



Environmental Setting and Site Design

Banana Field

NRS Meriden Aggregates Ltd.

Document Reference: 415/9—R1.1 – ESSD V3



Minerals
Waste
Environment

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Document Title: Environmental Setting and Site Design
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Site / Project: Banana Field
Client: NRS Meriden Aggregates Ltd.

Document Versions

1.0 10/04/2026

Prepared by: CC
Checked by: MS/JMS/AS
Approved by: JMS

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1.0 Report Context

1.1.1 MPG have been commissioned by *NRS Meriden Aggregates Ltd.* to make an application for a Bespoke Permit to the Environment Agency (EA) for the Use of Waste in a Deposit for Recovery Operation on land known as the 'Banana Field' (The Site), NRS Meriden Quarry, Cornets End Lane, Meriden, Coventry, CV7 7LG.

1.1.2 This document is an Environmental Setting and Site Design (ESSD) and will consider:

- The Conceptual Site Model
- The environmental characteristics of The Site
- The design and engineering of The Site in light of potential environmental considerations

1.1.3 This report should be read in conjunction with the Firth Hydrogeological Risk Assessment (HRA) and the following drawings referenced : *415/9-Sensitive Receptor Map, 415/9-Historic Landfill Plan, 415/9-Flood Risk Map, 415-/9-Site Layout Plan.*

1.2 Conceptual Site Model

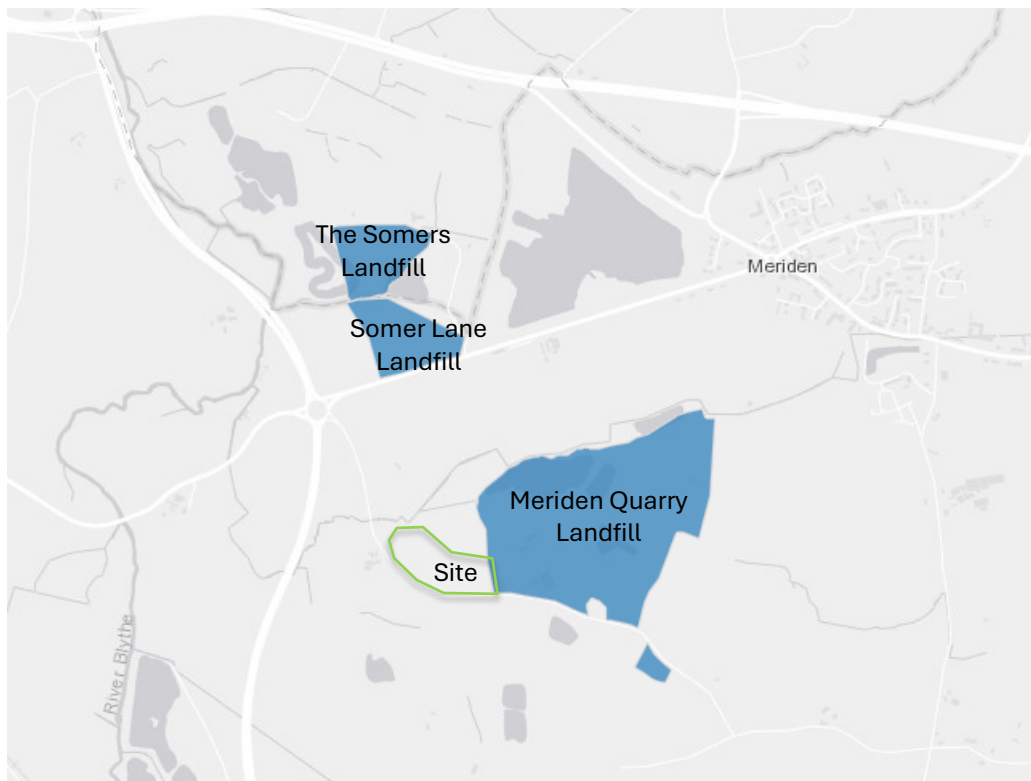
1.2.1 Site Details

1.2.1.1 The National Grid Reference for The Site is SP 22630 81197. The Site is accessed via the wider Meriden Quarry complex – The site access points can be seen on Drawing ref: *415/9-Site Layout Plan.*

1.2.1.2 The Site is located southwest of Meriden, a village located between Coventry and Birmingham. The Site, the 'Banana Field', is a quarry site that lies on the western boundary of the NRS Meriden quarry complex and is approximately 5.63ha in size.

- 1.2.1.3 The proposals for The Site predominantly to restore ground levels to be conducive to agriculture, as required by Planning Permission ref: PL/2018/02524/MWMAJ. The contour levels required are shown in the restoration scheme of the same planning permission and included as plan ref: M096-00110-6.
- 1.2.1.4 The Site is surrounded predominantly by the wider Meriden quarry complex, with the south and western edges abutting Cornets End Lane and agricultural fields. To the southwest there is a small agricultural/industrial compound, which also features a residential property.
- 1.2.1.5 A detailed Conceptual Site Model can be found in the *Firth Consultants Ltd.* HRA that was conducted for The Site.
- 1.2.1.6 The wider site is fenced off, has barbed wire and a bund, as well as locked gates and overnight security. Whilst The Site itself does not have any specific security features, it is highly unlikely anybody could access the wider site and therefore The Site.
- 1.2.1.7 The designated concreted quarantine area for The Site is located north of the weighbridge. This can be seen on Drawing ref: *415/9-Site Layout Plan*.
- 1.2.2 Source: Historical Activity
 - 1.2.2.1 Whilst there are no historic landfills on site, the Hydrogeological Risk Assessment (HRA) conducted by *Firth Consultants* states that there are multiple historic landfills in the vicinity of The Site. This, in conjunction with DEFRA data, shows three nearby historic landfills, the closest of which abuts the eastern side of the boundary.

Figure 1 – Historic Landfill Sites



- 1.2.2.2 To the east, spanning a large portion of the NRS Meriden site, there is a 43ha historic landfill infilled between 1962 and 1992 with inert, industrial, commercial, household and special waste, and liquid sludge ('Meriden QuarryLandfill').
- 1.2.2.3 A 6.7ha landfill approximately 527m north of The Site was infilled with inert and household waste between 1984 and 1993.
- 1.2.2.4 Another landfill approximately 826m north of The Site, with an area of 7.2ha, was infilled between 1983 and 1993 with inert waste. However, the local authority records that sewage sludge was also deposited at The Site.
- 1.2.2.5 Due to the hydraulic gradient of The Site, the Meriden Quarry historic landfill has the potential to be a pre-existing source of groundwater and surface water contamination in The Site. However, the HRA concludes the two northern historic landfills are unlikely to be a source of groundwater or surface water contamination in the local vicinity of The Site.
- 1.2.3 Source: Proposed Activity

1.2.3.1 The proposed activity at The Site is to complete the approved restoration scheme using imported inert waste. Regarding inert waste as a source of pollution, the HRA states the following:

“a potential worst case source is assumed to be material with leachate concentrations equal to the inert WAC”

1.2.3.2 As stated in the HRA and Environment Agency (EA) Guidance, rogue loads with non-compliant wastes must also be considered as a risk. Whilst Waste Acceptance Procedures (WAP) reduce the risk of non-compliant loads from entering The Site, the risk cannot be ruled out and therefore rogue loads should be considered a potential source.

1.2.3.3 The accepted wastes for The Site are listed below:

Waste Code	Description	Extra Details
01 01 02	Waste from non-metalliferous excavation	Restricted waste overburden and interburden only
01 04 08	Waste gravel and crushed rocks other than those containing dangerous substances	
01 04 09	Waste sand and clays	
02 04 09	Soil from cleaning and washing beet	
10 12 08	Waste ceramics, bricks, tiles and construction products (after thermal processing)	
17 01 01	Concrete	
17 01 02	Bricks	
17 01 03	Tiles and ceramics	
17 01 07	Mixtures of concrete, bricks, tiles and ceramics	Metal from reinforced concrete must have been removed
17 03 02	Bituminous mixtures other than those mentioned in 17 03 01	Road planings only. Only to be used on tracks/access roads
17 05 04	Soils and stones (topsoil, peat, subsoil and stones)	Restricted to topsoil, peat, subsoil and stones only
19 02 06	Sludges from physico/chemical treatment other than those mentioned in 19 02 05	This would only include filter cake from both the on-site washplant and off site washplants.
19 12 09	Minerals (such as sand and stones) from the treatment of waste aggregates that are otherwise naturally occurring materials	Restricted to wastes from treatment of waste aggregates that are otherwise naturally occurring minerals. Does not include fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard
19 12 12	Crushed bricks, tiles, concrete and ceramics, including mixtures of materials	Restricted to crushed bricks, tiles, concrete and ceramics only. Metal from reinforced concrete must be removed. Does not include fines from treatment of any non-hazardous waste

		or gypsum from recovered plasterboard
20 02 02	Soil and stones (topsoil, peat, subsoil and stones)	Restricted topsoil, peat, subsoil and stones only.

1.2.4 Pathway and Receptor: Geology

1.2.4.1 The Site lies on the Sidmouth Mudstone Formation, which is classified as a Secondary B Aquifer. However, the Glaciofluvial Deposits and Alluvium are classified as Secondary A Aquifers. Due to the nature of the Sidmouth Mudstone, the Glaciofluvial Deposits and Alluvium surrounding The Site are considered to be the primary groundwater receptor (Firth HRA).

1.2.5 Pathway and Receptor: Aquifer Characteristics

1.2.5.1 Whilst the site is not located within a Source Protection Zone (SPZ), there are nine licensed groundwater abstractions within 2km of The Site, two of which are potable extractions approximately 1750m east and south of The Site. These are not considered a receptor due to the hydraulic gradient meaning they are not downstream of The Site.

1.2.6 Pathway and Receptor: Groundwater Flow

1.2.6.1 The groundwater in the Glaciofluvial deposits adjacent to The Site flows to the northwest/west and likely discharges to The River Blythe and Horn Brook. The migration of dissolved phase contamination via groundwater is considered a potential pathway. A significant proportion of the superficial aquifer in the local area has been removed by quarrying activities, both past and present.

1.2.7 Pathway and Receptor: Surface Water

1.2.7.1 Horn Brook, located approximately 30m northwest of The Site, flows into the River Blythe. Cornets End Brook will be reinstated in accordance with the planning permission and will flow across the north of The Site to join Horn Brook. Both Horn Brook and the River Blythe are considered potential receptors. There are also two surface water abstractions within 2km of The Site

that are licensed for spray irrigation. They are located upstream and therefore are not considered receptors.

1.2.8 Pathway: Man-made Subsurface Pathways

1.2.8.1 Drawing ref: *415/9-Monitoring Locations Plan* displays the borehole locations, as well as monitoring and compliance points.

1.2.9 Receptor: Amenity (nuisance)

1.2.9.1 Drawing ref: *415/9-Sensitive Receptor Map v3* shows all of the sensitive receptors surrounding The Site.

1.2.10 Pathways

1.2.10.1 Any possible pathway from the aforementioned on-site sources to the receptors must be considered.

1.2.10.2 Leaching contaminants and migration can pose a risk to groundwater. The restoration scheme includes a (minimum) 1.2m thick capping layer over the inert waste, comprising of site-won topsoil, subsoil and overburden, which will include land drains, limiting infiltration and generation of leachate in the waste mass.

1.2.10.3 As the quarry is underlain by a thick layer of low permeability clay, the migration of pore water through the base of the infilled area is negligible. Along the side walls, a low permeability clay liner will be constructed to mitigate migration to the adjacent Glaciofluvial deposits.

1.2.10.4 The sidewall liner will comprise site won Mercia Mudstone placed in 250mm layers to achieve a 3m thick sidewall with a minimum permeability of $1 \times 10^{-7} \text{m/s}$. Sidewall slopes at the site will achieve a 1:2 gradient.

1.3 Compliance Points and Risk Assessments

1.3.1 Groundwater

1.3.1.1 As stated in the HRA, the theoretical compliance point is located on the outer edge of the clay sidewall liner. However, in order to provide monitoring data there are groundwater monitoring wells in and around The Site which will be used to sample groundwater. These will test the levels of different substances in the water to determine if they are compliant or in breach of the Environmental Assessment Levels (EALs). The groundwater monitoring wells can be found in Drawing ref: *415/9 Monitoring Locations Plan*.

1.3.2 Surface Water

1.3.2.1 The Site is predominantly in a Flood Risk Zone 1, with a very low likelihood of flooding. Drawing ref: *415/9 Flood Risk Map* shows Flood Zones 2 and 3 – these zones appear to be in depressions formed at The Site, which will change as the restoration develops.

1.3.2.2 Running through The Site is Cornets End Brook, which has been temporarily diverted for the quarrying operations and will be reinstated as part of the restoration scheme. Once reinstated, it will be separated from the waste by a clay liner. Horn Brook and the River Blythe are considered potential receptors.

1.3.2.3 Surface water will be monitored monthly for the first 12 months during operations, and then quarterly following this. Any increase in contaminants will be responded to with an investigation (and any subsequent actions), as well as increased frequency of testing until the levels are back to normal. See Document ref: *415/9 Monitoring Plan* for more details.

1.3.3 Amenities

1.3.3.1 The risk to amenity is affected by a number of elements, including noise, dust, vibrations and tracked mud. Due to The Site's distance to sensitive receptors and the nature of the operation, a noise impact assessment is not required. A

Dust and Emissions Management Plan has been carried out (document ref: 415-9_DEMP) for The Site, which covers the sensitive receptors, risks and mitigation measures for issues such as dust and mud.

1.3.4 Limit Levels

1.3.4.1 Limit levels are provided for groundwater and surface water are as follows:

Substance	Class ¹	DWS ² (mg.L ⁻¹)	EQS ⁵ (mg.L ⁻¹)	MRV (mg.L ⁻¹)	Background conc. ⁸ (mg.L ⁻¹)	EAL (mg.L ⁻¹)
Antimony	NH	0.005	-	-	No data	0.005
Arsenic	H	0.01	0.05	0.005 ⁷	No data	0.005
Barium	NH	1.3 ³	-	-	No data	1.3
Cadmium	NH	0.005	0.15	-	<0.006	0.005
Chromium	NH	0.05	0.0047	-	0.005	0.0047 ⁹
Copper	NH	2	0.0347	-	<0.09	0.0347
Lead	H	0.01	0.00996	0.0002 ⁷	<0.006	0.0002
Mercury	H	0.001	0.00007	0.00001 ⁶	0.00002	0.00001 ⁹
Nickel	NH	0.02	0.0163	-	0.041	0.0163 ⁹
Selenium	NH	0.01	-	-	No data	0.01
Zinc	NH	3 ⁴	0.04	-	0.03	0.04
Chloride	NH	250	250	-	21.6	250
Fluoride	NH	1.5	-	-	No data	1.5
Sulphate	NH	250	400	-	43.7	250
Benzo(a) pyrene	H	0.00001	1.7 x 10 ⁻⁷	5 x 10 ⁻⁸ ⁷	<0.00001	5 x 10 ⁻⁸
Naphthalene	NH	-	0.002	-	0.00002	0.002
Benzene	H	0.001	0.01	0.001 ⁶	No data	0.001

Table 1 - The proposed contamination limit levels (Firth HRA)

1.3.5 Surface Water Management

1.3.5.1 Surface water on The Site does not percolate into the ground. Once the restoration scheme is completed, surface water will drain into the Cornets End Brook. Prior to this, groundwater will naturally accumulate in different areas as The Site is infilled. Document ref: *415/9-Monitoring Plan* details the monitoring process for surface water, and Drawing ref: *415/9-Monitoring Locations Plan* shows the compliance points for surface water monitoring.

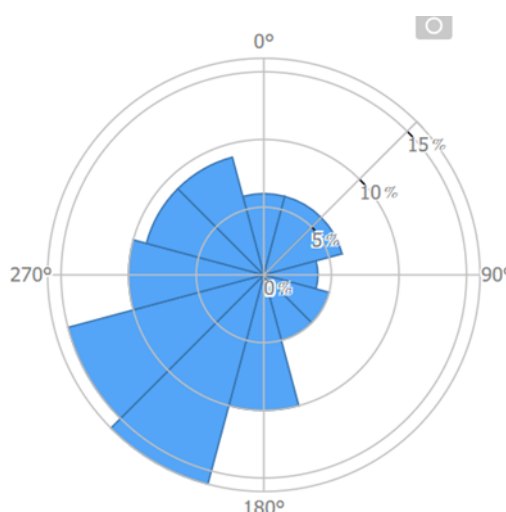
1.3.6 Post Closure Controls (aftercare)

- 1.3.6.1 The approved Planning Permission states The Site will be restored to agriculture. The river, Cornets End Brook, will be realigned following the completion of the works.
- 1.3.6.2 There is an Agricultural Aftercare Strategy for The Site in planning permission PL/2018/02524/MWMAJ, which includes the strategy for a five-year aftercare period.
- 1.3.6.3 As recommended in the Agricultural Aftercare Strategy, annual meetings should be arranged between the Company, Landowner and Mineral Planning Authority to update and monitor the progress of the restoration and aftercare.
- 1.3.6.4 Groundwater monitoring would continue until the Permit is surrendered. Annual topographic surveys would be carried out to assess any settlement (though limited settlement is anticipated).

1.4 Monitoring and Compliance Points

- 1.4.1.1 The prevailing wind direction at The Site is from the south southwest.

Figure 2 – Wind Rose



- 1.4.1.2 The prevailing wind direction at The Site, shown on a wind frequency rose (GWA 2026)

1.4.1.3 As shown in the sensitive receptor map (*415/9-Sensitive Receptor Map*), the majority of sensitive receptors are not within the prevailing wind direction and therefore are at low risk to being significantly affected by airborne particulates.

1.4.1.4 The weather forecast will be checked daily using Met Office Forecasts in order to establish whether any extra precautions need to be taken in the event of extreme weather.

1.4.2 Gas Monitoring

1.4.2.1 As the recovery operation uses inert wastes, the risk of ground gas is negligible, and therefore, gas monitoring is not considered necessary for The Site.

1.4.2.2 As the site is surrounded by historic landfill which accepted biodegradable wastes from mixed sources including household, commercial and industrial there is likely to be a source of landfill gas directly to the east of the site.

1.4.2.3 Given the age of the Meridan Quarry Landfill it is likely that in accordance with the principals and practices of the time this site was developed on a dilute and disperse basis meaning there is no formal basal engineering hence no barrier to lateral gas migration.

1.4.2.4 Baseline ground gas data at the Banana Field will therefore be influenced by off-site sources and should there be any perimeter gas monitoring data available for the Meridan Quarry Landfill it could be used to demonstrate the current background condition for the abutting Banana Field.

1.4.3 Restoration

1.4.3.1 The restoration scheme for The Site consists of infilling the quarry with inert materials, with site-won topsoil, subsoil and overburden as a top layer. The approved restoration scheme is part of planning permission PL/2018/02524/MWMAJ. The permission states the intent to re-establish an arable agriculture after-use on the remainder of the restored extraction area, as well as reinstating Cornets End Brook to its approximate original alignment.

1.4.4 Adaption to Climate Change

- 1.4.4.1 Adaption to climate change is considered appropriately in the HRA and DEMP. This is a temporary operation and precautions will be taken as necessary.
- 1.4.5 Site Stability and Topography
- 1.4.5.1 The surrounding topography is generally flat. Currently, The Site is depressed into the landscape – however, after restoration, The Site will assimilate with the surrounding topography. The restoration scheme proposes natural contours that blend in with the surrounding landscape.
- 1.4.5.2 Annual topographic surveys will be undertaken annually at the site to assess any settlement. Areas of settlement will be infilled as required.
- 1.4.5.3 With regards to slope and waste mass stability, a Stability Risk Assessment has been undertaken. Given the nature of the wastes that will be placed in the Deposit for Recovery Operation there is likely to be minimal settlement within the waste mass as no biodegradable material will be accepted and waste will be placed in layers.
- 1.4.5.4 During waste placement each layer will be pushed out by a bulldozer and receive a level of compaction from the tracked mobile plant. It is anticipated that following this methodology the waste mass will be sufficiently stable.
- 1.4.5.5 The side slope lining system will have a benched top and design is constrained by the nature of the quarry walls. A 1 in 2 slope gradient is required as a result of the quarrying landform. Site won clay will be placed in layers along the sidewall and compacted to achieve the required permeability. This will be demonstrated by laboratory testing of the core samples.
- 1.4.5.6 The side wall liner will be keyed into the in-situ Mercia mudstone at the base of the site to ensure continuity of the liner across the entirety of the site.