



Saxon Pit Southern Buttress Environmental Permit Application

Hydrogeological Risk Assessment

East Midlands Waste Management Ltd

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Basis of Report

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1.0 INTRODUCTION

East Midlands Waste Management Limited (EMWM) has instructed SLR Consulting Limited (“SLR”) to prepare a Hydrogeological Risk Assessment (“HRA”) in support of a deposit for recovery Environmental Permit (“EP”) application for the construction of a buttress to stabilise the southern face of Saxon Pit, located at Peterborough Road, Whittlesey, PE7 1PJ (the Site).

Saxon Pit is an exhausted clay pit which has historically suffered from several minor failures of the quarry face along its eastern and southern boundaries. The eastern slope of the wider site has been stabilised by regrading works under a separate deposit for recovery EP (EPR/FB3406KC) and now similar works are required to stabilise the southern slope.

The stabilisation will involve the placement of suitable imported inert waste material to construct an engineered buttress against the southern face of the quarry at a 1V:3H gradient. A retaining structure, such as a gabion wall at the toe of the slope. Based on an isopachyte of the existing topography and the proposed buttress design, approximately 216,700m³ of material will be required for the construction (between 325,500 and 390,600 tonnes assuming a density between 1.5 and 1.8 tonnes/m³).

This report is set out as follows:

- Section 2.0 develops the conceptual site model (CSM) Site and assesses the risk to the hydrogeological and hydrological regime posed by the proposed buttressing works. This includes a review of the local geological, hydrogeological and hydrological setting and is based on potential source-pathway-receptor linkages;
- Section 3.0 includes the hydrogeological risk assessment – which is either qualitative or quantitative in nature depending upon the findings of the CSM;
- Section 4.0 outlines proposed requisite surveillance

The objectives of the assessment are to demonstrate that the Site will be compliant with Schedule 22 (Groundwater Activities) of the Environmental Permitting Regulations 2016 (as amended). These Regulations require that certain substances (Hazardous Substances) are not discharged to groundwater such that they are discernible, and that the discharge of other substances (Non-Hazardous Pollutants) is limited “so as to prevent pollution”.

The HRA has been completed in accordance with Environment Agency (EA) online Inert Waste Guidance¹, general guidance on groundwater risk assessments for environmental permits² and specific guidance for landfill operators on hydrogeological risk assessments³

2.0 CONCEPTUAL HYDROGEOLOGICAL SITE MODEL

The conceptual hydrogeological site model is based on the source-pathway-receptor linkages. The key elements of the hydrogeological model are discussed in further detail within the following sections below:

- Site Setting – including details of site location, topography and rainfall

¹ Gov.UK (published 30 Jan 2020, updated 17 Jan 2024) *Landfill operators: environmental permits – Landfills for Inert wastes*, [Landfill operators: environmental permits - Landfills for inert waste - Guidance - GOV.UK](https://www.gov.uk/guidance/landfill-operators-environmental-permits-landfills-for-inert-waste) (www.gov.uk)

² Gov.UK (published 1 Feb 2016, updated 3 Apr 2018) *Guidance – Groundwater Risk Assessment for your environmental permit*, [Groundwater risk assessment for your environmental permit - GOV.UK](https://www.gov.uk/guidance/groundwater-risk-assessment-for-your-environmental-permit)

³ Gov.UK (published 30 Jan 2020, updated 17 Jan 2024) *Landfill operators: environmental permits – what to include in your hydrogeological risk assessment*, [Landfill operators: environmental permits - What to include in your hydrogeological risk assessment - Guidance - GOV.UK](https://www.gov.uk/guidance/landfill-operators-environmental-permits-what-to-include-in-your-hydrogeological-risk-assessment)



- Source – including information on the proposed waste source and risk to groundwater and surface water
- Pathways – including a review of the site setting including geology, hydrogeology and hydrology
- Receptors – outlining all potential receptors including groundwater, surface water and ecological receptors which could be impacted

2.1 Site Location and Topography

2.1.1 Location

The proposed activity will take place at the southern face of Saxon Pit, which is located to the South of Peterborough Road (A605); immediately to the west of Whittlesey and approximately 6 km east of Peterborough, Cambridgeshire. It is centred on National Grid Reference 525754E, 297057N.

The wider Saxon Pit site is bounded to the east by a housing estate, to the southeast is the canalised Kings’ Dyke which flows beneath the Peterborough to March railway line. The site is also surrounded by agricultural land to the west, as well as there being a surface water receptor.

2.1.2 Topography

Topography mapping indicates that the site is sunken below the surrounding area, associated with historic quarrying. Ground levels on the site slope towards the base of the pit at around -20mAOD and a surface water lagoon within the centre of the site which sits at around -24 mAOD. Site access on Peterborough Road sits at approximately 8 mAOD, whilst the railway line to the south of the site sits at 4 mAOD.

The western area of the site sits at c. 8 mAOD. Water levels in the Kings Dyke are estimated to be around 1.4 mAOD.

2.1.3 Rainfall & Recharge

The nearest Met Office Station with rainfall data is at Monks Wood, (c.9 km from the Site). The average annual precipitation (1991 to 2020) is 602.3 mm/annum. As detailed in Table 2-1 below, a minimum average rainfall is recorded in February with 37.4mm, whilst the maximum average is recorded in October with 63.2mm.

Table 2-1: Summary of Monthly and Annual Rainfall (mm)

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
48.7	37.4	37.8	42.7	45.5	52.3	55.9	56.0	52.6	63.2	57.0	53.3	602.3

2.2 Waste Source

2.2.1 Site Design and Construction

The southern slope on the Site needs to be buttressed. The proposed buttress will be created using inert waste and will need to be retained at an approximate distance of 47.0 m from the crest. The height at this distance is expected to be 5m, extending c. 120m laterally.

2.2.2 Waste Quality and Priority Contaminants

The slopes will be buttressed using imported inert waste material.



The inert waste source term has been assessed based on Inert WAC limits as outlined within section 2.1.2 of the Landfill Directive 2003/33/EC and reproduced in Table 2-1 and Table 2-2.

Table 2-2: Limit values for waste acceptable for Inert Waste

Component	L/S = 2 l/kg (mg/kg dry substance)	L/S = 10 l/kg (mg/kg dry substance)
Arsenic	0.1	0.5
Barium	7	20
Cadmium	0.03	0.04
Chromium (Total)	0.2	0.5
Copper	0.9	2.0
Mercury	0.003	0.01
Molybdenum	0.3	0.5
Nickel	0.2	0.4
Lead	0.2	0.5
Antimony	0.02	0.06
Selenium	0.06	0.1
Zinc	2	4
Chloride	550	800
Fluoride	4	10
Sulphate	560*	1000*
Phenol	0.5	1
DOC**	240	500
TDS***	2500	4000
Notes	<p>* If the waste does not meet these values for sulphate, it may still be considered as complying with the acceptance criteria if the leaching does not exceed either of the following values: 1,500mg/l as C_0 at L/S = 0.1l/kg and 6000mg/kg at L/S = 10l/kg.</p> <p>** If the waste does not meet these values for DOC at its own pH value, it may alternatively be tested at L/S = 10 l/kg and a pH between 7,5 and 8,0. The waste may be considered as complying with the acceptance criteria for DOC, if the result of this determination does not exceed 500 mg/kg.</p> <p>*** The values for total dissolved solids (TDS) can be used alternatively to the values for sulphate and chloride.</p>	

Table 2-3: Limits for Total Content of Organic Contaminants

Parameter	Value (mg/kg)
TOC (total organic carbon)	30,000 (*)
BTEX (benzene, toluene, ethylbenzene and xylenes)	6.0
PCBs (polychlorinated biphenyls, 7 congeners)	1.0



Parameter	Value (mg/kg)
Mineral oil (C10 to C40)	500
PAHs (polycyclic aromatic hydrocarbons)	100
* In the case of soils, a higher limit value may be admitted by the competent authority, provided the DOC value of 500 mg/kg is achieved at L/S = 10 l/kg, either at the soil's own pH or at a pH value between 7,5 and 8,0.	

Environment Agency guidance ‘Testing for Disposal to Landfill⁴’ clarifies: “While limits are set for these tests in the Council Decision annex, the Environmental Permitting Regulations, schedule 10 state that the L:S 10 l/kg test must be used.”. It is therefore proposed that the L:S 10l/kg WAC limits will be used for determining priority contaminants.

2.3 Pathways

2.3.1 Geological Setting

A summary of the regional geological sequence relevant to the Site is provided in Table 2-4. It should be noted that given the historic quarrying the superficial deposits have been excavated and are not present across the development site.

Table 2-4 Geological Sequence and Lithological Descriptions

Parent Group	Geological Strata	Lithological Description	Est. Typical Thickness (m)
Quaternary Superficial	Topsoil	Loamy Soils	3m
	Made Ground	Coarse gravel, cobbles of brick. Fine to coarse sand.	
	March Gravel Member	Sandy flint gravel to clayey silty pebbly sand. (Only in small parts at the north and west the site)	Unknown
Jurassic	Oxford Clay	Silicate-mudstone, grey, generally smooth to slightly silty, with sporadic beds of argillaceous limestone nodules.	c.20m
	Kellaways Formation	Mudstone, grey, commonly silici-silty or silici-sandy, with (predominantly in the upper part) beds of generally calcareous siltstone and sandstone.	Unknown

Soils

The Cranfield Soilscales online soil map viewer indicates that the Site is underlain by freely draining slightly acid loamy soils, although these will have been removed during historic quarrying.

Superficial and Bedrock

According to BGS online mapping⁵, the bedrock across the Site comprises of:

⁴ Environment Agency (March 2013). *Waste Sampling and Testing for Disposal to Landfill*. Ref. EBPRI 11507B Final

⁵ <http://mapapps2.bgs.ac.uk/geoindex/home.html>



- Oxford Clay Formation – covering the whole site
- Kellaways Sand Formation – underlying the Oxford Clay Formation, the Kellaways Formation mainly consists of low permeability mudstones, however there is a thin sandstone horizon that has the potential for some flow but is not likely to be able to be used as a resource due to the quality.

The 2019 HRA⁶ for the eastern buttress reported that the Oxford Clay Formation is shallowest to the east of the Site, at c. 15 m, and dips towards the west of the site where it is c. 30 m thick. This conceptual understanding has been confirmed by several site investigations at the site and adjacent land, including:

- A Site investigation carried out in 2017⁷ confirmed that the Oxford Clay Formation, which covers the entirety of the site is estimated to be naturally over 20 m in thickness, all the boreholes drilled on the southern border in this site investigation were around between 20 - 21 m deep and the Oxford Clay was present throughout the whole borehole (i.e. the base of clay / top of the Kellaways had not been reached).
- A Site investigation carried out in 2022 on the site immediately to the west, Victory Works, included several boreholes and trial pits. The boreholes which were drilled at c 25-30 mbgl, max 27.5m, show that the Oxford Clay is present throughout the entire boreholes. It also indicates that the base of the Oxford clay is beyond the base of the boreholes. This indicates that that the base of the oxford clay in the west of the site may reach 30 mbgl.

The Kellaways Formation is not recorded in any of the boreholes described above.

The deepest part of Saxon Pit is around 28m deep, c. -20 mAOD according to topographic mapping. Based on the above Si data and the Oxford Clay Formation is estimated to be to a depth of at least -21.5 mAOD, but likely thicker in the west, indicating a minimum of 1.5m of Oxford Clay below the base of the pit. It is however noted that the base of the Clay has not been reached in any of the boreholes and it is noted that the lagoon extends to a depth of at approximately -24mAOD and is also entirely within the Oxford clay, suggesting a likely thickness of >4m of clay present beneath the base of the pit.

Limited detail of the underlying Kellaways Formation is available. Regional BGS mapping indicates that the deposits are overlain by the Oxford Clay for a distance of at least 4.5km in all directions, outcropping within Peterborough to the north-west of the Site.

2.3.2 Hydrogeology

Aquifer Classification and Vulnerability

The DEFRA online mapping service 'Magic Map'⁸ classifies the Oxford Clay as an Unproductive Aquifer, described as:

'rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow'.

The underlying Kellaways Formation is classified as a 'Secondary A Aquifer' described as:

⁶ SLR Consulting Ltd (2019) *Saxon Pit: Hydrogeological Risk Assessment*, Ref: 403-07764-00001

⁷ SLR Consulting Ltd (Dec 2017) *Saxon Pit: Factual Ground Investigation Report*, Ref: 403-07764-00001

⁸ <https://magic.defra.gov.uk/MagicMap.html>



'Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers'

The superficial March gravels are also classified as a 'Secondary A aquifer', although given that these deposits are not present across the site there is considered to be no potential pathway for any contaminants generated by the site.

Aquifer Characteristics

Site investigations conducted in 2017 had minor groundwater seepage in one of the four boreholes drilled, however it was commented that no permanent groundwater body was encountered.

The site investigations in the site directly to the west, Victory Works, indicated that most the boreholes drilled experienced very low or no recharge.

Oxford Clay has been characterised as having a very low permeability, usually recorded at less $1 \times 10^{-9} \text{m/s}$.

Groundwater Levels and Flow

There is no site-specific information about the groundwater flows or levels, however site investigations carried out on the site directly to the west indicated that the water level across three boreholes sits at around 0.7 - 2.3m.

These logs confirm that the boreholes have little to no recharge taking place. This suggests that the flow is either very slow or stagnant.

No information is available on groundwater levels in the underlying Kellaways Sands.

2.3.3 Hydrology

Regional Hydrology

The site falls within the catchment of the King's Dyke to the east of the site, a tributary of the River Nene.

The Kings Dyke is culverted beneath the railway line to the south of the site flowing in a north-easterly direction. At its closest point, the channel is located c.40m south east of the site and drains an upstream catchment area⁵ of 23.75km². Kings Dyke flows ultimately into the old course of the River Nene c.10km downstream of the site, via Briggate River, Twenty Foot River and Whittlesey Dyke. Significant lengths of these watercourses are canalised along their reaches. The Kings Dyke is formed via an offtake from the River Nene (Stanground Lock). Water levels are controlled by the St Germans Pumping Station and the lock gates at Stanground Lock, to sustain a level of c.1.5m aOD which can be managed as required.

The new course of the River Nene is designated as Environment Agency Main River⁶ which, at its closest point, flow eastwards 1km north of the site draining an approximate upstream catchment area⁵ of 1,642km². The River Nene rises to the north of Northampton and flows towards Peterborough. The Dog-in-a-Double sluice is located approximately 8km downstream of Peterborough, to the north of Whittlesey, at which point the fluvial Nene meets the tidal reaches of the River Nene. Approximately 40km downstream of the sluice, the River outfalls into the Wash. The tidal reaches of the River Nene are defended by a series of raised earth embankments, with the exception of Wisbech Reach.

The local topography is flat and low lying, with large areas of fenland where the landscape is dominated by drainage channels managed by Internal Drainage Boards. These channels are crucial to maintain the agricultural land use and manage flood risk.



Site Drainage

The current and proposed site drainage is outlined within the Surface Water Drainage Strategy⁹, and is summarised as follows:

- The site drainage for the buttress of the southern slope is proposed to mimic the previous designs for the existing eastern buttress;
- Flow is routed overland, into the existing lagoon on the Saxon Pit site. This lagoon has a capacity of 10,040 m³ and is approximately 3.5 m deep. Water levels are kept around 2 – 2.5 m. Flows are then pumped from the lagoon into a reed bed that feeds into the King’s Dyke at a rate up to 52.8l/s. The new site drainage plan will control the flows shedding off the buttress in order to stop the flooding of the low-lying areas;
- A swale will also be installed to intercept, attenuate and convey any flows shed from the slope face of the proposed buttress towards the lagoon.

2.3.4 Receptors

2.3.4.1 Abstractions and Source Protection Zones

The DEFRA online mapping viewer confirms that the site does not sit within a groundwater Source Protection Zone (SPZ). The nearest SPZ is a Zone II which is located approximately 16 km north-west of the site.

Licensed abstractions within a 2 km radius of the site are recorded below in

Table 2-5. There are no groundwater abstractions within 2 km radius of the site.

Table 2-5: Licensed Abstractions within 2 km of the site.

Licence ID & Owner	Distance from Site (km)	Abstraction purpose	Max. Daily Quantity (m ³)	Source
AN/033/0053/050 Chapelbridge Farms	South - west 1.22	Spray Irrigation - Direct	2000	SW
6/33/53/*S/0811 Star Pit Partners	South- west 1.46	Spray Irrigation – Direct	18,000	SW

2.3.5 Hydrology

It is considered that the Kings Dyke is the primary surface water receptor as the runoff from the site is pumping into a reed bed directly connected to the Kings Dyke. This means that the River Nene is also a potential receptor as the Kings Dyke rejoins the River Nene further downstream. The River Nene is recognised by the Environment Agency as an EA main river; however the Kings Dyke is not. The Kings Dyke Middle Level is classified as having a moderate overall ecological status, whereas the River Nene Mortons Leam has poor ecological status.

⁹ SLR Consulting Ltd (2024), *Saxon Pit Southern Buttress Stabilisation Works Surface Water Drainage Strategy*, Ref: 422.064744.00001



2.3.6 Ecological Sites

A review of DEFRA’s online mapping service “Magic Map”⁸ confirms that there is one ecologically sensitive site located within a 2 km radius of the site, the Nene Washes SSSI located c. 900 m to the north of the site.

The citation for Nene Washes SSSI is as follows:

‘The site represents one of the country’s few remaining areas of washland habitat which is essential to the survival nationally and internationally of populations of wildfowl and waders. The site is additionally notable for the diversity of plant and associated animal life within its network of dykes.’

There is no indication within the citation that the SSSI is reliant upon groundwater sources, however it will potentially be dependent upon surface water flows.

2.4 Summary of Hydrogeological Site Conceptual Model

The Site’s hydrogeological conceptual model is summarised in Table 2-6.

Table 2-6: Summary of Hydrogeological Site Conceptual Model

Linkage	Site Details
Source	The proposed buttress will be created using inert material only, which will be imported to the site. Given the nature of the materials to be accepted the potential for leachate to be generated will be low.
Pathway	<p>There is unlikely to be any pathway for any potential leachate generated by infiltration into the inert waste as the base and sidewalls of the Saxon Pit sits within the Oxford Clay which is understood to be at least 1.5m in thickness at its base and likely to be in excess of 4m. Any potential leachate generated by infiltration into the inert waste will therefore migrate into the surface water drainage network as opposed to any groundwater pathway.</p> <p>At the pits deepest point there is estimated to be between 1.5m and 4m of Oxford Clay beneath the pit</p> <p>The underlying Kellaway Formation is classified as a Secondary A aquifer, however BGS mapping indicates that it is overlain by Oxford Clay for at least 4.5km in all directions from the Site and will therefore not provide baseflow to any watercourses within the vicinity of the Site.</p> <p>Degradation and/or attenuation of any potential contaminants will take place within the existing lagoon, and the reed bed that leads to the receptor.</p>
Receptor	<p>In order to comply with Schedule 22 (Groundwater Activities) of the EPR, the following is considered the appropriate receptor:</p> <ul style="list-style-type: none"> for Hazardous and Non-Hazardous Substances, the receptor is assumed to be the King’s Dyke which then flows into the River Nene. <p>Although the Kellaway Formation is classified as a Secondary A aquifer there are no abstractions or other receptors associated with this aquifer within a 2km radius of the Site.</p>
Compliance Points	For the purposes of defining receptors, the compliance points are taken to be the discharge points into the surface water receptors, as there are no groundwater receptors. The compliance point is therefore considered to be the discharge into the Kings Dyke. Compliance with the Regulations at the points defined above will ensure that other receptors are adequately protected.



3.0 Hydrogeological Risk Assessment

The Conceptual Site Model developed in Section 2.0 indicates that the site is located within unproductive strata with a minimum of 1.5m thickness of clay (likely to be in excess of 4m thick) present at the base overlying the Kellaways Sands.

It is therefore considered that there is no requirement for a quantitative risk assessment to be completed.

3.1 Lifecycle Phases

It is considered that a risk assessment of lifecycle phases is not required, given that there is considered to be no groundwater pathway or receptor.

3.2 Accidents and their Consequences

Details of accidental occurrences at the installation that could present a potential risk to groundwater quality adjacent to the site are provided in Table 3-1 below:

Table 3-1: Accidents and Proposed Mitigation

Accidental Occurrence	Risk to Groundwater	Likelihood of Occurrence	Mitigation and Corrective Measures
Deposition of non-inert wastes.	Generation of leachate containing Hazardous Substances or Non-Hazardous Pollutants.	Low – due to the essential and technical precautions.	Any incorrectly accepted wastes will be immediately returned to the customer or moved to a suitable storage area prior to removal to a suitable site.
Spillage of fuels from storage tanks or vehicles.	Release of hydrocarbons (Hazardous Substances) into the ground and migration to groundwater.	Low – fuel stores will be bunded in accordance with Regulations. A traffic system and speed limit will be imposed at the Site to reduce both the risk of accidents and the likelihood of spillage occurring.	Any spillage will be cleaned up immediately and any resulting contaminated soils removed to a suitable installation.

With respect to the accidental deposition of potentially contaminated inert waste material, it is considered that the risks and potential consequences of such accidents to hydrogeological receptors are extremely low for the following reasons:

- all deliveries will be pre-arranged and come from known sources to ensure no contaminated material is delivered;
- if deemed necessary, characterisation testing will be undertaken to demonstrate that the material will comply with inert WAC limits, prior to the acceptance at the site;
- visual inspection will be undertaken of every load of material deposited at the site; and
- in the event of suspicion regarding the acceptability of the geological barrier material, quarantine procedures will be enforced.

In the extremely unlikely event of a rogue load of inert waste material accidentally being deposited at the site, any potential contaminant concentrations associated with the rogue



load can be expected to be reduced within the surrounding and underlying Clay bedrock materials via the following processes:

Degradation

Bacteria and other microorganisms can use certain dissolved organic contaminants (e.g. derived from a hydrocarbon spillage) as a source of food or energy supply. The bacteria and microorganisms can form films or masses and attach themselves to the matrix.

Sorption

Occurs when a contaminant is sorbed onto minerals or organic matter. It also occurs when the contaminant attaches itself to mineral surfaces due to an electrical charge attraction (cation exchange), particularly in cohesive geological barrier material. The effect of sorption would be to slow the rate of migration of the potential contaminant through the surrounding geological barrier material. This would also promote increased degradation of organic contaminants

Oxidation-Reduction Reactions

In these chemical reactions inorganic chemicals are subject to oxidation (gain of electrons) or reduction (loss of electrons). The reactions are controlled by microorganisms which act as catalysts and can result in the precipitation of metal pollutants where aerobic conditions are present.

Diffusion

this can help to slow contaminant travel times, while allowing greater opportunities for degradation, thereby reducing contaminant concentrations.

Volatilisation

Evaporation of hydrocarbons such as benzene, toluene and xylenes can take place where exposed to the atmosphere.

Dilution

Dilution within the porewaters of the surrounding uncontaminated infill materials and within the in situ geological pathway.

Given the very low permeability of the underlying Oxford Clay any leakage through the deposit and into the underlying Kellaways Formation will be very low and therefore subject to significant dilution within the Kellaways Formation aquifer.

3.3 Emissions to Groundwater

The assessment confirms that the site will be compliant with the Environmental Permitting Regulations 2016, given that there will be no groundwater pathway beneath the Site.

Therefore, Hazardous Substances will not be discernible in the groundwater or surface water at the compliance points and Non-Hazardous Pollutants will not be present at the compliance points above a level that may constitute pollution.

3.4 Review of Technical Precautions and Hydrogeological Completion Criteria

Essential and technical precautions are those measures required to ensure that the site complies with the Environmental Permitting Regulations 2016.



Essential and technical precautions typically include both restrictions on material types and the engineering and other environmental management measures.

The following technical precautions will be required:

- all inert waste material deliveries will be pre-arranged and come from known sources;
- all inert waste materials will be subjected to stringent acceptance criteria and acceptance procedures; and
- all materials will be inspected at the weighbridge. All site operatives will be trained to inspect material upon tipping to ensure that it meets the acceptance criteria and to implement an accident management plan to remove such material immediately.

Requisite surveillance will also be required, as detailed within the following section.

No other essential and technical precautions are considered necessary, and the site can be considered to be 'complete' immediately after the completion of restoration works and/or definite closure of the site.



4.0 Requisite Surveillance

5.1 The Risk Based Monitoring Scheme

The Environmental Permitting Regulations 2016 (as amended), require that “*requisite surveillance*” is undertaken where disposal of substances potentially giving rise to Hazardous Substances or Non-Hazardous Pollutants has been authorised by the EA. Therefore, environmental monitoring will be undertaken to provide assurance that the Site is not resulting in any detrimental effects on water quality.

4.1 Leachate Monitoring

WAC testing will be completed on selected wastes prior to deposition at the Site. There is no requirement for leachate monitoring. The waste will be subject to Inert WAC limits.

4.2 Groundwater Monitoring

Given the lack of a groundwater pathway or receptor no groundwater monitoring is required.

4.3 Surface Water Monitoring

Surface water run-off from the Site will be routed to the existing silt lagoon located to the north of the EP boundary and discharged alongside other inputs from the wider site.

Discharges of water from the silt lagoon, to the Kings Dyke, will be controlled by a discharge permit that is pending issue from the Environment Agency to EMWM. It is anticipated that this consent would provide the appropriate safeguards to protect the receiving water course, inclusive of the contribution from rainfall derived run-off from the proposed activities within this application



5.0 Conclusions

The results of this risk assessment have established the following:

- the proposed buttress will only accept inert waste streams which will meet inert WAC limits, therefore there is no significant contaminant source and leachate management is not required;
- the conceptual site model confirms that the buttress material will be tipped into an historic clay pit with no viable aquifer pathway across the sidewalls. Assessment of historic borehole logs confirm that there is a minimum of 1.5m of in-situ oxford clay within the base of the pit, likely to be in excess of 4m thickness, which will protect the underlying Kellaways Formation aquifer.
- no groundwater receptors associated with the underlying Kellaways Formation have been identified, the Kellaways are overlain by a significant thickness for a distance of >4.5km from the Site indicating the deposits will not provide baseflow to watercourses or ecological sites and no abstractions have been recorded within a 2km radius; and
- the Site should comply with the relevant requirements of the Schedule 10 and Schedule 22 of the Environmental Permit Regulations 2016 (as amended).





