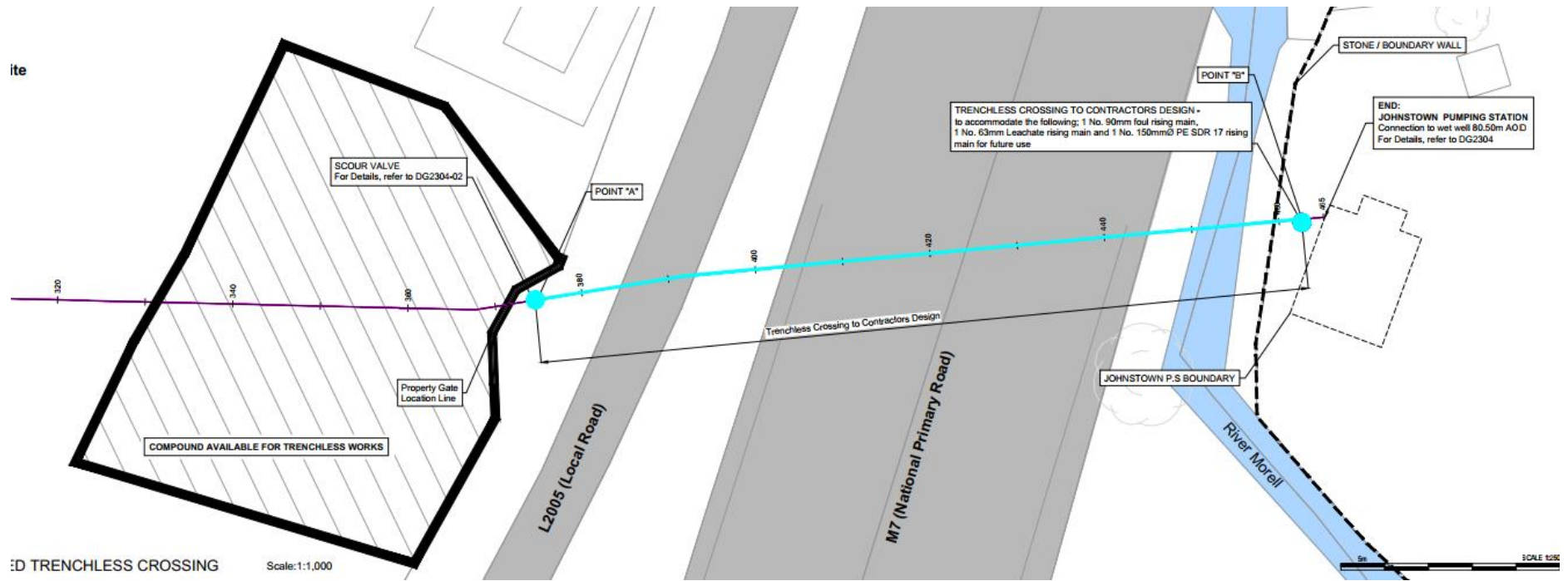


Figure 7-6 Plan view of the directional drilling below N7 and Morell river

TECHNICAL DATA

HYDRAUL-EZ®

HORIZONTAL DIRECTIONAL DRILLING FLUID



DESCRIPTION

HYDRAUL-EZ is a high-yield, 200 mesh sodium bentonite with a special dry polymer additive. It is designed to maintain borehole integrity in horizontally drilled boreholes. HYDRAUL-EZ is certified to NSF/ANSI Standard 60, Drinking Water Treatment Chemicals - Health Effects.

RECOMMENDED USE

HYDRAUL-EZ is specially designed for conditions encountered in angle and horizontal drilling. It can be used for all types of freshwater mud rotary drilling and as a jacking lubricant.

CHARACTERISTICS

- Concentrated for high yield
- Eliminates clay and shale swelling, bit balling, and sticking problems
- Forms a tight, thin filter cake in unstable formations
- Maintains borehole integrity in horizontal and vertically drilled holes
- Mixes quickly
- Requires less material due to low fluid loss properties

MIXING AND APPLICATION

Mixing ratios are based on the use of freshwater. Water purity will affect bentonite performance. For best results, make-up water should be pre-treated with SODA ASH to a pH of 8.5-9.5. HYDRAUL-EZ should be added slowly through a jet/hopper mixer.



BULK DENSITY

54 lbs/ft³ (0.86 kg/L)

PACKAGING

50 lbs (22.7 kg) bags, 48 per pallet. All pallets are plastic-wrapped.

DRILLING FLUID HYDRAUL-EZ mixing ratios in lbs (kg) per 100 gallons (1 m³) of water

Condition	Lbs of HYDRAUL-EZ	% Solids
Normal Conditions	20-30 lbs (22.5-36 kg)	2.3-3.5%
Sand and Gravel	30-40 lbs (36-47 kg)	3.5-4.6%
Fluid loss Control	40-60 lbs (47-72 kg)	4.6-6.7%

Figure 7-7 Horizontal Directional Drilling Fluid

7.2 Monitoring

Some further control measures are outlined below common to all seven of the above scenarios will be carried out by WBL staff during the management of the works, these include.

- Daily Inspection of the reprofiling works to identify any indications of leachate presence;
- Monitoring of the surface water management system for contamination (i.e. silt);
- Increased monitoring frequency for surface water receptors along the site perimeters;

- Daily weather report to be referenced at morning meetings with regards to the control of works taking place (i.e. silt).
- Water quality testing for water discharge into temporary ponds (See section 8 for further details).

7.3 Best practice measures to be used in dealing with surface water run-off and sediment control site wide

- 1. Temporary Ponds and Straw Bales**
- 2. Settlement Ponds**
- 3. Silt fencing**
- 4. Silt dewatering bags Standard or High flow.**
- 5. Silt Curtin and Sedi-Mat**
- 6. Silt Sock**

7.3.1 Temporary Ponds and Straw Bales

(in compliance with Appendix 1/75AR, Item 26 & Appendix 1/75AR, Item 34)

Figure 7-8 shows an example of a membrane lined pond. These ponds will be constructed where necessary relative to the works.



Figure 7-8 Membrane Lined Ponds

- Monitoring of these excavations will be carried out by the Site Foreman and frequently checked by the Project Manager to ensure prevention measures are adequately maintained.
- Figure 7-9 shows an example of straw bales shall be employed in streams, cut trenches and drains where necessary to create a filtration and control for any runoff, with the base of the bales embedded to promote filtrated flow through the bales, as per:

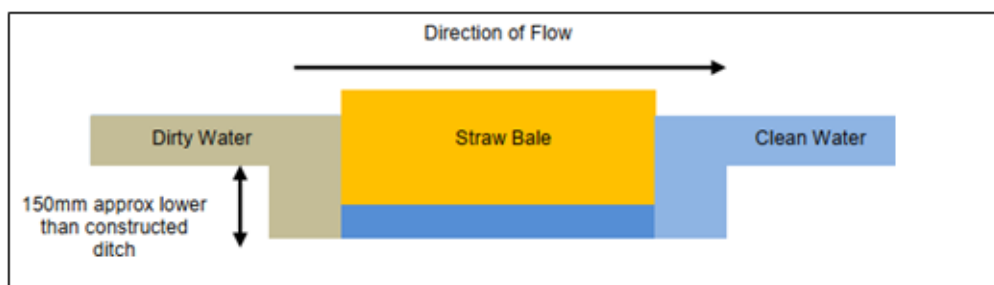


Figure 7-9 Straw Bale Embedding

- If straw bales are not acceptable or adequate, drainage stone baffles will be used instead.
- Where pumping is in operation it will be discharged to a suitable buffer zone, interceptor ditch, silt fencing, straw bales, drainage stones, ponds and/or a combination of a number of the listed items as deemed necessary.

- Runoff protection systems will be developed for all water-based controls to prevent damage to existing drainage and watercourse systems. In order to manage risks associated with ground/surface water temporary attenuation ponds shall be constructed as a first phase or works and all runoff shall be diverted via the ponds by pumping.

7.3.2 Settlement Pond with baffle configuration

(in compliance with Appendix 1/75AR, Item 26 & Appendix 1/75AR, Item 34)

Figure 7-10 below shows an example of a settlement pond that could be potentially used during the works depending on the location on site. There are baffles between each segment where water enters first one. When the level raises high enough, it decants into a second pond and same again into third pond. The idea is to allow sediments to settle. In the third segment, the outfall pipe is at a higher level so that the water with less sediment or ideally sediment free outfalls to pipe. It can then run through straw bale type baffle, drainage stone baffles and silt fence before discharge to an approved location on site.

An alternative to the settlement pond would be the possibility of ponds that are dug out with the outfall higher on the same principal.



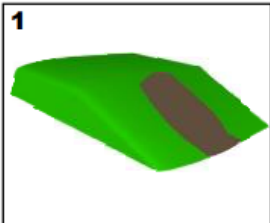
Figure 7-10 Settlement Pond

7.3.3 Silt fencing

Silt Fencing will be used throughout the Re-Grading waste phase in Zone 1, the location will be dictated by circumstances on site, but the intention is to place as far from the site boundary as possible but not too close to affect the works or risk being damaged due to plant movement. See Figure 7-11 below which shows a Terrastop Silt Fence installation.

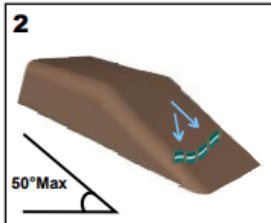
Hy-Tex Terrastop™ - Silt Fences for Stormwater Run-Off Control

1



- Find where erosion may occur.
- Look for areas where soil has been disturbed or vegetation removed.

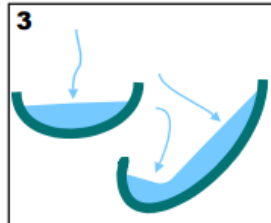
2



- Maximum 50° slope angle
- Not suitable for channels or ditches

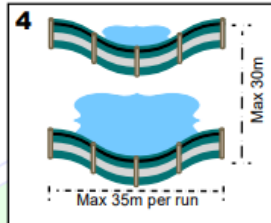
Use Ultra Erosion Guards for steeper slopes

3



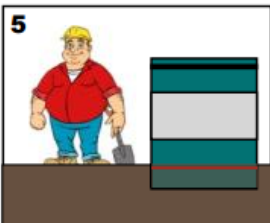
- Check where water is running
- Position fence central and at right angles to flow
- Curve fence ends up slope to form 'smiles' or 'J' shapes so water ponds behind fence

4



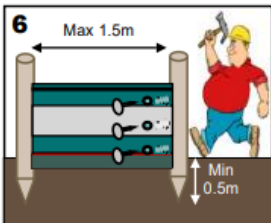
- Maximum 35m fence runs
- Maximum 30m between fence rows
- Add extra fences above and to the side for larger areas

5



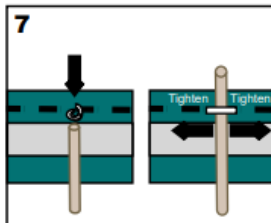
- Dig 100mm trench or use a trenching machine.
- Bury fence up to the red line.
- Make sure backfill is on upslope side of fence.
- Firmly compact.

6



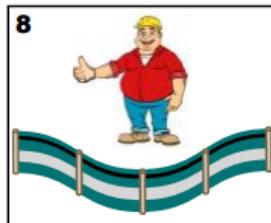
- Position posts on downslope side of fence
- Max 1.50m post spacing
- Min 0.50m in ground.
- Secure with 3 nails and washers per post or use cable ties
- Post size minimum 1.20m long and 50mm diameter

7



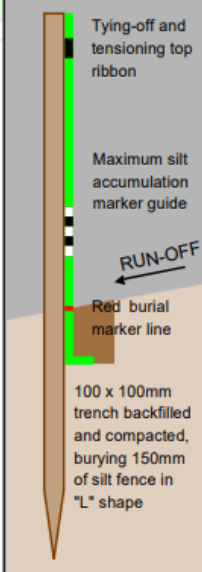
- Tension top edge by looping ribbon band over post.
- Add additional bracing posts for poor ground conditions

8



- Regularly check site
- Reassess for new areas of erosion and add extra fences as needed
- Repair any damage.
- Remove trapped silt when reaches top of white band or install additional fences.

Terrastop Silt Fence Installation Guidelines



- Tying-off and tensioning top ribbon
- Maximum silt accumulation marker guide
- RUN-OFF
- Red burial marker line
- 100 x 100mm trench backfilled and compacted, burying 150mm of silt fence in "L" shape

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 Aldington, ASHFORD, Kent TN25 7AJ
www.hy-tex.co.uk   @HyTexUKLtd



Tel: 01233 720097
sales@hy-tex.co.uk



Hy-Tex (UK) Limited
 Unrivalled Quality

Figure 7-11 Silt Fence for Stormwater Run-Off Control

Figure 7-12, Figure 7-13, Figure 7-14 below shows examples of Terra-Stop Premium Silt Fence which are to be used on site.



Figure 7-12 Terra-Stop Premium Silt Fence



Figure 7-13 Terra-Stop Premium Silt Fence



Figure 7-14 Terra-Stop Premium Silt Fence

7.3.4 Silt dewatering bags (Standard or High flow)

With reference to Figure 7-15 and Figure 7-16 below, it is the intention to use these bags during ground water pumping works at the interface with the Morell river when crossing under the M7. The purpose of the silt dewatering bags is used to intercept the surface water flow. In turn will slow the flow down and cause the silt to be deposited in the bag, allowing the cleaned water to flow downstream of their location.

During the directional drilling phase under then M7, where there is a particular risk of bentonite slurry escaping, this risk needs to be contained through the use of slit fencing and be in place prior to works and installed in line with the manufacturer's guidelines. The bentonite product intended for use by the drilling specialist is as already shown in Figure 7-7 above. This product is not classified as environmentally hazardous. The relevant safety data sheet will be available on site and briefed out to the entire crew involved with the works prior to commencement. There is minimal risk that there will be any slurry escape from the launch pit the crew are working in. The launch pit will also be on the north side of the M7 away from any stream.



Figure 7-15 Example of silt dewatering bags



Figure 7-16 Example of silt dewatering bags

7.3.5 Silt Curtin and Sedi-Mat

Where there is further risk of impact on the stream a silt curtain or sedi-mat will be used similar to that shown below. Following communication and agreement with all parties concerned, the specific RAMS for this element of the works will provide further details on the mitigation measures to be used and their exact location. Also, shown below are examples of Sedi-Mats to be used on site, they are shown in Figure 7-20 and Figure 7-21.

Silt Curtin

Figure 7-17, Figure 7-18 and Figure 7-19 below show examples of silt curtain to be used on site. Below the foam buoyancy pocket of the silt curtain is the curtain itself. SSI Environmental use a range of materials for manufacturing floating silt curtains, mainly pvc and woven geotextile. Where a flow is required through the silt curtain, Manufacturing can frequency weld into pvc or stitch into geotextile materials a pvc mesh which will allow a flow of water through without blinding. It must be noted that the pore opening size of the mesh will allow a large amount of sediment to pass through the curtain at the same time.

At the bottom of the ‘curtain’ is a ballast pocket, where chain is used as a ballast weight to hold the curtain down in the water. Every 5m or closer if required are d-shackles for attaching additional weight and anchors. In fast flowing water the bottom of the curtain will kick up to allow the water flow to pass under the silt curtain whilst forcing the sediment to be forced down assisting in the sediment control process.

Floating silt curtains can be made to any length and depth using a range of materials depending on the site conditions.



Figure 7-17 Example of a Silt Curtin



Figure 7-18 Example of a Silt Curtain

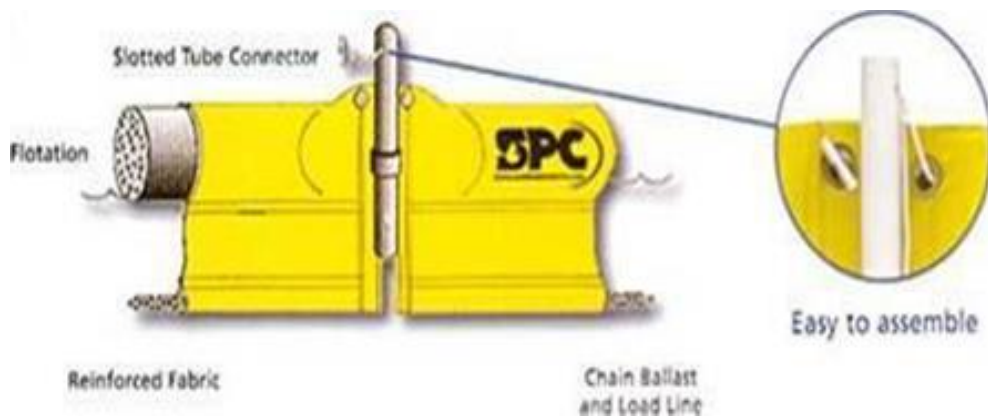


Figure 7-19 Example of a Silt Curtain Installation

Sedi-Mat

As shown below in Figure 7-20 and Figure 7-21 are examples of Sedi-Mats to be used on site. They are a simple, yet effective, biodegradable matting, which are fixed to the stream bed, and do not impede water flow. Sedimat is an effective tool for the protection of streams from sedimentation damage during in stream construction activities such as utility installation, culvert replacements, ditch maintenance, and bridge work. It is a flat 1.20 x 3.00m pad which is laid singly or in multiples on the streambed immediately downstream of the worksite

Sediment disturbed by construction is carried along the streambed by the current until it encounters Sedimat. The sediment then settles through the upper layer of jute mesh and into a layer of wood wool. A lower layer of hessian prevents the sediment from escaping. After construction is complete, the mats are removed and can be staked to the stream bank and seeded to provide immediate stream bank stabilisation. Because the mats are entirely biodegradable there is no need for disposal. The sediment mixed with the rotting wood wool provides a seedbed for germination and growth of the seed mix.

It can be installed on a streambed using either stones or stakes and can be placed in any configuration or number to provide desired coverage. It may be used alone or in conjunction with other methods of stream protection such as coffer dams, culverts or silt screen. They are laid flat on the streambed and they do not be affected by water velocity, nor do they raise water levels and thus flood the work area.



Figure 7-20 Example of a Sedi-Mat



Figure 7-21 Example of a Sedi-Mat

7.3.6 Silt Sock

Mitigation Measure (in compliance with Appendix 1/75AR, Item 18, Part a & Appendix 1/75AR, item 26)

A silt sock will be implemented as a mitigation measures where required during the works. This will be placed on the outfall of a pipe in a settlement pond or other holding area where surface water is discharge too. Figure 7-22 below shows a silt sock on the outlet pipe in the pond. This will further reduce the risk of silt discharging at this point.

This treatment system will be checked regularly to ensure the water discharged is clear of silt or solids.



Figure 7-22 Example of a Silt Sock placed on the outlet pipe

Figure 7-23 below shows an example of a settlement pond that will be something similar that we will be implementing during the works. This settlement will be lined and an outfall installed discharging to an approved area. On the bottom part of the picture shows a release trench which will serve as the inlet.



Figure 7-23 Example of a Settlement Pond

7.4 Outline of Surface Water Measures

Figure 7-24 below summaries each the measures to be in place to contain the surface water on site. The table breaks down how each zone will manage surface water in line with the mitigation measures as described in sub section 6.3 of this report. As the works progress through each phase, it will be vital that surface water is captured through the implementation of these measures.

KERDIFFSTOWN PARK SURFACE WATER MANAGEMENT

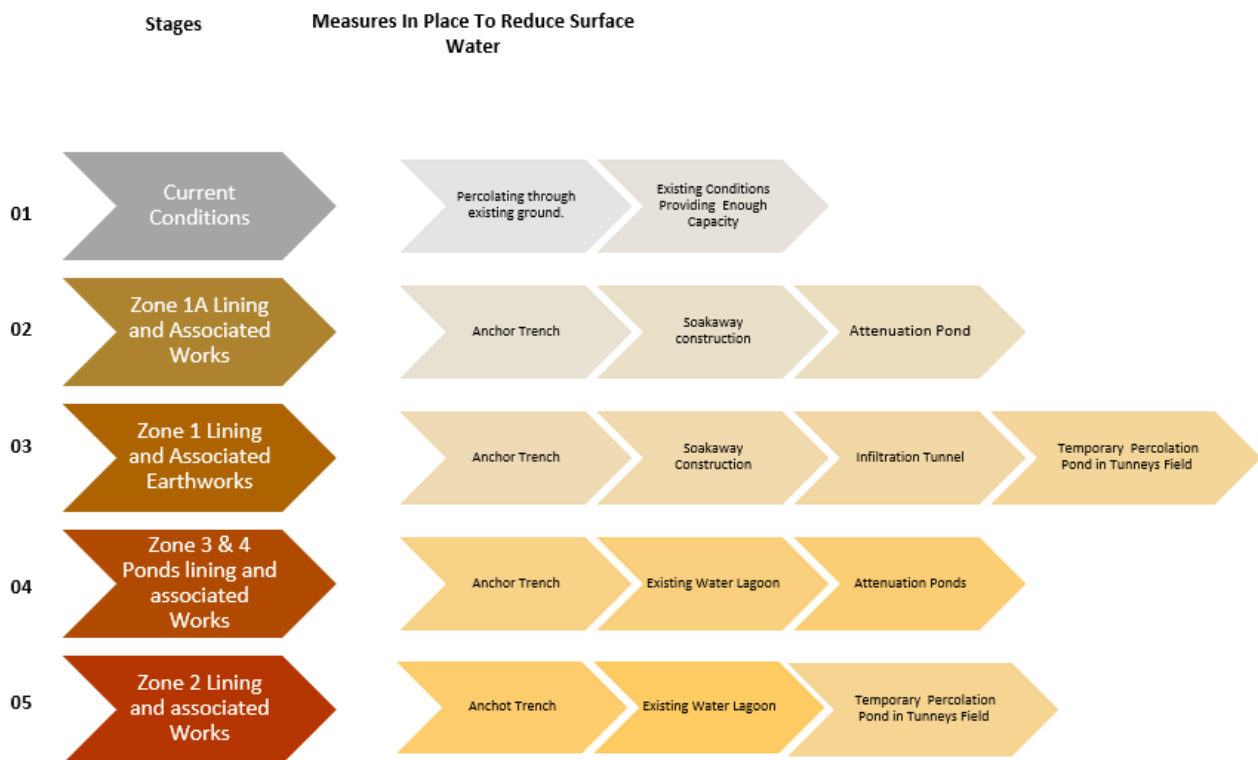


Figure 7-24 Stages and measures to control surface water

Note: Temporary percolation pond in Tunneys Field is subject to approval and feasibility. Volumes will be calculated once a percolation test is carried out and ensuring the area is suitable.

Figure 7-25 below shows Zone 3 and Zone 4 and the measures in place to manage surface water runoff during the works. The earthworks in these zones are due to begin in January 2021. The figure below shows the direction of the surface water by the red arrows.

The existing surface water lagoon will capture surface water runoff during the works until the two attenuation ponds are constructed in Zone 4, on programme these are planned for early 2021. These attenuation ponds

will then be used to control surface water once appropriate contamination control measures are in place before water entry to the pond. The works related to the storm connection to the Morell river will be in progress at this point also, however specific details relating to this connection will be provided later. Also, the surrounding drainage network linking into the attenuation ponds will be in place and this network will be used by WBL to ensure that the water gets to the ponds.

In the period prior to these works take place the existing lagoon will be maintained and modified as necessary to benefit the cut and fill works planned for early 2021. Further consideration is being given by WBL on how best to utilise the lagoon, to maximise the completion of the surrounding earthworks in zone 4, but at the same time retain a functional lagoon for taking in water and monitoring the water quality of same. Any modifications to this lagoon will be subject to agreement with the ER and will be sized accordingly to handle water from the adjoining zones.

KERDIFFSTOWN PARK ZONE 3 & ZONE 4 PONDS

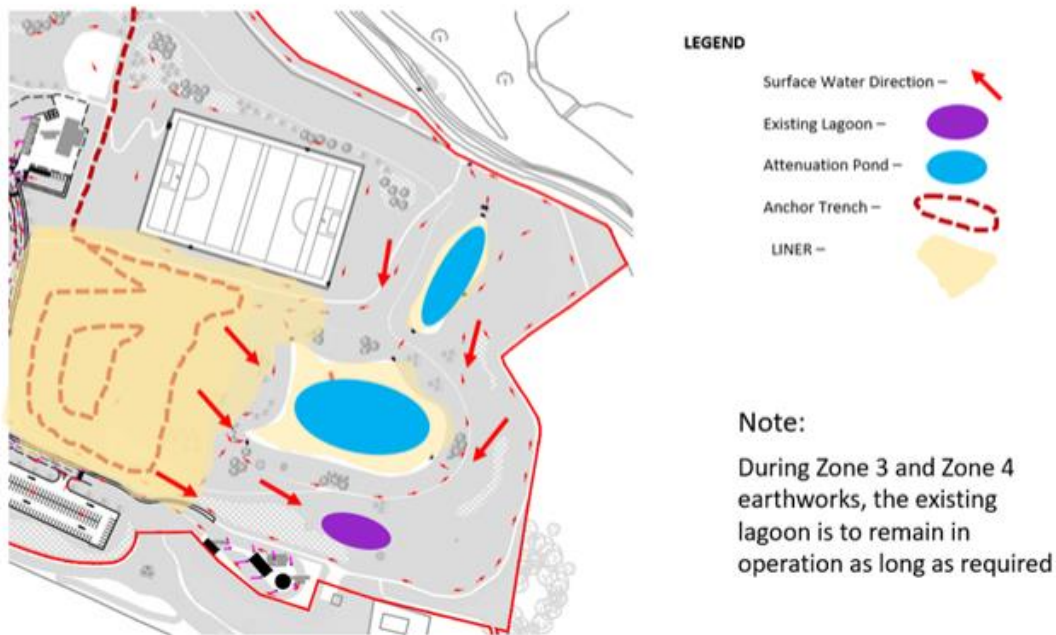


Figure 7-25 Surface water runoff in Zone 3 & 4

5.3 Further measures

As works progress throughout the project there will be further amendments to this plan, if required. A review will be carried out on how the effective the measures are and WBL are committed in addressing these issues.

8.0 MONITORING, REPORTING AND RECORDING

8.1 Monitoring

WBL will be monitoring the site operations as the works progress and ensuring the necessary measures are put in place for the management of surface water which are deemed effective.

See section 5.2 for monitoring techniques to be carried out by WBL to monitor surface water throughout the remediation works.

As onsite monitoring of groundwater is carried by out KCC. WBL will act immediately if there is a major change of water quality in results. Works will cease immediately, and review will be carried to determine the source of the problem.

8.2 Water quality inspections

Water quality inspections will be carried out by WBL Environmental Engineer, using a portable instrument with all relevant details will be noted. These testing will be carried out daily to ensure the quality of the water discharged into the pond(s) will be clean. Figure 8-1 below shows the portable instrument that will be used on site to carry out this water quality testing.

The parameters to be tested include:

- pH
- Conductivity
- TDS
- Temperature



Figure 8-1 Water quality testing equipment

8.3 Inspection/Monitoring Schedule

The following is a list of inspections and monitoring to be carried out during the works relating to surface water management. WBL site team including Project Manager, Foreman and Environmental Engineer will carry out these inspections.

- i. Inspect the Principal Control Measures outlined in this plan on a weekly basis. Report findings to the ER/KCC;
- ii. Inspect surface water treatment measures (ponds, tanks, sandbags, etc.) on a daily basis;
- iii. Daily visual inspection of all discharges of measures implemented within the site on a daily basis including excavation, deposition, pumping out or concreting works are on-going in the vicinity;
- iv. Visual inspections of the river crossings will be carried out and observed on a regular basis. The visual inspection will be carried out by the Project Manager or Foreman, who is aware of the importance of the sensitive nature of the receiving watercourses (Morell river).
- v. Wheel wash facilities shall be inspected on a weekly basis;
- vi. Borrow Pits shall be inspected on a daily basis while in operation and on a weekly basis thereafter;
- vii. Material Deposition Areas shall be inspected on a daily basis while in operation and on a weekly basis thereafter;
- viii. Stockpiles shall be monitored on a daily basis while being filled or emptied and otherwise on a weekly basis;

- ix. Control measures for works at or near water bodies shall be inspected on a daily basis;
- x. Concrete operations shall be supervised and designated concrete washing out facilities shall be inspected on a daily basis;
- xi. Site Compounds shall be inspected on a weekly basis;
- xii. Any direct release of sediment to a watercourse causing plumes or exceedance of water test parameters investigatory levels shall result in: -
 - a. ER/KCC shall be notified immediately;
 - b. the contractor will be required to take immediate action and to implement measures to ensure that such discharges do not re-occur;
 - c. Works if stopped, shall not recommence until appropriate corrective measures to avoid any repetition are put in place. Such measures shall be agreed with the Project Manager following consultation with the ER/KCC;
 - d. Works and/ or discharges from the works shall not recommence until written consent is received from the Project Manager.
- xiii. Where the Project Manager considers that the risk of a sediment release is high, ER/KCC shall be informed by WBL and protective action to be taken. The Project Manager shall report all such notifications and requests to the ER and KCC.

9.0 COMPLAINTS

Where there are complaints, albeit from an external source or from the ER/KCC, relating to any surface water management issue, these will be treated by Wills Bros Ltd in a constructive and cooperative manner to resolve. The specific procedures will include (but not be limited to);

- Inspection of the location from which the complaint originated.
- Comparison of the measured levels with limiting criteria.
- Identification of engineering control or management procedure (if appropriate) to be adopted to reduce the levels at the complainant location.

Each complaint will be thoroughly investigated, and appropriate remedial action carried out promptly. WBL will notify RE and KCC of any complaints.

Where corrective measures have been taken, the complainant will be updated by Wills Bros Ltd of the corrective action implemented.

10.0 RECORDS

Mitigation Measure (in compliance with Appendix 1/75AR, Item 8)

All records and documents associated with monitoring of the Works will be retained by Wills Bros Limited. On completion of the Works, Wills Bros Ltd will issue all this information to the Employer and Employer's Representative in electronic format.

Information retained will include:

- All monitoring data collected, including data files, and calculations used in processing the data
- Maintenance schedules and records for the maintenance of the instrumentation and the monitoring system including calibration certificates.
- Records of systems checks and testing and commissioning carried out.

11.0 REFERENCES

- Volume A Works Requirements, Book A1 Part 1 Specification
- P1063-01 Industrial Emissions Licence

Wills Bros Ltd – Kerdiffstown Landfill Remediation Project
Surface Water Management Plan
January – 2021

- EIAR Volume 2 of 4: Main Report, 2017

APPENDIX A

Checklist Sheet

