Upton House
Market Street
Charlbury
Oxfordshire, OX7 3PJ
United Kingdom
tel +44 (0)1608 810374
fax +44 (0)1608 810093
e-mail info@gwp.uk.com
www.gwp.uk.com

SHELLINGFORD QUARRY LANDFILL HYDROGEOLOGICAL RISK ASSESSMENT TO SUPPORT ENVIRONMENTAL PERMIT VARIATION APPLICATION EPR/BP3095EU/V006

For

MULTI-AGG LIMITED

January 2026

GWP Consultants LLP
Registered No. OC326183
Registered Office: Upton House, Market Street, Charlbury, Oxfordshire, OX7 3PJ, UK

Report Title: **Shellingford Quarry Landfill Hydrogeological Risk Assessment to support Environmental Permit Variation Application EPR/BP3095EU/V006**

Client: **Multi-Agg Limited**

Job: SHELLQMA
Report Number: 250716
Version: v.02
Issue Status: Issued to Client
Prepared by: Edward Betteridge
Issue Date: 21st January 2026

Issue History:

Issue No	Date	Description	Admin Review	Technical Review	Approver
v.01	22.10.25	Issued to Client	GM	SJ	SJ
v.02	21.01.26	Minor amendment required to Table 4 and Appendix 7 revised – report re-issued	CL	SJ	SJ

Approver Signature:

This document is based on GWP report template v.1.09 and Normal template v3.10 17/04/19

CONTENTS

1. INTRODUCTION 1
1.1 Report Context 1
1.1.1 Operator of the proposed development 1
1.1.2 Agent who completed this report 1
1.1.3 Outline of the proposed development 1
2. CONCEPTUAL HYDROGEOLOGICAL MODEL 1
2.1 Site Location 1
2.1.1 Site context 2
2.2 Climate 5
2.3 Geological Setting 6
2.4 Hydrological Setting 6
2.4.1 Surface Water Features 6
2.4.2 Description of local water courses 6
2.4.3 Waterbodies 7
2.4.4 Springs 7
2.4.5 Flows within local water courses 7
2.4.6 Flood Risk and the presence of indicative flood plains 7
2.4.7 Surface water abstractions 7
2.4.8 Consented discharges 8
2.4.9 Surface water quality 8
2.5 Hydrogeological Setting 8
2.5.1 Aquifer Characteristics 8
2.5.2 Groundwater Flow 9
2.5.3 Groundwater Quality 9
3. CONCEPTUAL SITE MODEL 10
3.1.1 Sources 10
3.1.2 Pathways 11
3.1.3 Receptors 12
4. HYDROGEOLOGICAL RISK ASSESSMENT 12
5. REQUISITE SURVEILLANCE 12
5.1 The Risk Based Monitoring Scheme 13
5.1.1 Review of Technical Precautions 13
5.1.2 Leachate Monitoring 13
5.1.3 Groundwater Monitoring 13
5.1.4 Surface Water Monitoring 15
5.2 Revised Compliance Limits for Down-Gradient Boreholes 15
6. CONCLUSIONS 17
6.1 Compliance with the Landfill Directive 17
6.2 Compliance with the Groundwater Regulations 17
6.3 Summary 17

TABLES

Table 1	Potential land use receptors
Table 2	Potential historic receptors
Table 3	Potential statutory and habitat receptors
Table 4	Waste types
Table 5	Groundwater monitoring schedule
Table 6	Surface water monitoring schedule
Table 7	Proposed revised compliance limits for down-gradient monitoring points

DRAWINGS

Drawing Number	Drawing Title	Version
SHELLQMA2508-1	Site location	a
SHELLQMA2508-2	Shellingford Quarry site location context plan	a
SHELLQMA2508-3	Site plan	a
SHELLQMA2508-4	Potential land use receptors	a
SHELLQMA2508-5	Potential cultural and heritage receptors	a
SHELLQMA2508-6	Potential statutory and habitat receptors	a
SHELLQMA2508-7	Excavation and infilling phasing	a
SHELLQMA2508-9	Geological setting	a
SHELLQMA2508-10	Hydrological setting	a
SHELLQMA2508-11	Institute of Geological sciences hydrogeological map	a
SHELLQMA2508-12	Environment Agency fluvial flood risk	a
SHELLQMA2508-13	Environment Agency pluvial flood risk	a
SHELLQMA2508-14	Groundwater and surface water monitoring locations	a

APPENDICES

Appendix 1	Groundsure Enviro Insight report
Appendix 2	Stanford R02 rainfall January 1994 to December 2023
Appendix 3	Surface water quality monitoring data
Appendix 4	Groundwater level monitoring data – Stanford Quarry OBH
Appendix 5	Groundwater level monitoring data – Shellingford Quarry
Appendix 6	Groundwater quality monitoring data
Appendix 7	Hafren Water Hydrogeological Risk Assessment Report
Appendix 8	Updated groundwater quality compliance limits for down-gradient boreholes

SHELLINGFORD QUARRY LANDFILL HYDROGEOLOGICAL RISK ASSESSMENT TO SUPPORT ENVIRONMENTAL PERMIT VARIATION APPLICATION EPR/BP3095EU/V006

1. INTRODUCTION

1.1 Report Context

Shellingford Quarry Landfill currently operates under Environmental Permitting Regulations (EPR) Permit EPR/BP3095EU which provides for the landfilling with imported inert waste of the quarry excavation in accordance with extant Planning Permissions STA/SHE/8554/12-CM (MW.0020/11) and STA/SHE/8554/11-CM (MW.0021/11).

Planning Permission P18/V2610/CM (MW.0104/18) was granted in September 2020 and provides for the extraction of sand and limestone from a western extension to Shellingford Quarry and restoration of the excavation to original ground levels using imported inert waste material and indigenous soils.

An EPR Permit application is being submitted to vary the existing EPR Permit EPR/BP3095EU to add a deposit for recovery activity to accommodate infilling within the adjacent western quarry excavation area with imported inert waste.

This report presents a Hydrogeological Risk Assessment (HRA) and has been prepared to support the EPR Permit application to vary the existing EPR Permit to accommodate the infilling with imported inert waste in the western quarry extension area as a deposit for recovery activity.

1.1.1 Operator of the proposed development

Multi-Agg Limited, The Upper Lime Kiln Works, Bytham Road, Ogbourne St. George, Marlborough, Wiltshire, SN8 1TD.

1.1.2 Agent who completed this report

GWP Consultants LLP, Upton House, Market Street, Charlbury, Oxfordshire, OX7 3PJ.

1.1.3 Outline of the proposed development

The EPR Permit application is to vary the existing EPR Permit EPR/BP3095EU to add a deposit for recovery activity to accommodate infilling within the adjacent western quarry excavation area with imported inert waste. The inert fill capacity associated with the deposit for recovery activity is *c.* 1.60Mm^3 which equates to a tonnage of *c.* 2.88Mt (using a conversion factor of 1.8t/m^3).

The additional deposit for recovery activity associated with the Permit variation will be limited to the western quarry excavation area that is adjacent to the inert landfilling area covered by the existing EPR Permit. This means the current Permit boundary will need to be extended to the west and south to allow for the additional deposit for recovery activity.

Details of the site setting and installation design are presented in the Environmental Setting and Site Design (ESSD) report prepared by GWP Consultants LLP (GWP) (GWP Report No. 250212) which accompanies the EPR Permit application (Appendix Hii) and which should be read in conjunction with this report.

2. CONCEPTUAL HYDROGEOLOGICAL MODEL

2.1 Site Location

The application site is located at Shellingford Quarry, Stanford Road, Stanford in the Vale, Faringdon, Oxfordshire, SN7 8HE (National Grid Reference SU 32700 93600).

Shellingford Quarry is located to the north of the White Horse Business Park between the villages of Shellingford *c.* 0.25km to the west and Stanford in the Vale *c.* 0.50km to the east. The town of Faringdon is located *c.* 3.0km to the west of the quarry.

Original ground levels within the western quarry extension area range from *c.* 90mAOD in the north to *c.* 74mAOD in the south, north of the Holywell Brook (also known as the Hollywell Brook).

The quarry is excavated in Upper Jurassic strata belonging to the Corallian Group and comprising principally the Highworth Grit Member (sand) and underlying Highworth Limestone Member (limestone) of the Kingston Formation.

Drawing No. SHELLQMA2508-1 shows the site location.

Drawing No. SHELLQMA2508-2 shows the EPR Permit variation application area within the context of the existing EPR Permit area, highlighting where the deposit for recovery activity in the western extension area will take place.

Drawing No. SHELLQMA2508-3 is the site plan which shows the total extent of the varied EPR Permit area being applied for.

Access to the site is currently from the A417 (Faringdon Road) and will remain unchanged.

An Enviro Insight report obtained in January 2022 for Shellingford Quarry is presented in Appendix 1.

2.1.1 Site context

This EPR Permit application is to vary the existing EPR Permit to add a deposit for recovery activity to accommodate infilling within the adjacent western quarry excavation area with imported inert waste, approved by Planning Permission P18/V2610/CM (MW.0104/18).

Drawing No. SHELLQMA2508-1 shows the site location.

Drawing No. SHELLQMA2508-2 shows the EPR Permit variation application area within the context of the existing EPR Permit area and the approved extent of mineral extraction and restoration infilling, highlighting where the deposit for recovery activity in the western extension area will take place.

Drawing No. SHELLQMA2508-3 is the site plan which shows the total extent of the varied EPR Permit area being applied for.

Potential environmental receptors located within the vicinity of the site are detailed (with location plans) in Sections 10, 11 and 13 of the Enviro Insight report presented in Appendix 1.

The following distances from the Environmental Permit application boundary have been used to identify rural designations/potential receptors:

- 1km radius – European ecological important sites including RAMSAR sites, Special Areas of Conservation, Local Wildlife Sites and Special Protection Areas;
- 1km radius – potentially sensitive receptors of ecological importance and sites of cultural and natural heritage. These include National Nature Reserves, Local Nature Reserves, Sites of Special Scientific Interest and Scheduled Monuments;
- 500m radius – all other potentially sensitive receptors e.g. residential, commercial, industrial, agricultural and surface water receptors.

Rural designations/potential receptors are detailed within the tables below.

Potential land use receptors within 500m of the site are detailed in Table 1 and are shown on Drawing No. SHELLQMA2508-4.

Table 1 – Potential land use receptors

Receptor name	Receptor type	Receptor direction from site	Approximate distance from application boundary
Church Farm	Industrial/Commercial	West	Adjacent
White Horse Business Park (various businesses)	Industrial/Commercial	South/East	5m (east)

Stanford Waste Recycling Centre	Industrial/Commercial	North	30m
Foxtail Garage	Industrial/Commercial	Southeast	350m
J Godfrey & Son Funeral Services	Industrial/Commercial	Southeast	390m
Timpson Engineering	Industrial/Commercial	Southeast	370m
The Light Car Company	Industrial/Commercial	Southeast	300m
Shellingford Sewage Treatment Works	Industrial/Commercial	West	290m
St. Faith's Church	Religious building	West	230m
Shellingford Church of England Voluntary Aided Primary School	Educational	West	230m
Busy Bees at Shellingford Nursery	Educational	West	280m
Quarry Cottage	Residential property	Northwest	150m
Laburnum Cottage	Residential property	North	220m
Properties within Shellingford village	Residential properties	West	250m (closest)
Properties within Stanford in the Vale	Residential properties	East	220m (closest)
New properties built at River Meadow (off Faringdon Road/Ware Road)	Residential properties	Southeast	100m
A417	Local Transport Network	North	Adjacent
B4508	Local Transport Network	North	160m
Stanford in the Vale road network	Local Transport Network	East	270m (closest)
Ware Road	Local Transport Network	South	150m
Church Street/Dogkennel Lane	Local Transport Network	West	270m
Holywell Brook	Surface water feature	South/West	100m (South), 200m (West)
Waterbody at Shellingford Crossroads Quarry	Surface water feature	North	70m
Settlement lagoon/balancing pond system	Surface water feature	On-site	-
Ponds and drain within Fishpond Copse	Surface water feature	West	260m

Drain adjacent to A417	Surface water feature	East	Adjacent
Pond	Surface water feature	South	300m
Pond	Surface water feature	South	650m
Pond associated with new properties built at River Meadow	Surface water feature	Southeast	240m
Pond associated with new properties built at River Meadow	Surface water feature	Southeast	370m
Agricultural land	Open ground	Patches North, South, East and West	Adjacent
Stanford in the Vale Football Club and park	Open ground/Public space	East	280m
Allotment	Allotment	East	390m

Potential historic cultural and heritage receptors within 1km of the site are detailed in Table 2 and are shown on Drawing No. SHELLQMA2508-5.

Table 2 – Potential historic receptors

Receptor name	Receptor type	Receptor direction from site	Approximate distance from application boundary
Monument to Alicia Clayton approximately 3 metres south of chancel of Church of St. Faith	Listed building	West	250m (closest)
Shellingford	Historical Conservation Area	West	200m
Stanford in the Vale	Historical Conservation Area	East	740m
Hatford	Historical Conservation Area	Northeast	940m

Potential natural statutory and habitat receptors within 1km of the site are detailed in Table 3 and are shown on Drawing No. SHELLQMA2508-6.

Table 3 – Potential statutory and habitat receptors

Receptor name	Receptor type	Receptor direction from site	Approximate distance from application boundary
Priority Habitat Inventory – Deciduous Woodland	Protected Woodland	South	Adjacent (closest)
Priority Habitat Inventory – Traditional Orchards	Protected Woodland	East	750m (closest)
Ancient and Semi-Natural Woodland	Protected Woodland	West	215m (closest)
Chaslins Copse	Local Wildlife Site	West	600m
Shellingford Crossroads Quarry	Site of Special Scientific Interest	North	175m

Historical landfilling within the vicinity of the site is detailed (with location plans) in Section 3 of the Enviro Insight report presented in Appendix 1.

The restored Shellingford Crossroads Quarry is located to the north of the existing permitted site (immediately to the north of the A417) and is located a minimum distance of *c.* 200m to the northeast of the western extension area. With the exception of the most western part (which was been left as an excavation void to revegetate naturally) the Shellingford Crossroads Quarry was restored using imported domestic and commercial waste (and accepted 'difficult' wastes) and the landfill was operated as 'dilute and disperse'.

British Geological Survey (BGS), Local Authority and Environment Agency (EA) historical landfill records also exist for areas just to the north of Faringdon Road located adjacent to the northern boundary of the existing site area. These records indicate that inert, industrial, commercial, household, special and liquid sludge wastes were accepted at these sites. The Stanford Waste Recycling and Reception Centre now operates at this location.

No other historical landfill sites are located within 1km of the site.

The additional deposit for recovery activity being applied for under this EPR Permit variation application will occur within the western extension area at the permitted Shellingford Quarry site. Drawing No. SHELLQMA2206-7 illustrates the phasing of the excavation and infilling of the western quarry extension, approved by P18/V2610/CM (MW.0104/18).

2.2 Climate

Daily rainfall data for the period January 1994 to July 2022 has been obtained from the Department for Environment Food & Rural Affairs (DEFRA) Hydrology Data Explorer for the Stanford R02 rain gauge (station number: 260221TP). The data acquisition for the rain gauge has been temporarily suspended and so no data since December 2023 has been analysed. The average annual rainfall during this period, for years with complete datasets, is estimated to be 607mm/year. The rainfall data is shown in Appendix 2.

Available daily evaporation data for the period October 2007 to September 2017 has been obtained from the EA for the River Ock catchment. Annual evaporation in the Ock catchment ranges from 438mm (2013) to 600mm (2008), with an average of 499mm over this period.

The effective rainfall (average annual rainfall minus average annual evaporation) for the site is estimated to be 108mm/year.

It is anticipated that when low permeability inert material is placed within the western extension area under the deposit for recovery activity that infiltration will be reduced to *c.* 46mm/year, based on a final clay loam grassed surface. This value represents the effective infiltration based on the 108mm/year infiltration with an infiltration coefficient applied (effective rainfall multiplied by infiltration coefficient). The infiltration coefficient of 0.43 has been established from the runoff

coefficient of 0.57 calculated from an average slope of 3.23% for the restored western extension area (National Coal Board, 1982)[1].

The direction of the prevailing wind is from the southwest (national prevailing wind direction).

2.3 Geological Setting

The geological setting of the site has been determined based on a review of published information, site investigation information and observations made in the existing quarry excavation.

The general geological setting of the site is shown on Drawing No. SHELLQMA2508-9.

Strata represented in the existing quarry and the western quarry extension area belong to the Stanford Formation and the underlying Kingston Formation which form part of the Corallian Group (Upper Jurassic).

More specifically, the strata comprise:

- Calne Member (Stanford Formation) – rubbly oolitic and clayey limestones (0.0m to *c.* 1.5m thick locally); overlying
- Highworth Grit Member (Kingston Formation) – fine and medium grained sands, rippled and cross bedded with thin limestone bands and clay lenses, increasingly silty to the base (*c.* 2.0m to *c.* 11m thick locally); overlying
- Highworth Clay Member (Kingston Formation) – grey sandy and silty clay, often thin or absent (0.0m to *c.* 3m thick locally); overlying
- Highworth Limestone Member (Kingston Formation) – oolitic and bioclastic limestones with thin sandy clay bands, becoming a sandy limestone to the base (*c.* 2.5m to *c.* 10m thick locally); overlying
- Lower Calcareous Grit Formation (Corallian Group) – silty and clayey fine to medium sands (*c.* 5.5m to *c.* 10m thick locally – not worked); overlying
- Oxford Clay Formation (Ancholme Group) – clay (greater than 30m thick – not worked).

The strata within and near the site generally dip to the south and southeast at variable gradients of between *c.* 1v : 40h (vertical : horizontal) and *c.* 1v : 100h. However, variations in strata dip and dip direction occur as a result of lateral variations in strata character and thickness.

Consistent with the requirements of the extant Planning Permissions the quarry is not currently, and will not be, excavated below the base of the Highworth Limestone Member *i.e.* no excavation into the underlying Lower Calcareous Grit Formation.

2.4 Hydrological Setting

2.4.1 Surface Water Features

Surface water features are shown on Drawing No. SHELLQMA2508-10.

2.4.2 Description of local water courses

The site is located within the catchment area of the Holywell Brook (a tributary of the River Ock) which flows in a southerly direction along the eastern side of Shellingford (*c.* 200m west of the western extension area) and then in an easterly direction (*c.* 100m south of the current site and western extension area) towards its confluence with the River Ock near Manor Farm *c.* 1.1km southeast of the site.

The Frogmore Brook is located *c.* 750m northeast of the site at its closest approach and flows in a southeasterly direction where it meets the River Ock *c.* 1.6km east of the site.

The FEH Web Service indicates that the catchment area of the Holywell Brook upstream of the southern part of the western extension area is *c.* 8.5km^2 and that the catchment area associated with the reach upstream of Shellingford is *c.* 5.9km^2.

[1] National Coal Board. 1982. Technical Management of Water in the Coal Mining Industry, Chapter 11 – Design of a tip drainage scheme.

2.4.3 *Waterbodies*

There are a number of surface waterbodies located within and surrounding the existing quarry area.

Within the existing quarry site there are a series of settlement lagoons used for clarification of mineral processing wash water. A small lagoon is located on the southern boundary of the site from which water from the existing quarry is discharged to the Holywell Brook under an extant discharge consent (NPSWQD002821)).

The closest external waterbody to the site is located in the western part of the restored Shellingford Crossroads Quarry *c.* 70m to the north of the existing quarry and *c.* 260m to the northeast of the western extension area. The waterbody is not groundwater fed and Google Earth aerial images show that the waterbody has largely dried out since 2012.

A pond is located *c.* 300m south of the site, within the footprint of the White Horse Business Park. A pond is also located *c.* 400m south of the site and another pond is situated *c.* 650m south of the site along the northern edge of the Holywell Brook.

Two attenuation ponds associated with the new housing development built at River Meadow (off Faringdon Road/Ware Road) are situated 240m and 370m to the southeast of the site, respectively.

2.4.4 *Springs*

The Institute of Geological Sciences (IGS) Hydrogeological Map of the South West Chilterns and the Berkshire and Marlborough Downs (IGS, 1978) shows a spring issue located immediately north of Shellingford village, which appears to contribute to, but not to be the sole source of, flow in the Holywell Brook (see Drawing No. SHELLQMA2508-11). The are no other identified springs located within 1km of the site.

2.4.5 *Flows within local water courses*

The Holywell Brook (the closest water course to the site), is not routinely monitored by the EA.

A visual inspection by GWP of the reach of the Holywell Brook between Shellingford and Stanford in the Vale on 12th July 2018 (*i.e.* during an extended dry period) estimated flows of *c.* 5-10 l/s including a flow of *c.* 5 l/s in the channel flowing along the eastern side of Shellingford.

The channel of the Holywell Brook is generally heavily vegetated, except where it has recently been cleared, and the water flow south of the copse located to the south of Shellingford shows evidence of high nutrient loading. It is considered that the high nutrient loading is due to the Shellingford sewage treatment works which discharges into the Holywell Brook at the southern end of the village.

Flows within the Holywell Brook are unaffected by the existing landfill and will remain unaffected by the additional infilling with imported inert waste associated with the deposit for recovery activity within the western quarry extension area.

Accordingly, it is considered that an assessment of flows in the Holywell Brook is not required for the purposes of the EPR Permit variation application.

2.4.6 *Flood Risk and the presence of indicative flood plains*

The site is located within fluvial flood risk Flood Zone 1 (annual exceedance probability for river flooding is equal to or less than 0.1% (*i.e.* less than 1 in 1000 years)) (see Drawing No. SHELLQMA2508-12).

The site is located mostly within a very low pluvial (surface water) flood risk zone (see Drawing No. SHELLQMA2508-13). The site has small standalone areas at risk of pluvial (surface water) flooding, but no areas that contribute to off-site receptors.

Flood risk maps are provided in Sections 7, 8 and 9 of the Enviro Insight report presented in Appendix 1.

The site does not lie within an area which is at risk of flooding.

2.4.7 *Surface water abstractions*

Only 1 No. licensed surface water abstraction is located within *c.* 1km of the site. Details of this surface water abstraction, located *c.* 830m to the west of the site, are given in Section 5.7 of the Enviro Insight Report presented in Appendix 1.

2.4.8 Consented discharges

Two current consented discharges are located within *c.* 1km of the site, as detailed within Section 4.13 of the Enviro Insight Report presented in Appendix 1.

The first is the discharge from the existing quarry site settlement lagoon/balancing pond system (reference: NPSWQD002821), *via* a discharge pipe and overland flow into the Holywell Brook.

The other consented discharge is held by the Shellingford Sewage Treatment Works (STW), located *c.* 320m west of the site, which discharges treated effluent to the Holywell Brook.

2.4.9 Surface water quality

The River Ock (to Cherbury Brook) was given a 'Moderate' ecological status and 'Fail' chemical status for 2019 by the EA.

The Holywell Brook is not routinely monitored by the EA.

The treated effluent discharged into the Holywell Brook from the Shellingford STW to the west of the site has been monitored routinely since 2000 for Biochemical Oxygen Demand (BOD) and suspended solids, with additional determinands monitored for between 2000 and 2006.

Since 2013 the quality of water discharged from the existing quarry into the Holywell Brook has been routinely monitored together with the quality of water upstream and downstream of the discharge point consistent with the requirements of the existing EPR Permit EPR/BP3095EU.

The 3 No. surface water monitoring locations (SW1, SW2 and SW3) are shown on Drawing No. SHELLQMA2508-14. Surface water quality monitoring data is provided in Appendix 3.

The surface water monitoring data shows no evidence that the existing permitted inert landfill is having a significant or measurable detrimental impact on the hydrological setting of the site and surrounding area.

Given that the continued acceptance of imported inert waste at the site will be strictly controlled using robust waste acceptance criteria and protocols, it is considered that the continued operation of the site, including infilling with imported inert waste in the western extension area under the deposit for recovery activity, will not result in any significant or measurable detrimental impact on the hydrological setting of the site and surrounding area.

Surface water quality monitoring will continue to be undertaken in accordance with the existing EPR Permit. Details of the monitoring scheme are provided in Section 5.1.4.

2.5 Hydrogeological Setting

2.5.1 Aquifer Characteristics

Aquifer characteristics and maps are provided in Section 5 of the Enviro Insight report presented in Appendix 1.

The Corallian Group strata which underlies the site and the surrounding area is classified by the EA as a 'Secondary A' aquifer, defined as 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of baseflow to rivers'.

The BGS[2] (Baseline Report Series 14. The Corallian of Oxfordshire and Wiltshire. Ref: NC/99/74/14. 2004) describes the Corallian Group strata as a 'sequence of minor aquifers' rather than a single uniform aquifer due to the heterogeneous character of the strata which can have very variable hydraulic properties.

Groundwater flow within the Corallian Group strata is a combination of fissure flow (predominant in the limestones) and intergranular flow (predominant in the sands).

Based on the results of tests undertaken within this aquifer, the BGS (2004) reports that the porosity of the Corallian Group across the region varies from 6% to 39% with a mean of 24%.

[2] British Geological Survey BGS. 2004. Baseline Report Series 14. The Corallian of Oxfordshire and Wiltshire. Ref: NC/99/74/14.

The site is not located within a groundwater source protection zone.

Details of licensed abstractions are provided Section 5 of the Enviro Insight report presented in Appendix 1.

2.5.2 Groundwater Flow

The Institute of Geological Sciences Hydrogeological Map of the South West Chilterns and the Berkshire and Marlborough Downs[3] shows groundwater levels in the Corallian Group in the vicinity of the site of *c.* 80mAOD (see Drawing No. SHELLQMA2508-11). The groundwater flow direction is shown to be to the south/southeast. A hydraulic gradient of *c.* 4.4 x 10^{-3} is indicated in the vicinity of the site.

Groundwater levels and flows within the vicinity of the site have been investigated based on available groundwater level monitoring data for the Corallian Group strata, comprising:

- data from the EA Stanford Quarry observation borehole (April 2001 to June 2015);
- data from 17 No. monitoring boreholes installed at the site, including 3 No. groundwater monitoring boreholes installed around the perimeter of the western extension area in 2021 (BH01/21, BH02/21, BH03/21).

Borehole locations are shown on Drawing No. SHELLQMA2508-14. Groundwater level monitoring data from the EA Stanford Quarry observation borehole is provided in Appendix 4. Groundwater level monitoring data from the site boreholes is provided in Appendix 5.

Groundwater is present in the Highworth Limestone Member and the underlying Lower Calcareous Grit Formation (Corallian Group) and the existing quarry is dewatered to allow mineral excavation, AGB construction and restoration infilling to be undertaken in dry conditions. The quarry, including the western quarry excavation area, will continue to be operated in the same manner.

Groundwater flow is to the south and southeast and groundwater discharge into the Holywell Brook is inferred.

Based on a review of groundwater level and flow information, it is considered that a proportion of groundwater flow in the vicinity of the site discharges into the Holywell Brook *i.e.* a groundwater fed baseflow in this watercourse is inferred.

The extension area will be worked to a maximum depth of *c.* 15m and, consistent with the quarry depth limitation imposed by Condition 17 of Planning Permission P18/V2610/CM (MW.0104/18), the western quarry extension will not be worked below the base of the Highworth Limestone Member *i.e.* no excavation into the underlying Lower Calcareous Grit Formation. This working depth limitation is to preserve an aquifer unit (the Lower Calcareous Grit Formation) beneath the site and, in doing so, to allow continued groundwater flow during quarry development and following the completion of site restoration infilling.

It is considered that continued inert landfilling within the existing permitted inert landfill area at the site, and inert waste infilling within the western extension area under the additional deposit for recovery activity, will have no significant or measurable detrimental impact on the hydrogeological setting of the site and the surrounding area.

2.5.3 Groundwater Quality

Groundwater chemistry has been monitored at the site since 2005 and monitoring continues in accordance with the requirements of the existing EPR Permit.

Groundwater monitoring locations are shown on Drawing No. SHELLQMA2508-14. Groundwater quality monitoring data for boreholes monitoring up-gradient and down-gradient of the existing permitted inert landfill area, and the proposed additional Permit area for the deposit for recovery activity within the western extension area, is provided in Appendix 6.

[3] Hydrogeological Map of the South West Chilterns and the Berkshire and Marlborough Downs including parts of hydrometric areas 39, 42, 43 and 53. 1978. Institute of Geological Sciences.

The groundwater monitoring data shows no evidence that the existing landfill is having a significant or measurable detrimental impact on the hydrogeological setting of the site and surrounding area.

Groundwater quality monitoring will continue to be undertaken in accordance with the existing EPR Permit. Details of the monitoring scheme are provided in Section 5.1.3. Revised compliance limits for boreholes down-gradient of the existing permitted inert landfill and the proposed deposit for recovery activity in the western extension area have been based on baseline groundwater quality data and are proposed in Section 5.2.

The conceptual hydrogeological site model is discussed in detail within the Hafren Water Hydrogeological Risk Assessment report. The Hafren Water HRA report is provided in Appendix 7.

A Conceptual Model Plan and schematic conceptual cross sections are provided as respective Drawings 3810/HRA/02 and 3810/HRA/03 within the Hafren Water HRA report.

3. CONCEPTUAL SITE MODEL

A detailed conceptual hydrogeological site model is included within Section 2 of the Hafren Water HRA report provided in Appendix 7.

3.1.1 Sources

This EPR Permit application is to vary the existing EPR Permit EPR/BP3095EU to accommodate a deposit for recovery activity to infill the western quarry extension excavation area with suitable imported inert waste.

The EPR Permit area currently receives, and will continue to receive, inert waste only.

The site will receive inert waste as part of the deposit for recovery activity within the western extension area.

The inert fill capacity associated with the deposit for recovery activity, which is the subject of the EPR Permit variation application, is *c.* 1.60Mm^3 which equates to a tonnage of *c.* 2.88Mt (using a conversion factor of 1.8t/m^3). To account for geological uncertainty, a conservative figure of *c.* 2.014Mm^3 of imported inert fill material has been used within the Hafren Water quantitative HRA in Appendix 7.

The waste types provided for by the EPR Permit application are listed below in Table 4.

The waste placed within the western extension area under the deposit for recovery activity will be Landfill Directive inert Waste Acceptance Criteria (WAC) compliant *i.e.* the waste will comply with the leaching values for waste acceptable at landfills for inert waste set out in Section 2.1.2 of *'Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC'*. The waste placed within the existing permitted inert landfill area will continue to be inert WAC compliant.

The variation application is submitted on the basis that the recovered waste placed within the western extension area will be suitable for its intended use and that the approved scheme is a deposit for recovery activity and not a waste disposal activity.

Despite the inert nature of the imported waste that will be placed in the western extension area under the deposit for recovery activity, this material represents one 'source' of potential contaminants for the purposes of this HRA. The other potential source of contaminants comes from the extent of the currently permitted inert landfill which will be located up groundwater gradient of the extension area. This area is yet to be landfilled. These areas are shown on the Conceptual Model Plan drawing 3810/HRA/02 within the Hafren Water HRA report provided in Appendix 7.

There are no proposals to landfill the area within the Environmental Permit boundary that is south of the extent of the currently permitted landfill which will be located up groundwater gradient of the extension area. This area will be restored with site-derived quarrying non-waste material. As such, this area has not been included within the conceptual site model as a contaminant source.

The site does not have a natural geological barrier and therefore an engineered basal and side slope Artificial Geological Barrier (AGB) appropriate for an inert landfill is constructed on a phased basis within the existing permitted site area in accordance with accordance with Annex 1 Section 3.2 of the Landfill Directive as referenced by the Environmental Permitting (England and Wales) Regulations and the Permit EPR/BP3095EU.

A basal and side slopes engineered AGB will be constructed within the western extension area in accordance with Annex 1 Section 3.2 of the Landfill Directive as referenced by the Environmental Permitting (England and Wales) Regulations, to accommodate the deposit for recovery activity in this part of the site.

The AGB will comprise a compacted layer of suitable indigenous quarry material (overburden, interburden and crushing/screening fines) and/or suitable selected imported inert waste material and will have a minimum thickness of 1m and a permeability no greater than 1 x 10^{-7}m/s.

The AGB will be constructed in accordance with the approved original Construction Quality Assurance (CQA) Plan (PGW&A Report reference SQL/CQA Plan/1) and the Addendum CQA Plan (GWP Report No. 190508) approved by the EA.

Table 4 – Waste types

Waste types	
Exclusions **Wastes having any of the following characteristics shall not be accepted:** **Consisting solely or mainly of dusts, powders or loose fibres** **Hazardous wastes** **Wastes in liquid form**	
Waste Code	**Description**
17	**CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**
17 01	**concrete, bricks, tiles and ceramics**
17 01 01	concrete (2)
17 01 02	bricks (2)
17 01 03	tiles and ceramics (2)
17 01 07	mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06 (2)
17 05	**soil (including excavated soil from contaminated sites), stones and dredging spoil**
17 05 04	soil and stones (excluding topsoil and peat) other than those mentioned in 17 05 03 (1)
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 09	minerals (for example sand, stones) from the treatment of waste aggregates that are otherwise naturally occurring minerals – excludes fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard (2)
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS**
20 02	**garden and park wastes (including cemetery waste)**
20 02 02	soil and stones (excluding topsoil and peat) (1)
(1) For the purposes of waste acceptance, soil includes naturally occurring sands and clays (2) Selected construction and demolition waste (C & D waste): with low contents of other types of materials (like metals, plastic, organics, wood, rubber, etc). 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. If it is unsure whether the waste fulfils the definition of inert waste, or is uncontaminated, then testing of the waste must be undertaken to confirm compliance with the criteria for inert waste as specified in The Landfill (England and Wales) Regulations 2002 as amended. The origin of all waste must be known.	

3.1.2 Pathways

The following pathways exist between the site and potential receptors:

- vertical infiltration of rainfall through the inert waste, AGB and to the Lower Calcareous Grit aquifer;

- lateral migration of contaminants through groundwater within the Lower Calcareous Grit aquifer below the inert waste;
- lateral migration of contaminants through the inert waste into the adjacent Highworth Grit and Highworth Limestone following cessation of dewatering and rebound of water levels.

Saturated aquifers have the potential to transport contaminants in the direction of groundwater flow towards receptors. The distribution and extent of these strata are discussed in Section 2.3 above and are illustrated in the conceptual hydrogeological model shown in the Hafren Water HRA report provided in Appendix 7.

Natural groundwater flow across the site is inferred to be in a southerly direction towards the Holywell Brook. Migration of contaminants within the Holywell Brook watercourse is considered to represent a secondary pathway to the River Ock.

3.1.3 Receptors

The groundwater present within the Corallian Group aquifer is considered to be the primary receptor, hence the requirement for an engineered basal and side slope AGB to be installed at the site, including within the western extension area where the deposit for recovery activity will take place.

The natural local groundwater flow direction is to the south/southeast and the inferred groundwater connection to the Holywell Brook, located *c.* 100m south of the site at its closest approach, makes this watercourse a potential receptor.

Groundwater quality monitoring will continue to be undertaken in accordance with the existing EPR Permit, with additional routine monitoring added for boreholes BH02/21 and BH03/21, located around the western extension area. Details of the monitoring scheme are provided in Section 5.1.3. Revised compliance limits for down-gradient boreholes, based on baseline groundwater quality data, are proposed in Section 5.2.

4. HYDROGEOLOGICAL RISK ASSESSMENT

Hydrogeological risk screening and a quantitative Hydrogeological Risk Assessment, focussing on the possible effects from the placement of imported inert waste material within the western extension area under a deposit for recovery activity, have been undertaken by Hafren Water and are included within the report provided in Appendix 7.

The Hafren Water report demonstrates that the placement of imported inert waste material at WAC limits within the western extension area will not result in hazardous substances present in groundwater adjacent to the site in concentrations discernible above background levels and that non-hazardous pollutants will not be present in concentrations such that pollution of nearby groundwater is caused.

5. REQUISITE SURVEILLANCE

Under the Groundwater (England and Wales) Regulations, there is a requirement for *'requisite surveillance'* in the form of leachate, groundwater and surface water monitoring. Environmental monitoring is a crucial element of the risk assessment process as it:

- allows for validation of the risk assessment;
- can confirm whether risk management provisions and objectives are being met;
- provides a warning mechanism if adverse impacts are found.

Control and compliance limits form the basis for assessing groundwater monitoring data at landfill sites.

Control limits are specific assessment criteria relating to groundwater, or other relevant parameters, that are used to determine whether a landfill is performing as designed. They act primarily as an early warning system to enable appropriate investigative or control measures to be implemented.

Compliance limits are specific compliance concentrations (or regulatory standards) and are specified in an EPR Permit. If the defined compliance limits are exceeded significant adverse environmental effects and/or breaches of regulatory standards will have occurred. Such effects are deemed consistent with groundwater having been polluted.

The monitoring proposed for the site has been developed to be proportionate to the risk the site poses to the environment. Key to the monitoring scheme is that the site will continue to receive only inert waste. Inert waste will continue to be received within the existing permitted inert landfill area. The site will receive inert waste as part of the deposit for recovery activity within the western extension area. The inert nature of the waste places the site outside the scope of the Groundwater (England and Wales) Regulations. However, risk-based monitoring is proposed for the site and is designed to demonstrate compliance with the permitted inert Waste Acceptance Criteria.

Key to the site's monitoring scheme is ensuring that the inert Waste Acceptance Criteria are strictly adhered too. Testing to ensure compliance will continue to be carried out as necessary by both the waste producer and the site operator. Strict adherence to the Waste Acceptance Criteria for inert landfill sites ensures that the site does not pose any contamination hazard to either groundwater or surface water. Testing of the inert waste that will be placed in the western extension area under the deposit for recovery activity will also be undertaken.

5.1 The Risk Based Monitoring Scheme

5.1.1 Review of Technical Precautions

Due to the inert nature of the imported waste, it is considered that the proposed technical precautions detailed below are appropriate and sufficient to prevent any unacceptable discharge from the site:

- strict control of waste types sourced and accepted;
- strict adherence to compliance criteria and testing;
- provision of an AGB in compliance with the Landfill Directive;
- progressive restoration to a profile to encourage surface water runoff from the waste mass and minimise water ingress into the inert waste mass;
- provision of ditches or berms, where required, to minimise surface water runoff into the landfill and deposit for recovery activity areas; and
- monitoring of down-gradient groundwater quality.

It is considered that leachate monitoring and management is not required due to the inert nature of the imported inert waste.

5.1.2 Leachate Monitoring

Leachate monitoring is not required under the current inert landfill Environmental Permit held by Multi-Agg Limited. Given the inert nature of the waste material that is placed within the permitted existing inert landfill and will be placed within the western extension area under the deposit for recovery activity, no leachate will be generated. Therefore, no leachate management or monitoring infrastructure is required or proposed for the Permit variation including the western extension area where the deposit for recovery activity will take place.

An AGB is required to provide sufficient attenuation between the inert waste source and any potential groundwater receptor. Phases of basal and side slopes AGB are currently constructed at the site as required under the existing Permit. The AGB within the western extension area will be constructed to achieve a minimum thickness of 1m and maximum permeability of 1×10^{-7}m/s in accordance with the approved original Construction Quality Assurance (CQA) Plan (PGW&A Report reference SQL/CQA Plan/1) and the Addendum CQA Plan (GWP Report No. 190508) approved by the EA.

5.1.3 Groundwater Monitoring

Groundwater will continue to be monitored within current boreholes adjacent to the existing permitted inert landfill site area. In addition, boreholes BH02/21 and BH03/21 installed around the perimeter of the western extension area will be monitored for groundwater levels and quality to assess the integrity of the performance of the deposit for recovery activity within the western extension area and to ensure that there is no negative impact on groundwater.

Groundwater monitoring at the current monitoring points associated with the existing inert landfill extent shall continue. The EA has previously been informed that boreholes BH01/09, BH01/11 (A and B) and BH03/09 were lost to quarry development and were replaced by boreholes BH01/19, BH02/19A, BH02/19B and BH03/19 respectively in January 2019. A CQA validation report (GWP

Report No. 190104) for the installation of replacement boreholes BH01/19, BH02/19A, BH02/19B and BH03/19 was submitted to the EA on 18th March 2019.

In addition, borehole BH05/02 was lost to quarry development at the end of 2020. Whilst not required to be monitored under the current inert landfill Permit, borehole BH05/15, located to the west of BH05/02, has been monitored since February 2019 and will continue to be monitored as a replacement for BH05/02.

Groundwater monitoring borehole locations are shown on Drawing No. SHELLQMA2508-14.

The schedule of groundwater monitoring is proposed in Table 5.

Table 5 – Groundwater monitoring schedule

Monitoring point reference	Parameter	Monitoring frequency
BH01/02, BH04/02, BH06/02, BH02/09, BH04/09, BH02/11A, BH02/11B, BH03/11A, BH03/11B, BH01/19 (replaced BH01/09), BH02/19A (replaced BH01/11A), BH02/19B (replaced BH01/11B), BH03/19 (replaced BH03/09), BH05/15 (monitored instead of BH05/02), BH02/21, BH03/21 All monitoring points shown on Drawing No. SHELLQMA2508-14	Groundwater level Groundwater chemistry - pH, Electrical Conductivity, Ammoniacal Nitrogen, Cadmium, Chloride, Chromium, Lead, Nickel, Sulphate, BTEX Compounds, Total Petroleum Hydrocarbons (TPH)	Quarterly
As above	Groundwater chemistry extended suite - Total Alkalinity, Boron, Calcium, Copper, Iron, Magnesium, Manganese, Mercury, Polycyclic Aromatic Hydrocarbons (PAHs), Potassium, Sodium, Total Organic Carbon (TOC), Total Oxidised Nitrogen (TON), Zinc	Annually

Updated compliance limits for down-gradient monitoring boreholes BH04/02, BH04/09, BH02/11A, BH02/11B, BH03/11A, BH03/11B and BH03/19 have been proposed (see Section 5.2) based on a review of the monitoring data obtained for the up-gradient and down-gradient boreholes at the site. The compliance limits will also apply to monitoring boreholes BH02/21 and BH03/21, located down-gradient of the western extension area.

Given that the acceptance of inert waste at the site will continue to be strictly controlled using robust waste acceptance criteria and protocols, it is considered that the continued operation of the Shellingford Quarry site, including infilling with imported inert waste in the western extension area under a deposit for recovery activity will not result in any significant or measurable detrimental impact on the hydrogeological setting of the site and surrounding area.

At six months prior to completion of the site, a Post Closure Management Plan will be submitted to the EA detailing the proposed post closure monitoring programme. Following the approval of this Post Closure Management Plan, completion of the site and completion of immediate post closure monitoring (2 years), providing there have been no indications of groundwater contamination or landfill gas generation, then the EPR Permit will be surrendered. The Post Closure Management Plan will also detail the procedures to be adopted should compliance limits for groundwater chemistry or landfill gas be exceeded.

5.1.4 Surface Water Monitoring

Given the inert nature of the waste and the strict waste acceptance procedures and protocols that are already employed at the site, it is considered that no hydrological risk is posed to the Holywell Brook or any surface water dependent sites of ecological sensitivity from the landfilling with imported inert waste in the existing landfill or the proposed inert waste infilling within the western extension area under the deposit for recovery activity.

Furthermore, the results from the quantitative modelling presented in Appendix 7 demonstrate that no unacceptable levels of hazardous substances or non-hazardous determinands are predicted to be within the groundwater at the respective receptors down-gradient of the site.

The Holywell Brook is currently monitored for water quality upstream and downstream of the permitted quarry discharge point (discharge consent NPSWQD002821) and from the discharge point itself. There is no evidence from the surface water monitoring that the current site activities are having a significant or measurable detrimental impact on the Holywell Brook.

The Holywell Brook will continue to be monitored in the same manner following Permit variation. It does not seem necessary to change the current monitoring schedule of the Holywell Brook as the proposed development does not involve an increased risk to this watercourse.

The 3 No. surface water monitoring locations (SW1, SW2 and SW3) are shown on Drawing No. SHELLQMA2508-14.

The schedule of surface water monitoring is proposed in Table 6.

Table 6 – Surface water monitoring schedule

Monitoring point reference	Parameter	Monitoring frequency
SW1, SW2, SW3 Monitoring points shown on Drawing No. SHELLQMA2508-14	Surface water chemistry - pH, Electrical Conductivity, Ammoniacal Nitrogen, Chloride, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Organic Carbon (TOC), Total Oxidised Nitrogen (TON)	Quarterly
As above	Surface water chemistry extended suite - Total Alkalinity, Cadmium, Chromium, Copper, Iron, Magnesium, Manganese, Nickel, Lead, Polycyclic Aromatic Hydrocarbons (PAHs), Potassium, Sodium, Sulphate, Zinc, BTEX Compounds, Total Petroleum Hydrocarbons (TPH)	Annually

The quality of groundwater down-gradient of the site, between the site and the Holywell Brook, will be monitored (see Section 5.1.3).

5.2 Revised Compliance Limits for Down-Gradient Boreholes

Groundwater chemistry has been monitored at the site since 2005 and monitoring continues in accordance with the requirements of the existing Environmental Permit.

Following a review of the groundwater monitoring data collected at the site, it is proposed to update the current compliance limits outlined in Table S3.1 within Schedule 3 of the Permit, based on the available monitoring data collected to date.

Groundwater monitoring locations are shown on Drawing No. SHELLQMA2508-14.

Updated compliance limits for existing down-gradient monitoring boreholes have been proposed based on a review of available monitoring data undertaken at up-gradient monitoring boreholes. Compliance limits for monitoring boreholes BH02/21 and BH03/21, located down-gradient of the

western extension area, have also been proposed based on the up-gradient data. For reference up-gradient and down-gradient monitoring boreholes used for setting the updated compliance limits are as follows:

- Up-gradient monitoring boreholes – BH06/02, BH02/09, BH02/19A (replaced BH01/11A), BH05/15 (monitored instead of BH05/02) and BH01/21 (up-gradient of western extension area – first monitored November 2021 and lost to quarry development after April 2023 monitoring round).
- Down-gradient monitoring boreholes – BH04/02, BH04/09, BH02/11A, BH02/11B, BH03/11A, BH03/11B, BH03/19 (replaced BH03/09), BH02/21 (down-gradient of western extension area) and BH03/21 (down-gradient of western extension area).

Up-gradient boreholes BH01/02 and BH01/19 (replaced BH01/09) located in the north of the existing site area have been omitted from the compliance limit analysis. A review of groundwater monitoring data for Shellingford Quarry Landfill and the closed Stanford Landfill completed in 2010 and included as Appendix E in the 2009 Annual Report for the site established that historical elevated determinand concentrations are most likely to be due to the background quality of the groundwater (contamination from the Stanford Landfill) and not a consequence of activities at the Shellingford Quarry Landfill site. As the Stanford Landfill site is located adjacent to the north of the existing site the influence of this historical landfill on the groundwater is observed in the boreholes located closest to it; those being BH01/02 and BH01/19. Therefore, the updated compliance limits for down-gradient boreholes at the site have not used data from these up-gradient boreholes.

Consistent with the requirements of the Environmental Permit, groundwater is monitored for a range of determinands. Having regard to the site being permitted to receive Landfill Directive compliant inert waste only, it is proposed that updated compliance limits for down-gradient boreholes continue to be set for Ammoniacal Nitrogen, Chloride, Cadmium, Chromium, Lead and Nickel.

Updated compliance limits for the down-gradient boreholes have been set at the geometric mean concentration plus three standard deviations as based on analysis of available monitoring data for the up-gradient boreholes up to and including May 2025.

The currently permitted and proposed updated compliance limits are given in Table 7. The data set used to calculate the updated limits is provided in Appendix 8.

Table 7 – Proposed revised compliance limits for down-gradient monitoring points

Determinand	Unit	Min.	Max.	Geometric Mean	Standard Deviation	Existing Compliance limit	Revised Compliance limit
Ammoniacal Nitrogen	mg/l	<0.02	0.809	0.16	0.13	0.5	0.6
Chloride	mg/l	3.5	207	27.65	34.97	250	133
Cadmium	mg/l	<0.00004	0.005	0.00023	0.00063	0.0001	0.0021
Chromium	mg/l	<0.0005	0.018	0.0023	0.0031	0.05	0.011
Lead	mg/l	<0.00001	0.061	0.0010	0.0106	0.1	0.033
Nickel	mg/l	<0.0004	0.073	0.0047	0.0113	0.05	0.039

Outlier values recorded for Ammoniacal Nitrogen, Chloride and Lead are identified in the data set within Appendix 8 and have been excluded for the purposes of calculating the updated compliance limits, although these outlier values may be true values given the background quality of the groundwater associated with the closed Stanford Landfill located adjacent to the north of the existing site area.

The updated compliance limits for most determinands are more stringent than the limits within the existing Environmental Permit. The revised limit for Ammoniacal Nitrogen is just 0.1mg/l greater than the existing compliance limit. The limit for Cadmium has increased as the laboratory limit of detection for this determinand (<0.001mg/l) within environmental monitoring received is now higher than the existing compliance limit (0.0001mg/l). In addition, in January 2018 Cadmium was reclassified as a non-hazardous pollutant from a hazardous substance under the Water Framework

Directive UKTAG and therefore a less strict compliance limit based on site-specific data is considered suitable for this determinand.

The updated groundwater compliance limits for all the selected determinands are based on site-specific data and are therefore considered appropriate for inclusion within the varied Permit.

The monitoring data shows no evidence for a general deterioration in groundwater quality at the site and, on this basis, it is concluded that the existing inert landfill is not having a significant or measurable detrimental impact on the hydrogeological setting of the site and surrounding area.

Given that the continued acceptance of inert waste at the site will be strictly controlled using robust waste acceptance criteria and protocols, it is considered that the continued operation of the Shellingford Quarry site, including infilling with imported inert waste in the western extension area under a deposit for recovery activity, will not result in any significant or measurable detrimental impact on the hydrogeological setting of the site and surrounding area.

6. CONCLUSIONS

6.1 Compliance with the Landfill Directive

An AGB is required to provide sufficient attenuation between the landfill source and any potential groundwater receptor in order to ensure compliance with the Landfill Directive as referenced by the Environmental Permitting (England and Wales) Regulations. A basal and side slope AGB will continue to be constructed on a phased basis within the currently Permitted inert landfill area in accordance with Annex 1 Section 3.2 of the Landfill Directive as referenced by the Environmental Permitting (England and Wales) Regulations.

A basal and side slopes engineered AGB will be constructed within the western extension area in accordance with Annex 1 Section 3.2 of the Landfill Directive as referenced by the Environmental Permitting (England and Wales) Regulations, to accommodate the deposit for recovery activity in this part of the site.

The AGB will have a minimum thickness of 1m and a permeability no greater than 1 x 10^{-7}m/s and will be constructed in accordance with the approved original Construction Quality Assurance (CQA) Plan (PGW&A Report reference SQL/CQA Plan/1) and the Addendum CQA Plan (GWP Report No. 190508) approved by the EA.

Given the inert nature of the waste material no leachate will be generated. Therefore, no leachate management or monitoring infrastructure is currently required or proposed.

6.2 Compliance with the Groundwater Regulations

The risk assessment has demonstrated that under normal operational and post-operational phases, the additional deposit for recovery activity within the western extension area will not result in hazardous substances present in groundwater beneath the site in concentrations discernible above background levels. In addition, non-hazardous determinands will not be present in concentrations such that pollution of groundwater is caused. It is considered therefore that the site will be compliant with respect to the Groundwater (England and Wales) Regulations.

6.3 Summary

Given that the acceptance of inert waste at the site will continue to be strictly controlled using robust waste acceptance criteria and protocols, it is considered that the current inert landfilling in the existing permitted site area and the proposed deposit for recovery activity in the western extension area will not result in any significant or measurable detrimental impact on the hydrogeological setting of the site and surrounding area.

GWP CONSULTANTS
JANUARY 2026

APPENDIX 1

Groundsure Enviro Insight Report

APPENDIX 2

Stanford R02 rainfall January 1994 to December 2023

APPENDIX 3

Surface water quality monitoring data

APPENDIX 4

Groundwater level monitoring data – Stanford Quarry OBH

APPENDIX 5

Groundwater level monitoring data – Shellingford Quarry

APPENDIX 6

Groundwater quality monitoring data

APPENDIX 7

Hafren Water Hydrogeological Risk Assessment Report

APPENDIX 8

Updated groundwater quality compliance limits for down-gradient boreholes