SANDON QUARRY NORTHERN VOID RESTORATION

Environmental Permit Application

Environmental Setting and Site Design

Prepared for: Brett Aggregates Limited

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1.0 INTRODUCTION

1.1 Report Context

Brett Aggregates Limited (BAL) has instructed SLR Consulting Limited (SLR) to prepare a bespoke Environmental Permit (EP) application to authorise the deposit of waste for recovery in the restoration of the Northern Void, Sandon Quarry, Sandon, Chelmsford, Essex, CM2 7RL, hereafter referred to as 'the Site'.

The EP application seeks to restore the northern void of Sandon Quarry through infilling using approximately 1,608,800 tonnes of inert materials The majority of the area will be restored to a species rich grazed grassland with shallow pools and areas of exposed substrate interspersed throughout to provide habitat for invertebrate species relevant to the void's current designation as an LWS.

This Environment Setting and Site Design (ESSD) report sets out the conceptual model, the environmental setting and site design, and is supported by the risk assessments submitted in this application.

1.2 Site Details

1.2.1 Site Location and Access

Centred on national grid reference TL 74747 04347, the northern void of Sandon Quarry is located within a predominantly agricultural landscape approximately 170m to the southeast of the village of Sandon, Essex. The A12 trunk road (T) is situated approximately 10m to the west of the Site. Access to the Site can be gained from the A1114 on a slip road at the junction of the A1114 with Molrams Lane and Church Street. The site is surrounded by a network of minor roads connecting the villages of Sandon to the north-west of the site, Butts Green to the south-east and Howe Green to the south with properties present on the roads between the main villages. There are several residential properties located within the area surrounding the Site. The closest properties are located approximately 120m to the north-west of the Site and beyond the A12(T).

The location of Sandon Quarry is illustrated on Drawing EP1, whilst the phased restoration scheme is illustrated in Drawings 001-012.

1.2.2 Site Classification

The recovery of waste on land will be employed in the restoration of the Quarry.

1.2.3 Application Boundaries and Site Security

The Site Environmental Permit Boundary is illustrated on Drawing EP2.

The wider Sandon Quarry complex benefits from the following infrastructure to keep the Site secure, and prevent unauthorised access:

- Visitor Sign in/Sign out book; and
- Perimeter fencing/hedging and lockable gates.

1.2.4 Site Context

Surrounding land-use and receptors are identified on Drawing EP4 Environmental Site Setting. Immediate surrounding land uses are identified in Table 1-1 below.

Table 1-1 Immediate Surrounding Land Uses

Boundary	Description
North	Agricultural land and the A12 road.
East	The former Sandon Quarry and agricultural land.
South	The Sandon Southern Void Inert Landfill
West	The former Sandon Quarry, A12 and agricultural land

The wider surrounding land uses are described in further detail below:

1.2.5 Industrial/Commercial Premises

Brett operate a closed and active landfill sites within the Sandon Quarry Southern Void immediately to the South of the Site, under environmental permit references EPR/TP3191EW (active landfill) and BP3799NC (closed landfill). Brett also operate a soil, substitute and aggregate recycling facility (EPR ref. FB3203MM) approximately 100m to the east of the Site.

The closest industrial/commercial premises not operated by Brett are units located approximately 380m to the east of the Site.

1.2.6 Residential Properties

The closest residential area is within Sandon village approximately 120m to the north-west of the Site on Hall Lane.

Sandon Hall, which is owned by Brett, is located approximately 250m to the south of the Site boundary.

1.2.7 Local Transport Network

The A12 is located 10m from the western boundary of the Site. There are also a number of smaller residential roads which serve Sandon Village, to the north-west of the Site. The closest of these is Hall Lane 110m from the Site boundary.

1.2.8 Agricultural/Open Ground

The Site is predominantly surrounded by land within the Sandon Quarry complex which has been restored to a mixture of agricultural land, woodland, ecological habitat and open space. . The Sandon Quarry Southern Void whose restoration to agriculture use is approaching completion lies 20m to south of the Site. Drawing 1910/005 K Restoration Proposals illustrates how the areas surrounding the Northern Void have been restored.

1.2.9 Woodland

With the Site being located in a predominantly rural location, there are various parcels of woodland within 500m of the Site. According to the EA Habitat and Conservation screening assessment and MAGIC map, the nearest area of woodland lies 30m to the north-west of the Site and 15m west, these are classified as Priority Habitat - Deciduous Woodland habitat.

1.2.10 Public Footpaths, Recreational Areas and Areas for Public Use

There are a series of allotment gardens located within Sandon village approximately 68m to the north-west.

There are a number of public footpaths to the north, south, east and west.

1.3 Geology

The wider Sandon Quarry site was described in the Sandon Quarry South ESID**Error! Bookmark not defined.** as located on a northeast-southwest orientated buried channel (paleochannel) of sand and gravel (River Terrace Gravels). This paleochannel is further described as being highly variable in thickness and cutting into the surface of the London Clay. The Drift geology comprises units of sand and gravel with thin, intercalated clays and silts. The BGS geological map indicates that the main buried channel extends approximately 200m south of the northern void, 300m to the west of the northern void and over 1km to the northeast of the northern void. Appendix K of the 1998 ES[Error! Bookmark not defined.] also refers to a narrow southern part of the channel south of the southern void, approximately 120m wide.

The River Terrace deposits are overlain by a variety of other superficial deposits across the modelled area. The northern void is largely surrounded by older manmade fill as follows:

- western site boundary – spoil from the construction of the A12;
- northern site boundary – historic landfilling; and
- southern site boundary – causeway formed historically with infill, then Sandon Southern Void landfill further south.

Along the eastern site boundary lies Alluvium beneath both arms of nearby Sandon Brook, and glaciofluvial and glaciolacustrine deposits across the slope of the hillside to the north-east.

The superficial deposits in the vicinity of the Site are presented in Drawing HRA1. The geological sequence identified is summarised in Table 2-3 below.

Table 1-2
Summary of Geology

Age	Strata	Description	Thickness
Anthropocene	Made Ground / Fill	Mixture of reworked sands and gravels, silts and clays	0 – 20m
Quaternary	Glaciofluvial Deposits	Mid-Pleistocene Sand and Gravel	0 – 3m
	Glaciolacustrine Deposits	Mid-Pleistocene Clay and Silt	0 – 3m
	Head	Poorly sorted and poorly stratified hillwash of clays, sands and gravels	0 – 5m
	Alluvium	Fluvial clay, silt, sand and gravel	1.2 – 5.2m
	River Terrace Deposits	Greyish-brown sand and gravel	2 – 25m
Paleogene	London Clay	Blue-grey stiff grey CLAY	Up to 150m

Bedrock Geology

The superficial sands and gravels are underlain by London Clay bedrock which outcrops at the surface to the south-east, south and south-west of the northern void as well as across a small area to the north of the village of Sandon.

The approximate base of the sand and gravels (top of the London Clay) is presented in Drawing HRA1; this demonstrates that the paleochannel extends in a north-easterly direction from the northern void for a distance of approximately 2.5km. The paleochannel is at its deepest in the vicinity of the northern void with a minimum elevation of approximately -10mAOD, becoming progressively shallower as it extends approximately 2km to the north. To the south of the southern void the base of the paleochannel rises steeply to where the London Clay outcrops, approximately 400m to the south and south-west.

1.4 Hydrogeology

1.4.1 Aquifer Designations

The Magic Map service[1] classifies the River Terrace Deposits as a Secondary A Aquifer, described as:

> *"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. These are generally aquifers formerly classified as minor aquifers"*

The London Clay is classified as Un-Productive Strata, described as:

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

1.4.2 Source Protection Zones

The Multi-Agency Information for the Countryside (MAGIC)[2] website indicates that the application Site does not lie within a source protection zone (SPZ).

1.5 Hydrology

Sandon Quarry is located within the catchment of the River Chelmer in an area of low relief. The eastern arm of Sandon Brook, a tributary of the River Chelmer, flows in a northerly direction, 80m east of the Site. The western arm of Sandon Brook lies to the north-west, approximately 30m from the Site at its closest point. The two arms of the Brook converge at Woodhill Road, 400m north of Site, and flows north-east to join the River Chelmer approximately 4km north. Hanningfield Reservoir is located 5km south of the Site.

There is a surface water ponds located within the Site boundary, due to the high water level at the Site. There are additional surface water ponds to the south, south-east, east, west and north-east of the permit boundary, the nearest of which 150m south-east.

1.5.1 Groundwater Vulnerability

The MAGIC website indicates that the Site lies on an area of Low Groundwater Vulnerability. There is a small area on the southern boundary of the Site which is classified as unproductive.

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[1] https://magic.defra.gov.uk

[2] Multi-Agency Information for the Countryside – Available at: http://www.magic.gov.uk, accessed December 2021

1.5.2 Flood Zone

The Flood Map for Planning[3] confirms that the Site lies within a Flood Zone 1, which is defined as "land having a less than 1 in 1,000 annual probability of river or sea flooding".

There are areas in close proximity to the Site which lie in the Sandon Brook watercourse Flood Zone 3, which is classified as an area with a high probability of flooding. No areas within the Site permit boundary lie within these zones, and the closest Flood Zone 3 lies 80m to the east.

1.6 Ecology

1.6.1 European/International Designated Sites

The MAGIC map website and an EA Habitats and Conservation screening assessment (Appendix A of the ERA included in Section 5 of this EP application) conducted for the Site, have both been accessed to determine the presence of any European or Internationally designated sites within a 2km radius from the Site's boundary. These searches on the MAGIC website confirms that there are none of the following European or International sites located within 2km of the site boundary;

- Sites of Special Scientific Interest (SSSI);
- Special Area of Conservation (SAC);
- Special Protection Areas (SPA); and
- RAMSAR.

Local Wildlife Sites

Sandon Quarry itself lies within the Sandon Pit Local Wildlife Site (LWS).

Protected Species/Habitats

A known habitat of the Bullhead fish is located approximately 600m east and there is a European Eel migratory route within Sandon Brook approximately 30m north-west.

Great Crested Newts have previously been identified within the Sandon Quarry northern void. Prior to recovery operations commencing the Newts will be relocated from the northern void to a pre-existing receptor site, under the translocation consents agreed. The purpose built ponds to the north of the northern void have already been used in the translocation of Newts from the Sandon Quarry southern void when this was restored. The translocation exercise was conducted under a derogation licence (Reference ESPM 2011:3093) issued under Regulation 53(1) of the Conservation of Habitats and Species Regulations 2010.

1.6.2 National/Locally Designated Sites

Ancient Woodland

An area of Ancient & Semi-Natural Woodland lies 1.4km from the Site to the north-east. A section of Ancient Woodland, 'Old Hare Wood', lies 1.8km from the Site also to the north-east.

Other Receptors

A review of the EA Habitat and Conservation screening assessment and the MAGIC website, confirms that none of the following are situated within 2km of the Site:

- Area of Outstanding Natural Beauty;

[3] Gov.uk, Flood Map for Planning, available at https://flood-map-for-planning.service.gov.uk/, accessed in December 2021

- Local Nature Reserve;
- National Nature Reserve; and
- National Parks.

1.7 Cultural Heritage

Listed Buildings

There are numerous listed buildings within 2km of the Site. The nearest of which being Sandon Hall and Barn to the west of Sandon Hall, located approximately 250m south of Site's boundary.

Registered Parks and Gardens

A section of Danbury Park, a Registered Park and Garden lies north-east, located 1km from the Site at its closest point.

Scheduled Monuments

The scheduled monument Icehouse in Danbury Country Park, located within Danbury Park, lies 1.7km to the north-east of the Site.

Other Receptors

Searches on the MAGIC website confirms that there are none of the following within 2km of the application site:

- National Trust Properties;
- World Heritage Sites; and
- Registered Battlefields.

1.1 Receptors

Local Receptors within 500m of the Site are identified in Table 1-2, along with cultural and ecological receptors within 2km.

Table 1-3 Identified Receptors

Receptor Name	Receptor Type	Direction from Site	Approximate Distance from proposed site boundary (at nearest point)
Local receptors within 500m of the Environmental Permit Boundary as shown on Drawing EP4 Environmental Site Setting			
Surface water bodies including lakes and ponds	Surface water features	South, south-east, east, west, and north-west	Within site boundary
A12	Local Road Network	West	Adjacent
Agricultural and open land	Agricultural and open land	North, south, east	Adjacent
Sandon Quarry Southern Void	Agricultural and open land	South	Adjacent
Local footpaths	Footpaths	North, south, east and west	Adjacent

Receptor Name	Receptor Type	Direction from Site	Approximate Distance from proposed site boundary (at nearest point)
Priority Habitat - Deciduous Woodland	Woodland	East	15m
Priority Habitat - Deciduous Woodland	Woodland	North-West	30m
Sandon Brook and tributaries of the River Chelmer	Rivers	East, north	15m
Allotment Gardens within Sandon	Recreational	North-west	68m
Hall Lane	Local Road Network	North-west	110m
Residential properties within Sandon Village	Residential	North-west	120m
Sandon Hall	Residential	South	250m
Industrial units	Industrials	East	380m
Cultural and ecological receptors within 2km of the EP boundary as shown in Drawing EP5 Cultural and Natural Heritage			
Sandon Quarry	Local Wildlife Site	Within site boundary	Within site boundary
Great Crested Newts	Protected Species/Habitats	Within site boundary	Within site boundary
European Eel migratory route	Protected Species/Habitats	North-west	30m
Sandon Hall and Barn to the west of Sandon Hall	Listed Buildings	South	250m
Bullhead fish habitat	Protected Species/Habitats	East	600m
Danbury Park	Registered Park & Garden	North-east	1000m
Ancient & Semi-Natural Woodland	Ancient Woodland	North-east	1400m
Icehouse in Danbury Country Park	Scheduled Monument	North-east	1700m
Old Hare Wood	Ancient Woodland	North-east	1800m

1.1.1 EA Position Statement on the Location of Landfills

This is not applicable because the Site is not a landfill.

2.0 SOURCE

2.1 Site History and Historical Land Use

The Site is a former sand and gravel pit within the Northern Area of the Sandon Quarry complex. It comprises a deep void, approximately 5mAOD at its lowest point and up to approximately 32mAOD at its crest, with steep slopes at the edges.

Planning permission for the extraction of sand and gravel in the Northern Quarry area was granted in 1955 (ref. CHR/252/55). Sand and gravel was extracted from the 1960s through into the 1980s. In the 1980s, the western part of the Northern Quarry area was restored under a Control of Pollution Act licence ref. 118/85 using excavated natural materials arising solely from the A12 construction site. Completion of restoration of the Northern Quarry area was then delayed by an extension of the quarry's operating life granted by planning permission ref. CHL/14/84 in 1985.

No restoration activities have taken place at the Site since 1985. However, restoration of the wider Sandon Quarry complex has continued since as described below in Section 2.1.2.

In 2018, planning permission for the restoration of the Northern Quarry void was granted by Essex County Council (ref. ESS/08/16/CHL).

Since planning permission for restoration of the Site was granted in 2018, BAL have been working to address pre-commencement conditions in the Site's planning permission and undertaking preparatory works. This has included undertaking site investigation, monitoring, preparing risk assessments and developing detailed methodologies for the delivery of the slope stabilisation (which have subsequently been submitted to ECC and approved, with the Environment Agency (EA) as a consultee) and restoration scheme.

The northern quarry void is designated as a Local Wildlife Site (LWS) due to invertebrate species and associated habitats which have established following the completion of sand and gravel extraction. Works such as the relocation of great crested newts and reptile species and establishment of a biodiversity compensation area are underway in accordance with an Ecological Management Plan agreed with Natural England.

2.1.1 Stability

Historically, the southern and western A12 (T) slopes of the northern void have experienced significant stability issues. Geotechnical appraisals and water level monitoring of the site have been undertaken since 2016.

In July 2020, a series of tension cracks in the north-western area of the northern void were identified by BAL personnel during routine visual inspections of the western A12(T) slope. In December 2020 it was reported by site personnel that the lower part of the slope had slipped by approximately 300mm, along the line of the tension cracks initially observed in July 2020. On the 27th December 2020 further slippage of the slope in the order of 1m was recorded by site personnel.

The ongoing stability issues at the site, including the December 2020 slope movements, can be partially attributed to excess porewater pressures forming in the western slope following increased pumping to draw the water level in the void down.

In February 2021, an Emergency Earthworks Remedial Strategy comprising the construction, using waste, of a berm for access and a buttress to support the slope was designed by SLR. Discussions were held between the Environment Agency (EA) and BAL throughout May and June 2021 regarding the instability events and, in July 2021, a Local Enforcement Position (LEP) (ref. AH/EAWML102405) was granted by the EA for the emergency earthworks.

Construction of the berm and emergency buttress commenced in November 2021 following a delay obtaining permission from the ECC in relation to certain conditions in planning permission ref. ESS/08/16/CHL.

2.1.2 Adjacent Former Waste Management Activity Boundaries

The Site is a former sand and gravel pit within the Northern Area of the Sandon Quarry complex. The Northern Area is the last area of the Site requiring restoration. Accordingly, there are a number of former waste management activities within the immediate vicinity of the Site as follows:

- Sandon Quarry Southern Void Inert Landfill – operated by BAL under environmental permit ref. EPR/TP3191EW. Active inert landfill approaching completion of restoration (likely expected in 2022) and surrendered deposit of waste for recovery activity
- Hall Lane Landfill – operated by Aylett Gravel Co Ltd (a Brett Group subsidiary) under environmental permit ref. BP3799NC now a definitively closed inert landfill
- Western part of Northern Quarry – Control of Pollution Act licence ref. 118/85 under which excavated natural materials arising solely from the A12's construction are supposedly deposited.

2.1.3 Pollution Incidents

To the operator's knowledge, there have been no known recent pollution incidents within the Site boundary or within close proximity to the Site boundary.

2.1.4 Proposed Development

This EP application seeks to authorise the use of suitable imported inert waste materials as a replacement for non-waste construction material, in stabilising the quarry slopes including that adjacent to the A12(T), and the restoration of the quarry void to agricultural and nature conservation uses with new public rights of way. The proposed restoration of the land is illustrated in the following drawings

- 'Restoration Proposals' ref. 1910/005/K dated March 2012.

The void will be restored using inert waste for which treatment is not technically possible. The majority of the area will be restored to a species rich grazed grassland with shallow pools and areas of exposed substrate interspersed throughout to provide habitat for invertebrate species relevant to the void's current designation as a Local Wildlife Site (LWS). The restored landform will comprise a gentle slope from approximately 32mAOD in the south to approximately 25mAOD in the north. Around the edges of the Site, woodland will be allowed to naturally regenerate, and a hedgerow will be planted through the centre of the Site dividing it in to two. A permissive bridleway will run around the inside edges of the woodland along with permissive footpaths through the centre of the Site and to link in with the existing network of footpaths in the area.

Although not included within the scope of this EP since materials will be sourced from on-site stockpiles, the restoration scheme included within the scope of ESS/08/16/CHL includes a biodiversity compensation area (to compensate for loss of the Northern Void LWS and restoration of the plant site to the east of the northern void. The biodiversity compensation area will be created at least 1 year prior to the commencement of the northern void's restoration and will incorporate reed swamp, exposed substrate and exposures created by soil stripping and disturbance, sparse ephemeral over bare ground, species-rich grassland, tall ruderal vegetation, log piles, scrub, shallow pools and open water to provide habitat for invertebrates found in the northern void LWS. Existing trees and woodland, semi-improved grassland, ponds and associated vegetation will be retained as far as possible.

The restoration scheme for the plant site will form an extension to the habitats created in the biodiversity compensation area. The plant site will be restored following the cessation of operations within the plant site. Once restoration of the northern void is completed, it is anticipated that the target invertebrate species will recolonise from the biodiversity compensation area.

Given stabilities issues at the Site - as described in Section 2.2 - the site will be restored in a partially dewatered state and involve subaqueous placement of the attenuation layer and fill until above the water level. The level

of water within the void will be maintained at 14.5-15mAOD unless operational safety reasons require it to be drawn down to a minimum of 9mAOD.

Key points regarding the proposed Northern Void restoration are as follows:

- Due to the stability risks to the A12 and quarry slopes, the quarry void will be filled in a phased and partially dewatered to within 300-400mm of the pre-settlement contour levels. The infilling will be undertaken over 12 phases which can be summarised as follows and are illustrated in Drawings 001-012. The phasing scheme has been designed in accordance with the requirements of Condition 10 of planning permission ESS/08/16/CHL.
    - Phases 1 through to 9 involve the creation of berms within the quarry void and then infilling the voids between the berms to achieve a level platform at 17mAOD, above the water level within the void. The phasing has been designed to provide stability to the quarry side slopes in order of priority. Phase 1 comprises the emergency earthworks to be completed under the LEP (ref. AH/EAWML102405).
    - Phase 10 involves the creation of a buttress to the full height of the former quarry in the north-eastern corner.
    - Phase 11 involves the creation of a buttress to the full height of the former quarry in the south-eastern corner.
    - Phase 12 involves the placement of fill to within 300-400mm of the pre-settlement contour levels.
- Following completion of fill material placement, a layer of fine clay and sand approximately 300-400mm thick will be sourced from any remaining on site material (following restoration of the plant site) and imported waste. It will be spread to provide a suitable substrate which will be sown with species rich chalk grassland. Shallow ponds and areas of sandy substrate will be created in line with approved details
- Including 67,000m^3 of waste material to be placed under the LEP, volumetric calculations based on the current topography and proposed restoration contours estimate that approximately 846,737m^3 material will be required to complete the scheme. This equates to approximately 1,608,800 tonnes based on a conversion factor of 1.9 tonnes per m^3.
- Waste will be deposited at a maximum rate of up to 300,000 tonnes per annum for use in restoration of the void. Restoration of the northern quarry void is anticipated to be completed in approximately 8.5 years.

The Site location is shown on Drawing EP1 Site Location, the Site permit boundary is shown on Drawing EP2 Environmental Permit Boundary.

Waste Types

It is confirmed that only inert waste material that is suitable for its intended use will be accepted at the Site. The waste categories which will be employed in the restoration operation at the Site are detailed in Table 2-1 below.

The inert waste types specified in Table 2-1 are listed in the EA's 'Check if your waste is suitable for deposit for recovery' guidance, April 2021, as being potentially suitable for restoration of mineral workings.

All waste accepted at the Site will be inert, and no contaminated materials will be accepted. Documentation will accompany all waste material accepted, which will be reviewed in accordance with the Site's waste pre-acceptance and acceptance procedures to ensure any materials used are suitable for use in the restoration operations.

Table 2-1 Proposed Waste Types for Deposit of Waste for Recovery

Waste Code	Description
01	WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING AND PHYSICAL AND CHEMICAL TREATMENTS OF MINERALS
01 04	Wastes from physical and chemical processing of non-metalliferous minerals
01 04 08	waste gravel and crushed rocks other than those mentioned in 01 04 07
01 04 09	waste sand and clays
17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)
17 01	Concrete, bricks, tiles and ceramics
17 01 01	concrete[1]
17 01 02	bricks[1]
17 01 03	tiles and ceramics[1]
17 01 07	mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06[1]
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil
17 05 04	soil and stones other than those mentioned in 17 05 03 [2]
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE
19 12	Wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified
19 12 12	Crushed bricks, tiles, concrete and ceramics, including mixtures of materials[1] [3]
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS
20 02	Garden and park wastes (including cemetery wastes)
20 02 02	soil and stones (excluding topsoil and peat) [2]

Note [1] – Selected construction and demolition waste (C&D waste: with low contents of other types of materials like metals, plastic, organics, wood, rubber etc.). The origin of the C&D waste must be known

No C&D waste from constructions, polluted with inorganic or organic dangerous substances, e.g. because of production processes in the construction, soil pollution, storage and usage of pesticides or other dangerous substances, etc, unless it is made clear that the demolished construction was not significantly polluted.

No C&D waste from constructions, treated, covered or painted with materials, containing dangerous substances in significant amounts.

Note [2] –Soil includes naturally occurring sands and clays

Note [3] – Not including residual 'fines' from mechanical treatment of mixed waste at transfer stations.

3.0 PATHWAY AND RECEPTOR

3.1 Geology

Full detail can be found in the Hydrological Risk Assessment (HRA) (Ref 416-01526-00069_HRA) enclosed in Section 6 of this application.

Soils

The Cranfield Soilscapes online soil map viewer[4] indicates that the natural soils at the Site were predominantly '*Freely draining slightly acid loamy soils'* which drain to local groundwater and rivers. Site investigation found top-soils with a thickness of approximately 0.2m around the perimeter of the quarry void.

Superficial Deposits

The wider Sandon Quarry site was described in the Sandon Quarry South ESID**Error! Bookmark not defined.** as located on a northeast-southwest orientated buried channel (paleochannel) of sand and gravel (River Terrace Gravels). This paleochannel is further described as being highly variable in thickness and cutting into the surface of the London Clay. The Drift geology comprises units of sand and gravel with thin, intercalated clays and silts. The BGS geological map indicates that the main buried channel extends approximately 200m south of the northern void, 300m to the west of the northern void and over 1km to the northeast of the northern void. Appendix K of the 1998 ES[Error! Bookmark not defined.] also refers to a narrow southern part of the channel south of the southern void, approximately 120m wide.

The River Terrace deposits are overlain by a variety of other superficial deposits across the modelled area. The northern void is largely surrounded by older manmade fill as follows:

- western site boundary – spoil from the construction of the A12;
- northern site boundary – historic landfilling; and
- southern site boundary – causeway formed historically with infill, then Sandon Southern Void landfill further south.

Along the eastern site boundary lies Alluvium beneath the eastern arm of nearby Sandon Brook, and glaciofluvial and glaciolacustrine deposits across the slope of the hillside to the north-east.

The superficial deposits in the vicinity of the Site are presented in Drawing HRA1. The geological sequence identified is summarised in Table 3-1 below.

Table 3-1 Summary of Geology

Age	Strata	Description	Thickness
Anthropocene	Made Ground / Fill	Mixture of reworked sands and gravels, silts and clays	0 – 20m
Quaternary	Glaciofluvial Deposits	Mid-Pleistocene Sand and Gravel	0 – 3m
	Glaciolacustrine Deposits	Mid-Pleistocene Clay and Silt	0 – 3m
	Head	Poorly sorted and poorly stratified hillwash of clays, sands and gravels	0 – 5m

[4] Cranfield Soil and Agrifood Institute Soilscapes Online Soil Map Viewer (Accessed 29/11/21) http://www.landis.org.uk/soilscapes/

Age	Strata	Description	Thickness
	Alluvium	Fluvial clay, silt, sand and gravel	1.2 – 5.2m
	River Terrace Deposits	Greyish-brown sand and gravel	2 – 25m
Paleogene	London Clay	Blue-grey stiff grey CLAY	Up to 150m

Bedrock Geology

The superficial sands and gravels are underlain by London Clay bedrock which outcrops at the surface to the south-east, south and south-west of the northern void as well as across a small area to the north of the village of Sandon.

The approximate base of the sand and gravels (top of the London Clay) is presented in Drawing HRA1; this demonstrates that the paleochannel extends in a north-easterly direction from the northern void for a distance of approximately 2.5km. The paleochannel is at its deepest in the vicinity of the northern void with a minimum elevation of approximately -10mAOD, becoming progressively shallower as it extends approximately 2km to the north. To the south of the southern void the base of the paleochannel rises steeply to where the London Clay outcrops, approximately 400m to the south and south-west.

3.1.1 Hydrogeology

Aquifer Characteristics

The Magic Map service[5] classifies the River Terrace Deposits as a Secondary A Aquifer, described as:

> *"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. These are generally aquifers formerly classified as minor aquifers"*

The London Clay is classified as Un-Productive Strata, described as:

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

Rainfall Infiltration

Rainfall data have been provided by the Environment Agency for a rain gauge located in Chelmsford, approximately 2.5km to the north-west of the Site. The gauge provides daily rainfall for the period August 2011 to March 2021. Long-term average (1981 – 2010) rainfall data have also been obtained from the Met Office for Writtle, approximately 7km north-west of the Site. Average monthly rainfall from both sources is summarised in Table 3-2.

Potential Evapotranspiration (PET) data have been obtained from MAFF Technical Bulletin 34[6], area 33E. The recorded PET and calculated effective rainfall (based on Met Office Long-Term averages) are summarised in Table 3-2. The monitoring data indicate that PET exceeds average rainfall between April and September and the bulk of recharge will typically occur over the winter period between October and February each year

[5] https://magic.defra.gov.uk

[6] MAFF (Dec 1975) *Technical Bulletin 34: Climate Change and Drainage*

Table 3-2 Average Monthly Total and Effective Rainfall and Potential Evapotranspiration

Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Rainfall at Chelmsford (EA) 2011 - 2021	58.38	33.88	33.56	34.22	40.87	48.22	50.38	55.74	40.94	65.40	51.32	64.36	577.26
Rainfall at Writtle (Met Office) 1981 - 2010	53.20	39.20	40.20	41.60	48.70	49.90	44.30	51.70	48.60	64.10	58.00	52.30	591.80
PET	3.0	10.0	32.0	57.0	84.0	98.0	98.0	80.0	51.0	21.0	5.0	1.0	540
Effective Rainfall at Writtle	50.2	29.2	8.2	0.0	0.0	0.0	0.0	0.0	0.0	43.1	53.5	51.3	235.5

Recharge rates are likely to be relatively high where River Terrace and glaciofluvial deposits are present at the surface with lower recharge rates into Alluvium, Head and Glaciolacustrine deposits.

Groundwater Levels and Flow

Groundwater levels across both the northern and southern voids have long been impacted by groundwater management, particularly from the southern void. Groundwater levels were historically maintained towards the base of the southern void at an elevation of c.4mAOD. It is unknown when pumping at the Site commenced, however a 1998 hydrogeological report on Sandon Quarry[7] indicated a water level at the time of -4mAOD in the southern void in December 1997 (no information is available on the water level in the northern void at this point).

A topographical survey completed on 13th December 2010 indicated a water level in the southern void of 3.59mAOD and in the northern void at 8.52mAOD. Pumping from the southern void was gradually reduced until ceasing in 2017 and water levels in the northern void had rebounded to an elevation of c.15.80mAOD by late 2017. Since 2017 groundwater levels have been managed by pumping from the northern void.

Groundwater levels have been regularly monitored at fifteen perimeter boreholes from January 2014 to October 2021. Most of these monitor the sands and gravels, although several have been installed within areas of backfill and made ground. Borehole locations are shown on Drawing HRA1 which also shows groundwater level contours for May 2021, a time-series graph illustrating groundwater levels in all boreholes is presented as Appendix 02 of the HRA, and groundwater level data are summarised in Table 3-3 for the monitoring period 2019-2021, when more recently installed boreholes are also available.

Table 3-3 Summary of Groundwater Level Data 2019-2021

Borehole ID	Horizon Monitored	Date Range		Groundwater Level (mAOD)				
				Count	Min	Mean	Max	Range (m)
BH01 (1997)	Shallow sand	28/02/19	17/08/21	10	21.27	22.16	23.67	2.40
BH01/17	Historic fill	04/01/19	26/10/21	11	17.19	17.88	19.05	1.86
BH07	Shallow sand	28/02/19	17/08/21	11	21.69	22.27	23.09	1.40
BH1/97	Gravel	28/02/19	26/10/21	17	16.88	17.94	19.05	2.17

[7] MJ Carter Associates (Jan 1998) *A hydrogeological report on Sandon Quarry*, Ref: BGL/SA/HC/998/04

Borehole ID	Horizon Monitored	Date Range		Groundwater Level (mAOD)				
				Count	Min	Mean	Max	Range (m)
BH12R	Sand	28/02/19	17/08/21	11	25.42	26.04	26.42	1.00
BH14	Sand and overlying fill	02/01/19	30/11/21	291[a]	13.94	15.47	17.03	3.09
BH15	Sand and overlying fill	02/01/19	30/11/21	292[a]	13.98	15.51	16.25	2.27
BH16	2m sand layer in clay	28/02/19	26/10/21	17	18.16	19.29	21.22	3.06
2020-02	Historic fill	23/03/21	26/10/21	8	17.89	18.89	20.42	2.53
2020-03	Sand	05/02/21	26/10/21	9	12.92	14.26	14.95	2.03
2020-05	Gravel	05/07/21	30/11/21	51	16.28	16.88	17.32	1.04
2020-06	Historic fill	05/07/21	30/11/21	49	15.46	16.17	16.89	1.43
BH6/97R	Sand and gravel	28/02/19	17/08/21	11	15.40	15.77	16.24	0.84
BH06A	0.4m sand layer in silt	28/02/19	26/10/21	17	21.14	21.80	22.86	1.72

[a] – monitored more frequently for stability reasons

A review of the groundwater level data indicates the following:

- from 2014 – 2017 there was a rising trend in groundwater levels associated with the reduction and cessation of pumping from the southern void;
- between November 2017 and June 2021, when pumping from the northern void typically ranged from 600-900 m3/day, groundwater levels have shown a slight declining trend close to the northern void, where lake water levels declined from 15.6mAOD in late 2017 to c.14mAOD in the summer of 2021.
- groundwater levels within the sand and gravel aquifer in the general vicinity of the Site since 2019 have ranged from 26.42 mAOD at BH12R in the south to 16.88 mAOD in the north;
- groundwater levels within the sand and gravel aquifer adjacent to the dewatered quarry void had fallen to 14.6mAOD by the summer of 2021, but there has been significant variation of several metres depending on occasional variations in the rate of pumping from the northern void;
- a seasonal variation of up to 2-3m is evident in groundwater levels in the general vicinity of the Site; and
- groundwater flow across the Site is broadly towards the north.

Aquifer Properties

Permeability testing was completed by SLR as part of the 2020 Ground Investigation, and results of the permeability testing were presented within the Ground Investigation Report included within Appendix 01 of the overarching *'submission to discharge condition 10 of planning consent ESS/08/16/CHL'* report.

Testing for permeability of the fill around the western edge of the northern void confirmed low permeabilities of less than 0.01 m/day, indicating that there are not likely to be significant groundwater inflows where there is thick fill. The general applicability of this order of magnitude of permeability for the fill was confirmed by MODFLOW modelling[8] carried out by SLR.

Testing of the sands and gravels was completed in five of the perimeter boreholes along the western boundary of the Site. Borehole locations as presented on Drawing HRA1. The test results as summarised in Table 3-4 indicate that the permeability of the sands and gravels is relatively high, at between 1m/day and 11m/day. The applicability of this range of permeability was also confirmed by MODFLOW modelling carried out by SLR.

[8] Sandon Quarry Northern Void: Groundwater Modelling Report, August 2021, SLR Ref: 403.09886.00012

Table 3-4 Permeability Test Results at Boreholes Installed in Sand and Gravel

Borehole	BH1/97	BH16	BH15	2020-05	2020-03
Ground Level (mAOD)	+25.97	+26.34	+28.34	+31.02	+16.38
Slotted Casing (mAOD)	-4 to +8	+2 to +25	-1 to +27	+7 to +12	-1.3 to +11.9
Summary of Geology (Elevation (mAOD)	Sand: +21 to +26 Silt: +10 to +21 Gravel: -4 to +10	Clayey Fill: +22 to +26 Clay: +6 to +22 Sand: +4 to +6 Clay: +2 to +4	Clayey Fill: +8 to +28 Sand: -1 to +8	Fill: +12.5 to +31 Gravel: +7 to +12.5	Fill: +12.5 to +16.4 Sand: -1.3 to +12.5
Rest Water Level (mAOD)	17.29	18.18	14.96	16.80	15.17
Permeability (m/day)	5 – 11	1 – 8 [a]	1 – 1.5 [a]	2 - 9	2 – 9
[a] - results analysed assuming that all flows are in sand or gravel horizons only					

3.1.2 Groundwater Quality

Groundwater quality has been sampled on a quarterly basis at six boreholes monitoring the deeper sand aquifer, and also from the dewatering discharge. Recent results are presented below in Tables 3-5 to 3-7, with data shaded if Drinking Water Standards (DWS) have been exceeded, and key groundwater chemographs are presented in Appendix 03 of the HRA.

Groundwater quality is generally within the relevant DWS, apart from:

- elevated sulphate concentrations which are likely to be due to elevated concentrations in older historic fill. More recent concentrations have remained below the 2013 maximum of 1290 mg/l at BH14. Concentrations in down-gradient borehole BH1/97 have generally exceeded or approached DWS, possibly influenced by older historic fill;
- concentrations of iron and manganese have exceeded DWS, potentially due to redox variations; and
- at borehole BH6/97R concentrations of nickel have exceeded DWS (and arsenic has approached DWS) , which is likely to be due to sorption onto manganese oxide nodules in the silt horizon present within this borehole;
- nickel, lead and PAHs have also been elevated at boreholes influenced by older historic fill.

Table 3-5 Summary of Routine Determinands in Groundwater Quality 2018-2021

Sample Point	Summary Stats 2018 Onwards	Alkalinity as CaCO3	Ammoniacal Nitrogen as N	BOD	Chloride	COD (Total)	Conductivity	pH	Sulphate as SO4	Total Organic Carbon	Total Oxidised Nitrogen
		mg/l	mg/l	mg/l	mg/l	mg/l	us/cm	pH units	mg/l	mg/l	mg/l
	UK DWS	-	0.39	-	250	-	2500	6.5 - 9.5	250	-	-
BH1/97	Count	15	15	15	15	15	15	15	15	15	15
	Detects	15	12	10	15	12	15	15	15	15	0
	Min	196.0	<0.06	<1	68.5	<11	1020	7.0	228.0	3.0	<0.7
	Mean	284.1	0.091	1.3	75.7	17.0	1075	7.4	236.8	3.5	-
	Max	340.0	0.12	3.0	79.4	33.0	1170	7.8	261.0	4.9	<0.7
BH12R	Count	11	11	11	11	11	11	11	11	11	11
	Detects	11	0	7	11	10	11	11	11	11	10
	Min	75.0	<0.06	<1	4.9	<11	263	7.0	31.5	6.7	<0.7
	Mean	96.9	-	1.7	13.6	31.7	370	7.3	72.0	11.0	3.09
	Max	121.0	<0.06	4.0	23.9	59.0	480	7.9	129.0	16.8	6.80
BH14	Count	17	17	17	17	17	17	17	17	17	17
	Detects	17	13	11	17	15	17	17	17	17	0
	Min	202.0	<0.06	<1	135.0	<11	1750	6.9	394.0	1.9	<0.7
	Mean	347.7	0.10	1.6	228.5	38.2	1870	7.3	487.8	2.5	-
	Max	586.0	0.17	5.0	312.0	345.0	2040	7.7	601.0	3.9	<0.7
BH15	Count	17	17	17	17	17	17	17	17	17	17
	Detects	17	14	14	17	17	17	17	17	17	0
	Min	324.0	<0.06	<1	49.3	68	1610	6.8	586.0	3.1	<0.7
	Mean	435.1	0.26	4.1	68.3	125.8	1925	7.0	821.9	4.1	-
	Max	549.0	0.54	24.0	165.0	316.0	2370	7.5	1210.0	6.1	<0.7
BH16	Count	15	15	15	15	15	15	15	15	15	15

Sample Point	Summary Stats 2018 Onwards	Alkalinity as CaCO3	Ammoniacal Nitrogen as N	BOD	Chloride	COD (Total)	Conductivity	pH	Sulphate as SO4	Total Organic Carbon	Total Oxidised Nitrogen
		mg/l	mg/l	mg/l	mg/l	mg/l	us/cm	pH units	mg/l	mg/l	mg/l
	UK DWS	-	0.39	-	250	-	2500	6.5 - 9.5	250	-	-
	Detects	15	12	11	15	15	15	15	15	15	0
	Min	404.0	<0.06	<1	26.4	19	1090	7.0	195.0	4.6	<0.7
	Mean	1885.7	0.081	5.6	42.2	362.3	1143	7.2	223.6	6.1	-
	Max	6040.0	0.12	41.0	47.4	1080.0	1280	7.5	241.0	9.7	<0.7
BH6-97R	Count	15	15	15	15	15	15	15	15	15	15
	Detects	15	15	9	15	13	15	15	15	15	0
	Min	201.0	0.14	<1	36.1	<11	819	6.9	182.0	6.0	<0.7
	Mean	279.9	0.23	2.1	46.4	24.9	996	7.4	245.9	7.1	-
	Max	358.0	0.38	7.0	54.3	57.0	1250	7.8	404.0	8.7	<0.7
Northern Void Dewatering Discharge	Count	16	20	20	20	20	20	20	16	16	20
	Detects	16	1	8	20	16	20	20	16	16	1
	Min	149	<0.06	<1	63.7	<11	1090	7.9	361.0	3.7	<0.7
	Mean	202.4	0.033	1.2	69.0	16.5	1287	8.1	494.1	4.5	0.4
	Max	273	0.080	4	72.9	45.0	1400	8.3	558.0	5.3	1.2

Table Notes:

- Metals are dissolved (filtered)
- Averages have been calculated using half the detection limit for that monitoring round in the case of non-detects
- Averages have not been calculated where half of monitoring rounds were non-detects.

Table 3-6 Summary of Dissolved Metals in Groundwater Quality 2018-2021

Sample Point	Summary Stats 2018 Onwards	As	Cd	Ca	Cr	Cu	Fe	Pb	Mg	Mn	Hg	Ni	K	Se	Na	Zn
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	UK DWS	0.01	0.005	-	0.05	2	0.2	0.01	-	0.05	0.001	0.02	-	0.01	200	-
BH1/97	Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	Detects	8	0	15	1	0	5	2	15	15	0	7	15	0	15	0
	Min	<0.001	<.0006	173.0	<0.002	<0.009	<0.23	<0.006	16.2	0.35	<.00001	<0.003	6.45	<0.0008	36.1	<0.018
	Mean	.00055	-	188.1	-	-	-	-	17.7	0.39	-	-	7.38	-	40.0	-
	Max	0.0010	<.0006	200.0	0.011	<0.009	2.87	0.020	18.9	0.43	<0.0002	0.043	8.43	<0.0012	42.1	<0.018
BH12R	Count	1	11	11	11	11	11	11	11	11	1	11	11	1	11	11
	Detects	1	0	11	0	3	0	0	11	10	0	11	11	0	11	0
	Min	0.0020	<.0006	30.7	<0.002	<0.009	<0.23	<0.006	5.2	<0.007	<.00001	0.0030	8.33	<0.0012	6.8	<0.018
	Mean	0.0020	-	45.4	-	-	-	-	8.2	0.021	-	0.0048	15.45	-	10.8	-
	Max	0.0020	<.0006	61.2	<0.002	0.012	<0.23	<0.006	12.9	0.047	<.00001	0.0070	26.50	<0.0012	13.2	<0.018
BH14	Count	4	17	17	17	17	17	17	17	17	4	17	17	4	17	17
	Detects	1	0	17	1	0	4	3	17	17	4	17	17	0	17	0
	Min	<.0002	<.0006	317.0	<0.002	<0.009	<0.23	<0.006	25	0.69	0.00001	0.0070	10.20	<0.0008	53.8	<0.018
	Mean	-	-	343.7	-	-	-	-	27.5	0.80	4.75E-05	0.015	12.98	-	83.0	-
	Max	<0.001	<.0006	366.0	0.0090	<0.009	0.90	0.021	30	0.93	.00008	0.044	15.50	<.0012	122.0	<0.018
BH15	Count	4	17	17	17	17	17	17	17	17	4	17	17	4	17	17
	Detects	2	1	17	1	0	0	2	17	17	2	17	17	0	17	3
	Min	<0.001	<.0006	296.0	<0.002	<0.009	<0.23	<0.006	33.6	1.55	<.00001	0.022	13.00	<0.0008	38.8	<0.018
	Mean	.00060	-	412.8	-	-	-	-	45.7	2.53	.00004	0.049	18.02	-	46.9	-
	Max	<0.001	.00060	574.0	0.011	<0.009	<0.23	0.019	65.1	3.77	.00013	0.074	24.30	<0.0012	72.5	0.024

Sample Point	Summary Stats 2018 Onwards	As	Cd	Ca	Cr	Cu	Fe	Pb	Mg	Mn	Hg	Ni	K	Se	Na	Zn
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	UK DWS	0.01	0.005	-	0.05	2	0.2	0.01	-	0.05	0.001	0.02	-	0.01	200	-
BH16	Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	Detects	10	0	15	2	0	1	1	15	15	0	12	15	0	15	0
	Min	<0.001	<.0006	216.0	<0.002	<0.009	<0.23	<0.006	20.9	0.17	<.00001	<0.003	3.68	<0.0008	20.6	<0.018
	Mean	.00080	-	233.3	-	-	-	-	23.7	0.64	-	0.0072	4.94	-	24.7	-
	Max	0.0019	<.0006	245.0	0.011	<0.009	0.37	0.0080	25.2	3.01	<.0002	0.049	6.80	<0.0012	26.0	<0.018
BH6-97R	Count	4	15	15	15	15	15	15	15	15	4	15	15	4	15	15
	Detects	4	0	15	1	0	8	1	15	15	1	15	15	0	15	0
	Min	0.0014	<.0006	137.0	<0.002	<0.009	<0.23	<0.006	13.5	0.42	<.00001	0.030	12.10	<0.0008	26.6	<0.018
	Mean	0.0037	-	174.5	-	-	2.08	-	18.3	0.54	-	0.064	16.59	-	33.5	-
	Max	0.0090	<.0006	242.0	0.0030	<0.009	9.80	0.0060	27.5	0.82	.00001	0.091	27.40	<0.0012	43.9	<0.018
Northern Void Dewatering Discharge	Count	1	16	16	16	16	16	16	16	16	Not Analysed	16	16	1	16	16
	Detects	1	0	16	0	0	1	0	16	16		11	16	0	16	0
	Min	.00065	<.0006	173.0	<0.002	<0.009	<0.23	<0.006	26.7	0.021		<.003	9.64	<0.0006	36.8	<0.018
	Mean	.00065	-	231.9	-	-	-	-	30.0	0.13		.0030	11.1	-	41.0	-
	Max	.00065	<.0006	270.0	<0.002	<0.009	0.25	<0.006	33.2	0.37		.0040	12.3	<0.0006	45.0	<0.018

Table Notes: Metals are dissolved (filtered);
Averages have been calculated using half the detection limit for that monitoring round in the case of non-detects, but have not been calculated where over half of monitoring rounds were non-detects.

Table 3-7 Summary of PAHs Detected in Groundwater 2018-2021

Sample Point	Summary Stats 2018 Onwards	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Fluoranthene	Naphthalene	Phenanthrene	Pyrene	Total PAH
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
	UK DWS	-	-	-	-	-	-	-	0.10
BH1/97	Count	15	15	15	15	15	15	15	15
	Detects	0	0	1	0	0	0	0	1
	Min	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Max	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
	Max Detect	-	-	0.011	-	-	-	-	0.011
BH12R	Count	1	1	1	1	1	1	1	1
	Detects	0	0	0	0	0	0	0	0
	Min	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Max	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Max Detect	-	-	-	-	-	-	-	-
BH14	Count	4	4	4	4	4	4	4	4
	Detects	0	0	1	0	1	0	0	2
	Min	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Max	<0.01	<0.01	0.012	<0.01	0.027	<0.01	<0.01	0.027
	Max Detect	-	-	0.012	-	0.027	-	-	0.027
BH15	Count	4	4	4	4	4	4	4	4
	Detects	1	0	1	4	0	2	4	4
	Min	<0.01	<0.01	<0.01	0.016	<0.01	<0.01	0.015	0.032
	Max	0.11	<0.1	0.13	0.12	<0.1	<0.1	0.11	0.47
	Max Detect	0.11	-	0.13	0.12	-	0.030	0.11	0.47
BH16	Count	15	15	15	15	15	15	15	15

Sample Point	Summary Stats 2018 Onwards	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Fluoranthene	Naphthalene	Phenanthrene	Pyrene	Total PAH
		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
	UK DWS	-	-	-	-	-	-	-	0.10
	Detects	0	1	0	0	0	0	1	1
	Min	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Max	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Max Detect	-	0.012	-	-	-	-	0.023	0.035
BH6-97R	Count	4	4	4	4	4	4	4	4
	Detects	0	0	1	0	2	0	0	3
	Min	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Max	<0.01	<0.01	0.012	<0.01	0.015	<0.01	<0.01	0.015
	Max Detect	-	-	0.012	-	0.015	-	-	0.015

3.2 Receptors

3.2.1 Abstractions and Source Protection Zones

Online mapping[9] confirms that the proposed development is not located within a groundwater Source Protection Zone (SPZ) and that there are no licensed groundwater or surface water abstractions within a 2km radius of the Site.

Chelmsford City Council has confirmed[10] that there no private water supplies within 2km of the Site.

3.2.2 Surface Water

Surface water potential receptors at or immediately adjacent to the Site are:

- the eastern arm of Sandon Brook – flowing northwards near the eastern boundary of the Site (40m from the quarry void at the closest point, where the channel elevation is approximately[11] 25 mAOD). The eastern arm is underlain by alluvial silty clay 1.4 – 5.2m thick; and
- the western arm of the Sandon Brook – flowing north-eastwards near the northern boundary of the Site (50m from the quarry void at the closest point, where the channel elevation is approximately 23 mAOD. The western arm is underlain by alluvial clay/silt 1.2 – 3.3m thick.

The two channels merge around 400m to the northeast of the quarry immediately upstream of Woodhill Road, the combined channel being referred to as Sandon Brook. Flow within Sandon Brook is monitored by the Environment Agency at Sandon Bridge (NGR 52 TL 755 055 approximately 500m north of the confluence) where average flow is 0.30 m^3/sec (c. 26,000m3 /day) with a Q95 of 0.033 m^3/sec.

Water is currently pumped from Sandon Quarry and discharged to Sandon Brook (Eastern arm) under Discharge Consent PR2NF/E10173, which authorises the discharge of up to 2,500m^3/day of groundwater into the Sandon Brook at Grid Reference TL 7485 0421. Although historically this discharge occurred from the Southern Void, the current discharge occurs from the Northern Void to manage water levels.

Given the significant thickness of low permeability alluvium beneath both arms of the Sandon Brook, the brook Is not considered to be a receptor for any contamination migrating from the waste into groundwater adjacent to the Site.

3.2.3 Ecological Sites

The MAGIC map website and an EA Habitats and Conservation screening assessment confirms that there are none of the following ecological sites located within 2km of the Site boundary;

- Sites of Special Scientific Interest (SSSI);
- Special Area of Conservation (SAC);
- Special Protection Areas (SPA); and
- RAMSAR.
- Area of Outstanding Natural Beauty;
- Local Nature Reserve;
- National Nature Reserve; and

[9] https://magic.defra.gov.uk and https:/www.arcgis.com/home/webmap
[10] Email from Tim Savage (Chelmsford City Council) dated 3rd December 20921
[11] Based on EA 2017 Flood Model for Sandon Brook

- National Parks

Designated Ancient Woodlands (as detailed in the Section 1.6.2) 1.4km north-east of the Site are not likely to be groundwater dependent.

The primary surface water receptor is the Debden Water as groundwater, which generally flows from the Site to the north-east, potentially discharges there.

3.2.4 Receptor Locations for Modelling

The primary receptors assumed for this assessment are in accordance with those required by Schedule 22 (Groundwater Activities) of the Environmental Permitting Regulations, 2016, these are as follows:

- for Hazardous Substance the receptor is assumed to be the groundwater within the River Terrace gravel aquifer downgradient of the Site taking account of immediate dilution in the aquifer[12] but without any dispersion or attenuation in the aquifer pathway; and
- for Non-Hazardous Pollutants the receptor has been assumed to be the groundwater within the River Terrace gravel aquifer at the down-gradient Site boundary (down-gradient boreholes in the gravel).

For the purposes of defining receptors, the compliance points are taken to be at the down-gradient Site boundaries. It is noted that there may be other, physical receptors further away from the down-gradient Site boundary. Compliance with the Regulations at the points defined above will ensure that other receptors are adequately protected.

3.2.5 Amenity (Nuisance and Health Issues)

For the purposes of the risk assessment for amenity and accidents, the potential receptors that need to be considered are presented in Drawing EP4 and Drawing EP5 and have been set out within Table 1-2, in Section 1.1 of this report. The amenity and accident risks are considered in detail in the Environmental Risk Assessment (ERA), which is included in Section 5 of this EP application.

4.0 POLLUTION CONTROL MEASURES

4.1 Site Engineering

4.1.1 Attenuation Layer

A 1m attenuation layer with a permeability no greater than 1 x 10^{-7} m/s will be provided along the base and sidewall of the site as illustrated on Drawing EP6. The attenuation layer will be constructed using low risk inert, suitably cohesive waste materials with a pollution potential less than or equal to the background quality of the surrounding geology and water. A review of the waste materials' suitability for use in attenuation layer construction below the water table is provided below.

Below the water level, the attenuation layer will be formed by end tipping of the material. Self-compaction will be achieved by the weight of overlying fill placed and operating plant running on berms and the platform once above water level.

[12] UK Government, *Groundwater Protection Technical Guidance*, Available at: https://www.gov.uk/government/publications/groundwater-protection-technical-guidance/groundwater-protection-technical-guidance (Accessed 22/07/2020)

Construction of the attenuation layer will be undertaken in accordance with a Construction Quality Assurance (CQA) plan. The CQA Plan will detail the chemical and geotechnical requirements of the attenuation layer, placement procedures, site records, supervision and CQA validation requirements.

Composition of Proposed Attenuation Layer

The attenuation layer will be constructed using low risk inert, suitably cohesive waste materials. BAL has an understanding of waste stream character within the local area from its experience of accepting waste for the restoration of the Sandon Quarry Southern Void EPR/TP3191EW. As such, with reference to the EA's 'Engineering Construction Proposals for Deposit for Recovery' guidance (April 2021), BAL can confirm the physical and chemical suitability of the waste on the following basis:

Making Sure that the Waste is from a Single Source or Waste Type

All the waste will be of waste type 17 05 04 i.e. cohesive clay/silt. The waste stream comprises clay/silt with rare gravel, brick, concrete and sand inclusions within the clay matrix. It should be noted that approximately 75-85% of the material which has been imported for the restoration of Sandon Quarry Southern Void EPR/TP3191EW is single source with no suspicion of contamination and has therefore not required testing to demonstrate that it is inert.

Making Sure that the Waste meets the Definition of Inert Waste

Prior to acceptance on Site all materials proposed for use in the attenuation layer, will be subject to characterisation. As per EA guidance[13], before waste is sent for recovery, it should be subject to a basic characterisation to determine the properties of the waste and demonstrate the material is suitable both physically and chemically for the required use. The waste producer/holder will be required to send the necessary waste characterisation information to BAL in advance of delivery to Site. This enables BAL to control and monitor waste being accepted on Site.

All waste to be used in the construction of the attenuation layer in the Sandon Quarry Northern Void will be assessed in accordance with BAL's Waste Acceptance Procedures and confirmed as inert before use. Waste will either be:

- From a single source with no suspicion of contamination and therefore not require testing to demonstrate that it is inert;
- Require waste characterisation testing evidence from the waste producer to demonstrate that it is inert.

Making Sure that the Waste has Pollution Potential Less Than, Or Equal To, the Natural Quality of the Surrounding Geology and Water

As shown in Drawings HRA1 and HRA2, the northern void is largely surrounded by older manmade fill as follows:

- western site boundary – spoil from the construction of the A12;
- northern site boundary – historic landfilling; and
- southern site boundary – causeway formed historically with infill, then Sandon Southern Void landfill and Hall Lane Landfill further south.

Hence the only significant remnant natural material is along the eastern site boundary and beneath the quarry.

The presence of the older manmade fill is reflected in the variable groundwater quality around the site. The concentration of key potential pollutants in the waste are comparable with or lower than concentrations in the surrounding groundwater. For further information on groundwater quality, please refer to Section 3.1.2.

[13] Waste acceptance procedures for deposit for recovery, April 2021

Using Suitable Cohesive Material in the Attenuation Layer

All material to be used in the attenuation layer will be of waste type 17 05 04 i.e. cohesive clay/silt. The attenuation layer permeability deposited above the water table will be tested as part of CQA validation. The permeability of the sub-aqueous portion of the attenuation layer will be proven via remoulded permeability tests representative of the consolidation which will be incurred from the weight of overlying fill and trafficking over the site once above water level. Once consolidated or compacted, clay / silt materials are known to achieve permeabilities far lower than the proposed 1 x 10^{-7}m/s.

Confirming that Attenuation Material will not Leach Non-Hazardous Pollutants into Groundwater

The attenuation material will have concentrations of Non-Hazardous Pollutants lower than the conservative worst-case concentrations assessed in the HRA risk screening and modelling (SLR ref. 416.09886.00050/HRA, January 2022).

Evidence that Material will not Discharge Hazardous Substances below the Water Table

The HRA risk screening and modelling (SLR ref. 416.09886.00050/HRA, January 2022) has established that the discernible discharge of hazardous substances will be prevented.

Construction Quality Assurance

Records will be maintained at the Site of all attenuation layer construction activities, and shall include the identity (source, quantity, dates of delivery) of all attenuation layer material, and the results of any chemical and physical testing undertaken on material. Details of unsuitable material, including the source of the material, the reasons that it was considered unsuitable, and the action taken will also be recorded.

A Construction Quality Assurance (CQA) Plan for the construction of the sidewall and basal attenuation layers will be prepared in advance of recovery operations, subject to EA guidance[14] and EA agreement. As per the EA guidance, the CQA for the Site, will include

- Drawings of the proposed attenuation layers engineering;
- Specification of the proposed materials which will be used to construct the attenuation layers – including the type and frequency of conformance testing;
- Pass or fail criteria for all the materials which will be used to construct the attenuation layer;
- Details of conformance testing;
- Details of how the attenuation layers will be installed;
- Procedure for agreeing changes to the design;
- Details of the measures which will be taken when any non-compliant materials are identified; and
- Details of the information that will be included in the validation report.

All materials to be used in the construction of the attenuation layer will satisfy the physical, geotechnical and chemical properties required for the Site. Therefore, the focus of CQA will be on the acceptance only of materials suitable to achieve the overall specification.

Chemical Properties

To ensure the selected materials are suitable from a chemical point of view, the following procedure will be followed:

[14] EA guidance: Engineering construction proposals for deposit for recovery – published 21st April 2021

- Material to be used in the construction of the attenuation layer will be subject to comprehensive characterisation testing by the producer to demonstrate that it is chemically suitable for use and is in compliance with the waste acceptance criteria for the site. Only material demonstrated to be suitable for acceptance will be delivered to Sandon Quarry Northern Void;
- BAL will maintain transfer notes for all materials used in the attenuation layer construction. These records shall be available for inspection at the Site but will not form part of the CQA validation Reports;
- Periodic compliance testing of imported material will also be undertaken. The results of testing of material will be maintained by BAL and will be available for inspection by the EA;
- Waste materials used in the attenuation layer will be subject to continual visual inspection by BAL to detect any material that is unsuitable from a physical point of view, and to observe for signs of chemical contamination that may be evidenced by changes in appearance or odour; and
- Any material considered unsuitable for use in the attenuation layer will be isolated and removed from Site.

4.1.2 Capping

The Site will be brought to level with the imported inert fill through the placement of fill to within 300-400mm of the pre-settlement contour levels. Following completion of fill material placement, a layer of fine clay and sand approximately 300-400mm thick will be sourced from any remaining on Site material (following restoration of the plant site) and imported waste. It will be spread to provide a suitable substrate which will be sown with species rich chalk grassland. Shallow ponds and areas of sandy substrate will be created in line with approved details.

4.2 Restoration

The restoration proposals, illustrated in Drawings EP3 Cross Sections and Drawing 1910/005/K Restoration Proposals, aim to restore the Site in twelve phases. Key points regarding the proposed restoration are as follows.

- Due to the stability risks to the A12 and quarry slopes, the quarry void will be filled in a phased and partially dewatered manner to within 300-400mm of the pre-settlement contour levels. The infilling will be undertaken over 12 phases which can be summarised as follows and are illustrated in Drawings 001-012. The phasing scheme has been designed in accordance with the requirements of Condition 10 of planning permission ESS/08/16/CHL.
    - Phases 1 through to 9 involve the creation of berms within the quarry void and then infilling the voids between the berms to achieve a level platform at 17mAOD, above the water level within the void. The phasing has been designed to provide stability to the quarry side slopes in order of priority. Phase 1 comprises the emergency earthworks to be completed under the LEP (ref. AH/EAWML102405).
    - Phase 10 involves the creation of a buttress to the full height of the former quarry in the north-eastern corner.
    - Phase 11 involves the creation of a buttress to the full height of the former quarry in the south-eastern corner.
- Phase 12 involves the placement of fill to within 300-400mm of the pre-settlement contour levels. Following completion of fill material placement, a layer of fine clay and sand approximately 300-400mm thick will be sourced from any remaining on site material (following restoration of the plant site) and imported waste. It will be spread to provide a suitable substrate which will be sown with species rich chalk grassland. Shallow ponds and areas of sandy substrate will be created in line with approved details

- Including 67,000m^3 of waste material to be placed under the LEP, volumetric calculations based on the current topography and proposed restoration contours estimate that approximately 846,737m^3 material will be required to complete the scheme. This equates to approximately 1,608,800 tonnes based on a conversion factor of 1.9 tonnes per m^3.
- Waste will be deposited at a maximum rate of up to 300,000 tonnes per annum for use in restoration of the void. Restoration of the northern quarry void is anticipated to be completed in approximately 8.5 years.

The Site location is shown on Drawing EP1 Site Location, the phased restoration plan is shown on Drawings 001-012.

4.3 Management

4.3.1 Water Management System

Given the stability issues at the Site, BAL have assessed the feasibility of dewatering the site to enable engineering of the attenuation layer and placement of fill in dry conditions.

A Stability Assessment undertaken in August 2021[15] to address Condition 10 of planning permission ref. ESS/08/16/CHL found that drawing the water down rapidly would reduce the stability of the slope in the short term. Drawing down the water at a slower rate would take longer than is practical to enable restoration of the site within the 10 years following commencement as required by the site's planning permission. A safe rate of dewatering and timescale has not been determined due to the impracticalities, however, by way of example, a reduction of 200mm/month to 5mAOD would take approximately 4 years with the works estimated to take approximately 8.5 years thereafter. It should be noted that a reduction of 200mm/month to 9mAOD could not be proven to achieve a necessary factor of safety and therefore the dewatering rate would need to be slower than 200mm/month. Complete dewatering of the void is therefore not a viable option.

Given the August 2021 Stability Assessment found the western slope to be marginally stable based on the current pumping regime, BAL propose to maintain the current pumping regime and water level within the void between 14.5 and 15mAOD with sub-aqueous placement of fill, until the fill is above water level.

If, however, for operational safety reasons, the water level in the void needs to be lowered, BAL will implement a marginal increase in the pumping rate, to gradually drawn down to a minimum of 9mAOD. Once the water has been drawn down to this level, sub aqueous placement of inert fill will commence until the fill is above the water level.

Dewatering will be undertaken in accordance with the requirements of BAL's existing discharge consent ref PR2NF/10173B. a copy of which is enclosed as Appendix A.

4.3.2 Leachate Generation, Management and Monitoring

The Site will only accept inert waste and therefore waste on Site should not produce any leachate which could results in any significant discharge of hazardous or non-hazardous substances. Brett's comprehensive Waste Acceptance Procedures (refer to Section 11 Operating Techniques) will be followed closely to ensure that no unauthorised waste will be accepted on Site. As such, the Site does not require a management system for leachate prevention including artificial sealing liner, leachate management or any other engineering/management structures.

[15] SLR Consulting Ltd – Sandon Quarry Northern Void Stability Assessment ref. 403.09886.00012 (August 2021)

4.3.3 Landfill Gas Generation and Management

Due to the nature of the waste proposed to be accepted on Site being inert, there will be little to no significant quantities of landfill gas generated. Accordingly, there is no requirement to undertake landfill gas management on Site.

4.4 Post Closure Controls (Aftercare)

The land will be restored to a species rich grazed grassland with shallow pools and areas of exposed substrate interspersed throughout to provide habitat for invertebrate species relevant to the void's current designation as a Local Wildlife Site (LWS). The restoration scheme for the Site will form an extension to the habitats created in the biodiversity compensation area being created to the north of the Site, to compensate for the loss of the Northern Void LWS.

Following the restoration, the land will be subject to a period of aftercare to ensure that the restoration plan is successfully followed. The Site will be restored in accordance with the scheme shown in Drawing 19/10/005/K and agreed in planning discharge number 52 of the planning consent.

The Site will be restored and monitored in accordance with the conditions of the EP.

5.0 MONITORING

5.1 Weather

Relevant rainfall data applicable to the Site has been obtained from the Meteorological Office website for Andrewsfield climate station, which is approximately 20.8km from the Site[16]. Precipitation data recorded at this weather station is deemed a good representation of the Site's climate. Highest average rainfall from 1981-2010 at the station was recorded in October at 65.8mm, while lowest average rainfall was recorded in February at 38.87.

5.1.1 Prevailing Wind Direction and Strength

Wind speed and direction data from the meteorological observation station at Andrewsfield Airport, located approximately 20.8km to the north of the Site is displayed below (Figure 2). The wind rose represents an average of data taken from 2016. This data is considered representative of the Site conditions.

Figure 2 indicates that the prevailing wind direction is from the south-west, with approximately 13% of winds in this location coming from the south-west. Winds from the west and north are somewhat prominent, with winds occurring approximately 10% and 7% respectively from these directions. Winds from south and east are relatively infrequent. On this basis, locations to the north-east of the Site have the highest potential for impacts from any dust emissions from the Site.

[16] Meteorological Office, UK Climate Averages https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages Accessed December 2021

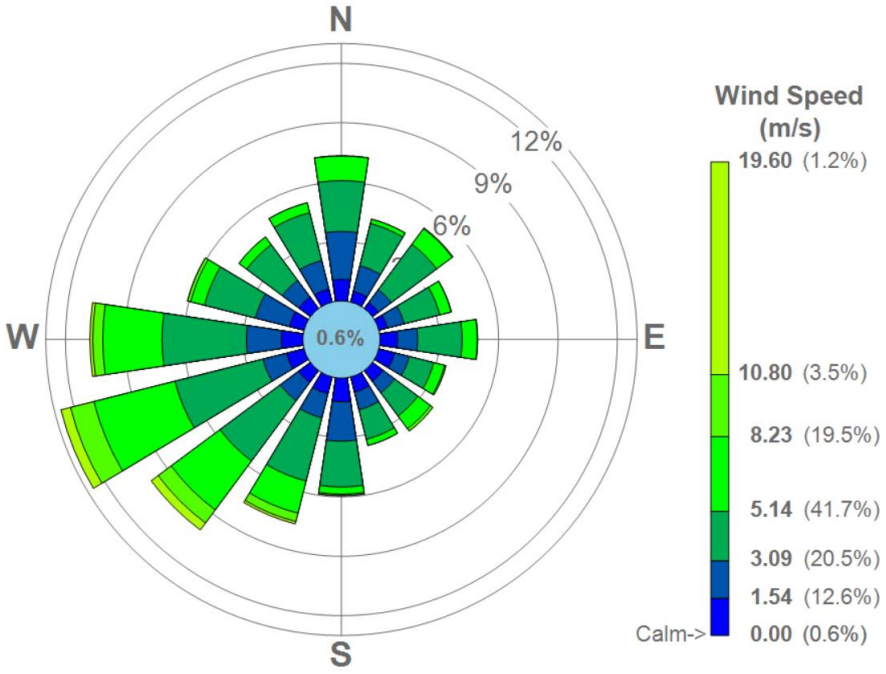

Figure 1 Wind Rose using 2016 data from Andrewsfield Meteorological Station

5.2 Gas Monitoring Infrastructure

Gas monitoring will be undertaken on Site within in-waste boreholes installed following the completion of each phase. In-waste boreholes will be installed on Site at a rate of 2 per hectare (for those areas where waste thickness is greater than 4m) as per Drawing EP7 MMP (or as otherwise agreed with the EA). The monitoring schedule for in-waste boreholes at the Site is presented in Table 5-1 below.

Table 5-1 Gas Monitoring Schedule

Location	Frequency	Measurement and Analytical Suite	Monitoring Method
In-waste boreholes installed at a rate of 2 per hectare (or as otherwise agreed with the EA).	Quarterly	Methane, Carbon Dioxide, Oxygen, Differential Pressure, Atmospheric Pressure and Meteorological Data.	As in LFTGN03 'Guidance on the Management of Landfill Gas' (2014). Record whether the ground is waterlogged, frozen or snow covered.

5.3 Surface Water Monitoring Infrastructure

The risk of any impact due to restoration of the Site on water quality in the Sandon Brook is considered to be relatively low due to the intervening low permeability alluvium on which the river is likely to be perched.

Furthermore, the location of the groundwater monitoring wells means that these provide early identification of any release which could impact the surface water down-gradient of the Site.

Discharge Consent PR2NF/E10173 authorises the discharge of groundwater from quarry dewatering, with the following restrictions on water quality:

- 'the discharge shall contain no more than 30 mg/l suspended solids';
- 'the discharge shall contain no visible oil or grease'.

The above water quality restrictions are considered to remain applicable, and no additional surface water compliance limits are considered necessary in the permit for inert restoration.

The proposed ongoing surface water monitoring schedule in the Sandon Brook upstream and downstream of the discharge location is presented in Table 5-2. This should be discontinued after cessation of the dewatering discharge.

Table 5-2 Proposed Surface Water Monitoring Schedule

Surface Water Monitoring Points	Monitoring Frequency	Parameters
SWA, SWB To be discontinued when dewatering discharge ceases.	Quarterly	Ammoniacal Nitrogen, chloride, suspended solids, visual oil and grease, pH, electrical conductivity, sulphate

5.4 Groundwater Monitoring

The monitoring of groundwater quality around the perimeter of the Site will be carried out using the existing network of monitoring boreholes. It is proposed that ongoing groundwater level and quality monitoring is undertaken from at least one up-gradient and two down-gradient boreholes within the River Terrace Deposits sand and gravel aquifer. Given the potential influence of historic fill on the perimeter up-gradient boreholes, it is also proposed to include two boreholes several hundred metres up-gradient of the Site to give a better indication of natural background groundwater quality.

Groundwater level monitoring indicates that groundwater flow is broadly towards the north across the Site. It is therefore proposed that the following Site boreholes are used for groundwater quality monitoring purposes going forward:

- Up-Gradient Perimeter: BH2020-05, BH14, BH15
- Up-gradient Offsite: BH6/97, BH12R
- Down-Gradient: BH16, BH1/97 and Dewatering Discharge (while operational)

The proposed monitoring schedule is outlined in Table 5-3 below, and monitoring locations on Drawing HRA1. The proposed schedule is based on current guidance and the results of the HRA (SLR ref. 416.09886.00050/HRA).

Table 5-3 Proposed Groundwater Monitoring Schedule

Groundwater Monitoring Locations	Monitoring Frequency	Measurement and Analytical Suite
Up-gradient: BH2020-05, BH14, BH15, BH6/97, BH12R Down-gradient: BH16, BH1/97, Dewatering Discharge (while operational)	Quarterly	Groundwater level (mAOD), electrical conductivity, chloride, ammoniacal nitrogen, pH, fluoride, nickel, sulphate, lead, arsenic.
	Annual	Total alkalinity, magnesium, potassium, calcium, sodium, chromium, copper, iron, selenium, manganese, zinc, cyanide, mercury, BTEX (benzene, toluene, ethylbenzene & xylene), acenaphthene, benzo(a)pyrene, total PAHs, Aromatic C10-C12, well base (mAOD).
Note: all metals to be analysed as filtered/dissolved		

5.5 Leachate

The inert waste is not expected to produce leachate, therefore there will be no leachate monitoring.

6.0 SITE CONDITION REPORT

A Site Condition Report (SCR) is only necessary for a site/area of a site where waste is not being permanently deposited. As all areas covered by the EP boundary at Sandon Quarry Northern Void are subject to permanent deposits of waste, a SCR is not needed for this application.

APPENDIX A

Existing Discharge Consent PR2NF/10173B

Copy - legal file

Sandon Discharge

ENVIRONMENT AGENCY

Our Ref: PRENF/11093
Variation No. PR2NF/10173B

28 October 1997

P+D17a ??

P+D63

Andrew Warner
Brett Waste Management
Brett House
Bysing Wood Road
Faversham
Kent
ME13 7UD

Dear Sir,

WATER RESOURCES ACT 1991 (AS AMENDED BY THE ENVIRONMENT ACT 1995), SCHEDULE 10 - VARIATION OF CONSENT TO DISCHARGE TRADE EFFLUENT BY Aylett Gravel Ltd from Sandon Quarry, Mayes Lane, Sandon, Essex.

Please find enclosed the Variation of Consent to Discharge under Schedule 10 of the Water Resources Act 1991 (as amended by the Environment Act 1995) in respect of your application received on 1 September 1997. This has been sent directly to you as requested by Matilda Beatty of Aspinwall & Co, a copy has also been sent to her.

Please note that Variation PR2NF/10173B has been altered to reflect a change in the volume of discharge.

If you have any queries relating to the above please do not hesitate to contact our office.

Yours faithfully,

JOHN DANIELS
Team Leader (Water Quality Consents)

This matter is being handled by Ruth Medler.

RECEIVED
30 OCT 1997

Environment Agency
Cobham Road, Ipswich, Suffolk, IP3 9JE
Tel 01473 727712 Fax 01473 724205 GTN 77-50 X4000

Water Resources Act 1991
as amended by the Environment Act 1995
Consent to Discharge
Certificate of Holder

ENVIRONMENT AGENCY

Part A

To: Mr M Courts
Aylett Gravel Limited
c/o Brett House
Bysing Wood Road
Faversham
ME13 7UD

The **Environment Agency** ("the Agency") hereby confirm that the above named person is a/the registered holder of consent PR2NF/E10173B

Nature of Discharge(s); Trade Effluent
at Sandon Quarry, Mayes Lane, Sandon, Essex

Note: This certificate should be kept with the consent document for future reference. If you transfer responsibility for the discharge to somebody else you must pass the consent to them and tell the Agency within 21 days. **Responsibility for the consent cannot be disclaimed by the holder but the registration of holder may be transferred to a successor.** To do this please complete the form below, then tear it off and return it to the address shown. If you fail to transfer the consent, even though you are no longer on the site, you may still be liable for prosecution for pollution. If you transfer the consent but do not tell us, you will be committing an offence. In case of any queries please contact your local Environment Agency office.

Part B **Please complete in block capitals or type.**

To: The Environment Agency, Cobham Road, Ipswich, Suffolk, IP3 9JE

Water Resources Act 1991: Notice of transfer of consent to discharge

Consent: PR2NF/E10173B

Name: Mr M Courts
Address: Aylett Gravel Limited
c/o Brett House
Bysing Wood Road
Faversham
ME13 7UD

I/We* hereby serve notice on the Agency that I/we* am/are* no longer a/the* Holder of the above consent which will be/was* transferred to:

* delete as appropriate

Name(s) of new holder(s):

Address:

Post Code:

Date of Transfer to new Holder(s); .....

Signed:..... **Dated:**.....

Name (block capitals): ..... **Position:** .....
(to be completed when signing on behalf of corporate bodies)

JWE/5/96

RECYCLED

Variation No. PR2NF/10173B
Reference No. PR/E/N/F/11093

ENVIRONMENT AGENCY

WATER RESOURCES ACT 1991 - SCHEDULE 10

(as amended by the Environment Act 1995)

NOTICE OF VARIATION OF CONSENT TO DISCHARGE

To: Mr M Courts
Aylett Gravel Limited
c/o Brett House
Bysing Wood Road
Faversham
ME13 7UD

WHEREAS the Essex River Authority in pursuance of its powers under the Rivers (Prevention of Pollution) Acts, 1951 to 1961, GRANTED CONSENT to the making of TRADE EFFLUENT by Aylett Gravel Co. Limited, on 26 July 1973, which was subsequently varied on 20 September 1994.

FROM Sandon Quarry, Mayes Lane, Sandon, Essex

NOTICE IS GIVEN that the Conditions specified in Consent No. PR2NF/10173 are hereby varied to read as follows:

1. The discharge shall consist solely of treated trade effluent.

2. The trade effluent shall consist solely of groundwater from the dewatering of sand and gravel workings.

3. The discharge shall be made through an outlet at National Grid Reference TL 7485 0421 into the Sandon Brook.

4. The volume discharged shall not exceed 2500 cubic metres in any period of 24 hours.

5. The discharge shall not contain more than 30 milligrams per litre of suspended solids (measured after drying at 105'C).

6. The discharge shall contain no visible oil or grease.

7. The discharge shall at no time contain any matter which will cause the receiving water to be poisonous or injurious to fish, spawn of fish or food of fish.

Environment Agency Anglian Region Eastern Area Cobham Road Ipswich Suffolk IP3 9JE

Variation No. PR2NF/10173B
Reference No. PR/E/N/F/11093

ENVIRONMENT AGENCY

8. The discharge shall be made through an outlet to the watercourse constructed and maintained so that a direct sample of the discharge may be readily obtained.

Subject to the provisions of Paragraphs 7 and 8 of Schedule 10 of the Water Resources Act 1991 (as amended by the Environment Act 1995), no notice shall be served by the Agency, which alters the variations made by this notice, without the agreement in writing of the discharger, during a period of 4 years from the date this notice is served.

PAUL HAYWARD
Environment Planning Manager (Eastern)

Dated :28 October 1997

Environment Agency Anglian Region Eastern Area Cobham Road Ipswich Suffolk IP3 9JE

ENVIRONMENT AGENCY

Date : 3 July 1996

P+063

Aylett Gravel Ltd
c/o Brett House
Bysing Wood Road
Faversham
Kent
ME13 7UD

Our ref :PR2NF/E10173

Dear Sir or Madam

ENVIRONMENT ACT 1995 - SCHEDULE 23. DISCHARGE CONSENT

Thank you for returning the form sent to you recently concerning the Discharge Consent and new Legal requirements which apply from 1 April 1996.

The site address which the Discharge Consent refers to is

Sandon Gravel Pit, Mayes Lane, Sandon, Essex

I acknowledge receipt of the completed form and confirm that our records have been amended accordingly.

If you require any further information, please contact my staff at the address below.

Yours faithfully

A E Warn

TONY WARN
Regional Water Quality Manager

Environment Agency, Kingfisher House, Goldhay Way, Orton Goldhay, Peterborough PE2 5ZR. Schedule 23 Help Desk - Phone 01733-464630 (direct line),Fax 01733-464472

P+D 63

NOTICE TO THE ENVIRONMENT AGENCY*
Environment Act 1995, Schedule 23, para 21(2)(b)(ii)

**The notes below may help in completing this notice.* PLEASE COMPLETE IN BLOCK CAPITALS

WITH RESPECT TO THE FOLLOWING CONSENT [as given by the National Rivers Authority (or its predecessors)] WHICH WAS IN FORCE ON 31st MARCH 1996,

Name on former NRA Register on 31/3/96 Aylett Gravel Ltd

Consent Number PR2NF/E10173 **Date consent was given or last reviewed** 20/09/94

for the making of a discharge/several discharges of pumped groundwater

at Discharge Site Address Sandon Gravel Pit, Mayes Lane, Sandon

I GIVE NOTICE TO THE ENVIRONMENT AGENCY THAT I AM THE PERSON MAKING THE DISCHARGE(S) REFERRED TO ABOVE AND THAT I PROPOSE TO RELY ON THIS CONSENT AFTER 1st OCTOBER 1996 AND WISH TO BE REGISTERED AS THE CONSENT HOLDER.

Name of Consent Holder ('the Discharger') Aylett Gravel LTD

<If you are a body corporate please complete with the registered name/address of the body corporate - see note 1 below>

Address c/o Brett House, Bysing Wood Road, Faversham

Kent Post Code ME13 7UD.

SIGNED M. Courts **PRINTNAME** M. COURTS

<job title Planning + Development Manager DATE 7-May-1996 *>*

<being the person with the delegated authority to sign of behalf of a body corporate - see note 1 below> ***DETAIL ADDITIONAL HOLDERS OVERLEAF***

NOTES TO HELP YOU TO COMPLETE THIS NOTICE

1. In addition to an individual, a 'person' in legal terms may refer to a 'body corporate' (e.g. public limited company ('plc'), limited company, local authority etc.). In these cases the body corporate will be registered as the consent holder. The person signing on behalf of the body corporate will be the person who has the power to do so (usually the Company Secretary for a plc or limited company, the Chief Executive for a local authority etc). The legal validity of the signatory is the responsibility of the body corporate. If you are signing with the delegated authority of the body corporate, please indicate your job title.

2. Legal advice may be advisable for some situations (e.g. grant maintained schools outside of local authority control).

3. If you are a partnership or registered charity then up to 4 partners/trustees should individually complete this notice. These partners/trustees will then be registered as joint consent holders.

4. If you share the making of the discharge(s) with another person(s) then you should all complete the notice and be registered as joint consent holders. (e.g. householders individually and severally discharging via a common private sewage treatment works). List additional holders / persons overleaf if required.

5. If in doubt, it may help to consider the 'person' as the person, either individually or severally, who would apply for the consent if an application were in future to be made to the Environment Agency. Under the amended legislation, ONLY the registered consent holder may in future apply to the Agency for a variation of the consent.

NOTE: The responsibility for this notice rests entirely with you and the Agency cannot be held responsible in any way for mistakes made as a result of the notes above (or otherwise) which are given in good faith..

P+D 63

ENVIRONMENT AGENCY

Our Ref: PR2NF/E10173

Date: 23 April 1996

RECEIVED
30 APR 1996

Aylett Gravel Ltd
Southend Rd
Sandon
Chelmsford
Essex
CM2 7AD

2661/73111

Dear Consent Holder

LEGAL CHANGES AFFECTING YOUR CONSENT(S) TO DISCHARGE
Environment Act 1995, Schedule 23

I am writing to give you important information about legal changes affecting your Consent(s) to Discharge.

From 1 April 1996, the Environment Agency became responsible for the environmental protection of air, land and water throughout England and Wales. The Agency took over responsibility for Consents from the former National Rivers Authority.

Please read the enclosed note. It explains the changes brought about by Schedule 23 of the Environment Act. **The changes require that you send written notice to the Agency before 1 October 1996 stating that you still require your consent.**

A standard reply form, with notes to help you complete it, is also enclosed with this letter. To assist you further, we have filled in the details of the consent as held on our Public Register. However, if you have any questions or need advice, please write to the address below, or telephone our National Customer Service number 0645-333111 and ask for the Schedule 23 Help Desk, or call on our Regional direct dial Help Line 01733-464630.

There are 21,000 discharge consents in Anglian Region. We have decided to give urgent priority to contacting all Consent holders as soon as possible. This may mean that some people may receive more than one letter of this type where several consents are held.

I thank you for your help. Please note that because of the huge numbers of Consents involved, it may take a little while for us to acknowledge your reply.

Yours sincerely

A C Warn

TONY WARN
Regional Water Quality Manager

Environment Agency, Anglian Region, Kingfisher House, Goldhay Way, Orton Goldhay, Peterborough PE2 5ZR

Sandon Discharge

Water Resources Act 1991
as amended by the Environment Act 1995
Consent to Discharge
Certificate of Holder

ENVIRONMENT AGENCY

Part A

To: Brett Aggregates Limited
Brett House
Bysing Wood Road
Faversham
Kent
ME13 7UD

The **Environment Agency** ("the Agency") hereby confirm that the above named person is a/the registered holder of consent

PR2NF/E10173

Nature of Discharge(s);
at INDUSTRIAL EFFLUENT
Sandon Gravel Pit, Mayes Lane, Sandon, Essex.

Note: This certificate should be kept with the consent document for future reference. If you transfer responsibility for the discharge to somebody else you must pass the consent to them and tell the Agency within 21 days. **Responsibility for the consent cannot be disclaimed by the holder but the registration of holder may be transferred to a successor.** To do this please complete the form below, then tear it off and return it to the address shown. If you fail to transfer the consent, even though you are no longer on the site, you may still be liable for prosecution for pollution. If you transfer the consent but do not tell us, you will be committing an offence. In case of any queries please contact your local Environment Agency office.

Part B **Please complete in block capitals or type.**

To:
The Environment Agency, Cobham Road, Ipswich, Suffolk, IP3 9JE

Water Resources Act 1991: Notice of transfer of consent to discharge

Consent:
PR2NF/E10173

Name:
Address:
Brett Aggregates Limited
Brent House
Bysing Wood Road
Faversham
Kent
ME13 7UD

I/We* hereby serve notice on the Agency that I/we* am/are* no longer a/the* Holder of the above consent which will be/was* transferred to:

* delete as appropriate

Name(s) of new holder(s):
Address:

Post Code:

Date of Transfer to new Holder(s); .....

Signed:..... **Dated:**.....

Name (block capitals): ..... **Position:** .....
(to be completed when signing on behalf of corporate bodies)

JWE/5/96

RECYCLED

LC43

(1942

ENVIRONMENT AGENCY

Our Ref: CGE PLM
Your Ref:

25 May 1999

Brett Aggregates Limited
Brett House
Bysing Wood Road
Faversham
Kent
ME13 7UD

Dear Sirs,

PR2NF/E10173 and PR2NF/E14773 - CONSENT TO DISCHARGE INDUSTRIAL EFFLUENT FROM premises at Sandon Gravel Pit, Mayes Lane, Sandon and Princess Margaret Road, East Tilbury Marshes, Essex.

Thank you for notifying the Agency that you are the new holders of the above consents. Please find enclosed a new Certificate of Holder document. Please keep this certificate with the consent document that should have been passed to you by the previous holder.

A Consent to Discharge is an important document. The right to discharge effluent may be valuable to you. The document should be kept safe, probably with the Deeds of the property where appropriate.

Please take careful note that if the holder of the consent changes, you should inform the Agency **IN WRITING** as soon as possible of the name of the new holder (certificate and transfer form attached). This is to ensure that the rights and charges associated with the Consent are transferred to the new holder. If you do not inform us of the change within 21 days, an offence will have been committed that may result in prosecution.

Where the holder dies or is served with a bankruptcy order, different rules and time scales govern these changes. In these situations, the executors or trustees should contact the Agency promptly for further guidance.

If you want to revoke (cancel), or vary (change/amend) the Consent in any way, you should contact the Agency. Similarly, if the holder changes contact address while continuing to hold the Consent, please contact the Agency.

Mc
Copies to cmt. file
P.B.W. (original)
K.S. (Sandon).

1/6.

Cont/d...

The Environment Agency
Cobham Road, Ipswich, Suffolk
Tel: 01473 727712 Fax: 01473 724205
GTN 7 50 X 4000

ENVIRONMENT AGENCY

If you have any queries relating to this matter, please do not hesitate to contact me on the number below.

Yours faithfully

JOHN DANIELS
Team Leader (Water Quality Consents)

Please ask for Claire Erwin. Ext.6710

The Environment Agency
Cobham Road, Ipswich, Suffolk
Tel: 01473 727712 Fax: 01473 724205
GTN 7 50 X 4000

EUROPEAN OFFICES

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