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HYDROGEOLOGICAL AND SURFACE WATER RISK ASSESSMENT

CROUCH'S FARM

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GENERAL NOTES

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1 REPORT CONTEXT

Crouch's Farm comprises a dairy farm near East Hoathy, Lewes, East Sussex. The owner wishes to construct earthworks within the boundaries of the site to act as a bund for three new silage clamps and to improve an existing slurry lagoon. The improvements to the slurry lagoon are to ensure compliance with current agricultural standards and guidance. To meet this goal, 152,000 m^3 of inert waste is proposed to be imported onto the site by PJ Brown (Civil Engineering) Ltd who will be responsible for construction of the earthworks. As such this report forms part of a Bespoke Waste Recovery Permit Application for the imported waste.

This report is divided into two sections and employs the Environment Agency's Source, Pathway, Receptor risk assessment model to assess the environmental impacts of the proposed construction.

Part 1 presents a Conceptual Site Model (CSM) for Crouch's Farm, which identifies and sets out the environmental baseline of the site. The conceptual model forms the basis of the assessment of the impact of the proposed development on the environmental baseline. The baseline is defined as the current situation and does not necessarily reflect natural conditions.

Part 2 provides an analysis of the potential hazards associated with the proposed construction in a Hydrogeological and Surface Water Risk Assessment (HRA).

PART 1: CONCEPTUAL HYDROGEOLOGICAL SITE MODEL

2 SITE SETTING AND DESCRIPTION

2.1 Site location

Crouch's Farm is located in a rural setting near East Hoathly, Lewes, East Sussex. It comprises a dairy farm centred about National Grid Reference (NGR) TQ 53043 118020. The main farm buildings are situated in the north of the landholding and access is via Hollow Lane to the west of the site.

2.2 Site setting

The site location and water features are shown on *Drawing 3591/HRA/01* and the site setting on *Drawing 3591/HRA/02*.

2.2.1 Site description

The site is located in an area of rolling topography. Crouch's Farm itself is located on the eastern flank of a north-south topographic high between the River Bull to the southeast and the River Usk to the northwest. The farm's industrial units are located in the northwest of the site at an elevation of approximately 75 metres Above Ordnance Datum (mAOD). The proposed earthworks construction will be positioned on an area approximately 46,000 m^2 with a southeasterly sloping topography from approximately 71 mAOD in the northwest to approximately 54 mAOD in the southeast.

2.2.2 Sites of ecological interest

One statutory site of conservation interest exists in the vicinity of the site. This lies approximately 2.1 km to the northeast of the farm and comprises the Waldron Cutting, a Geological Conservation Review (GCR) site that produces *Lycopodites* plant fossils from the Early Cretaceous.

Ancient semi-natural deciduous woodland is present beyond sections of the northern and southern site boundaries, and 300 m to the east. The woodland is classified as priority habitat.

In addition, a Great Crested Newt pond exists to the northeast of the site. The site boundary has been set to provide a 15 m exclusion zone around the pond and no works will occur within a 50 m radius from the pond.

2.2.3 Nearby waste operation permits and historic landfill sites

The Environment Agency previously authorised a permit application for a similar scheme to Crouch's Farm nearby. EPR/KB3607LP/A001 is a bespoke non-hazardous recovery permit that allowed the importation of 263,000 m^3 of non-hazardous waste for earthwork construction

purposes. The geological setting varies from that at Crouch's Farm (see Section 3 below) as the bedrock underlying the authorised permit is a Secondary A aquifer that overlies the same low permeability geology encountered beneath Crouch's Farm. This results in the permitted site being in a more sensitive site setting than that at Crouch's Farm.

Environmental Permit, BB3808UX, is for a waste operation that is located at TQ 50844 18469, approximately 2.4 km northwest of Crouch's Farm. This permits the treatment of asbestos and hydrochloric acid waste types. The site has the same stratigraphy as Crouch's Farm and thus is underlain by the same low permeability stratum, the Wadhurst Clay.

There is one historic landfill site in the area, 2.8 km east-northeast of Crouch's Farm, that also utilises the low permeability Wadhurst Clay. The site at Burnt House Farm (Ref: EAHLD20230) was licensed for the disposal of inert and industrial wastes over an area of 7,649 m^2.

2.3 Hydrology

2.3.1 Watercourses

The site is located within the catchment of the River Bull. Its position on the eastern flank of a topographic high dictates surface water flows towards The Dingle, a tributary of the Bull River, approximately 0.5 km to the east. To the west of the topographic divide surface water drains to the River Usk, approximately 7 km to the northwest.

Ordnance Survey mapping indicates a stream to be present in the southeastern corner of the site. It parallels the southeastern boundary for approximately 70 m before flowing 180 m east-northeast towards The Dingle. Up topographic gradient from the stream is a small pond (southwest of the site) that may comprise the source of the stream, although there is no obvious surface channel connecting the two.

Two other streams within 2 km west of Crouch's Farm flow towards the River Usk around Uskfield, approximately 7 km to the northwest. These are The Framfield, which is located 1.3 km to the northwest of Crouch's Farm, and The Ridgewood, which is 0.7 km to the southwest.

2.3.2 Springs

Based on Ordnance Survey mapping four springs exist within a 3 km radius of Crouch's Farm. The closest spring lies approximately 1.7 km to the west, near Durrants Farm and in the Usk catchment. Further away, three springs occur around Waldron approximately 2.4 km to the northeast and on the eastern side of the Bull River catchment. An additional spring that is not apparent on Ordnance Survey mapping is located approximately 1.9 km to the southwest at Hesmonds Stud.

3 GEOLOGY AND HYDROGEOLOGY

The bedrock and superficial geology of the area is shown on *Drawing 3591/HRA/03.*

3.1 Superficial deposits

British Geological Survey (BGS) mapping indicates that superficial deposits in the area consist of Quaternary alluvial and Head deposits, comprising clays, silts, sands and gravels. The alluvium closely aligns with the tributaries of both river catchments and traces their paths as they cut through the landscape. The Head deposits have built up along the tributary channel depressions where hillside sediment has been deposited downslope.

3.2 Bedrock geology

The bedrock in the area is composed of formations from the Wealdon Group. These include mudstone of the Wadhurst Clay Formation, sandstones of the Ashdown Formation and a mixture of siltstones, mudstones and sandstones of the Tunbridge Wells Formation. Crouch's Farm is sited over the Wadhurst Clay Formation. The underlying Ashdown Formation is exposed at lower elevations due to erosion by watercourses. In particular for this application, from The Dingle, 70 m to the north and east of the site boundary. The Ashdown Formation outcrops to the east of the southeastern corner of the site.

The Tunbridge Wells Formation, which overlies the Wadhurst Clay Formation, outcrops within 360 m to the south of the site boundary.

3.2.1 Stratigraphy

BGS mapping and borehole records indicate the Wadhurst Clay Formation overlies the Ashdown Formation in the area surrounding the site. While to the south, the Tunbridge Wells Formation overlies the Wadhurst Clay. BGS borehole records for boreholes closest to the site indicate that to the northwest and east of the site the thickness of the Wadhurst Clay is approximately 20 m, increasing to the south to approximately 36 m.

This information has been used to generate representative cross-sections of the area as shown on *Drawing 3591/HRA/05.*

There are no boreholes inside the site boundary to directly ascertain the relative thicknesses of the underlying strata. However, it is important to know the thickness of the Wadhurst Clay Formation below the site for the purpose of the risk assessment. This can be estimated from the known stratigraphy close by through extrapolation from the line of cross-section running from BGS boreholes at Little Goldsmith, TQ51NW9, approximately 0.79 km northwest of Crouch's Farm, and at Kirby Farm, TQ51NW14, approximately 1.2 km to the east-southeast. The

line of cross-section 'A' (*Drawing 3591/HRA/03*), displaying the thickness and dip of the Wadhurst Clay Formation between the borehole records can then be extrapolated to a parallel cross-section 'B' that runs through Crouch's Farm. This can then be used to estimate the thickness of the Wadhurst Clay beneath the site.

Based on this interpretation the Wadhurst Clay Formation is estimated to be a minimum of 2 m thick beneath the proposed earthwork. The Ashdown Formation is closest to the surface towards the southeastern corner of the site.

3.2.2 Structure

From BGS mapping there is no indication of structural dip in the local area around Crouch's Farm. However, on the regional scale the Wadhurst and Ashdown Formations dip up to 5° to the south.

From the extrapolated stratigraphy cross sections shown on *Drawing 3591/HRA/05,* the Wadhurst Clay dips by approximately 1° to the southeast beneath the site.

3.3 Hydrogeology

3.3.1 Aquifer classifications

The Ashdown Formation is classified as a Secondary A aquifer by the Environment Agency. Secondary A aquifers comprise permeable layers that can support local water supplies and may provide baseflow to rivers. The superficial Head deposits are classified as Secondary (undifferentiated), as the variability in the sediment types disallow the application of either a Secondary A or B definition. The alluvium is designated as a Secondary A type as it provides baseflow to The Dingle and other watercourses, although the volume of abstractable water within it is likely to be low due to its limited lateral extent around the stream. The Wadhurst Clay provides no practicable yields and as such is classified as Unproductive Stratum.

3.3.2 Hydraulic properties

The transmissivity values within the Ashdown Formation are reported to be between 50 and 160 m^2/d by the BGS (2000)[1] and have a general storage coefficient of 10^{-4}. No hydraulic properties are reported for the Wadhurst Clay.

Sandstones of the Ashdown and Tunbridge Wells Sands Formations yield up to 60 l/s and 10 l/s respectively according to the BGS GeoIndex 1:625,000-scale hydrogeology map.

1 British Geological Survey. The physical properties of minor aquifers in England and Wales. WD/00/04 2000.

3.3.3 The Wadhurst Clay aquiclude

As an unproductive stratum the Wadhurst Clay has no recorded permeability values in accessible literature. As such, the permeability can be considered low enough to restrict vertical groundwater flow and hence supply very limited recharge to the underlying Ashdown Formation within a significant timescale. Thus, the Wadhurst Clay acts as an aquiclude between the Tunbridge Wells Sand Formation above and Ashdown Formation beneath.

BGS borehole water levels show no evidence of perched watertables within the Wadhurst Clay.

3.3.4 Ashdown Formation Secondary aquifer

Whilst the low permeability of the Wadhurst Clay minimises vertical flow to the Ashdown Formation aquifer locally, BGS borehole records within a 2 km radius of Crouch's Farm indicate that groundwater elevations are recorded within the Ashdown Formation. Recharge to Recharge to the Ashdown Formation aquifer occurs over a large area of outcrop north of the site. It can be considered to be unconfined on the regional scale and an unsaturated zone will exist in its upper horizons.

Available BGS borehole water levels show that the watertable is between 55.5 mAOD and 42 mAOD in the unconfined Ashdown Formation in the vicinity of the site. These are indicative only as they are derived from rest water level data at the time the boreholes were drilled. However, they indicate an unsaturated zone beneath the site.

3.4 Statutory and non-statutory water classifications

3.4.1 Surface water catchment

Assessment in 2022 of the Water Framework Directive (WFD) "Bull River from Foxhunt Green to Lower Horsebridge Water Body" of the "Cuckmere Upper Operational Catchment" rated the ecological quality as '*Moderate*'. The waterbody had '*Good*' hydro-morphological supporting elements but '*Moderate*' ratings for both biological and physio-chemical quality elements. Assessment of chemical quality and other pollutants is not required by the WFD for this waterbody.

3.4.2 Groundwater catchment

Due to the presence of the low permeability Wadhurst Clay, the groundwater status of the area immediately surrounding the site is not assessed under the WFD. However, the sandstones that outcrop nearby are members of the "Hastings Beds Cuckmere and Pevensey Levels Water

Body (ID: GB40702G502100)". Overall, the waterbody's current rating is '*Good*' having been last assessed in 2019.

3.4.3 Non-statutory land-based designations

Crouch's Farm is located within the Surface Water Drinking Water Safeguard Zone of the Cuckmere Upper Operational Catchment (Ref: SWSGZ4004). This zone is at risk from the pesticide Metaldehyde.

3.4.4 Flood risk

A Flood Zone 1 category applies within the site boundary so that the fluvial flood risk is deemed to be very low.

3.5 Abstractions and discharges

3.5.1 Source Protection Zones

The site is not within a source protection zone.

3.5.2 Surface water abstractions

Less than 20 m^3/d is abstracted from the spring source at Hesmonds Stud, as such it is recorded as a de-regulated, private, abstraction by Wealden District Council.

No licensed surface water abstractions have been identified by the Environment Agency within a 3 km radius of the site.

3.5.3 Groundwater abstractions

There are three recorded groundwater abstraction licences within 3 km of Crouch's Farm, with licence numbers: 21/094, 10/41/154201, and 10/41/292302. Due to their abstracted volumes being under 20 m^3/d, licences 10/41/154201 and 10/41/292302 are now de-regulated.

The 21/094 licence is split into two locations at TQ 5120 1695 and TQ 5170 1710, approximately 2 km southwest of Crouch's Farm. It permits abstraction of up to 25 m^3/d from the Tunbridge Wells Sandstone Formation, which overlies the Wadhurst Clay southwest of the site.

Former licence10/41/154201 was also split into two locations at TQ 5408 1873 and TQ 5435 1785 at approximately 1.1 km northwest and 1.2 km east-southeast of Crouch's Farm and beyond the Bull River. It allowed 2.2 m^3/d to be abstracted from the Ashdown Formation.

Former licence 10/41/292302 allowed abstraction of up to 19 m^3/d from the Ashdown Formation. This abstraction is located at TQ 5280 1970, approximately 1.7 km to the north-northwest of Crouch's Farm.

3.5.4 Discharges

Crouch's Farm previously held a discharge permit (Ref: SO/D01364/001) between 1965 and 1996 that allowed the release of trade effluent to the ground and surface water.

There are currently eight permits that allow discharge into the Cuckmere Upper Operational Catchment within a 3 km radius of Crouch's Farm. Seven of these discharges release treated sewage effluent from farm sites, while one discharge is associated with a sewage treatment works operated by Southern Water Services Limited.

4 SITE DESIGN

4.1 Construction details

The proposed construction plan is provided in *Appendix 3591/HRA/A1*.

Inert waste is to be used to construct earthworks bunds for an improved slurry lagoon and three new silage clamps. The design utilises up to 152,000 m^3 of material that will be imported onto the site from further afield. The purpose of the improvements to the slurry lagoon is to ensure compliance with current Silage, Slurry and Agricultural Fuel (SSAFO) Regulations and add capacity. The new silage clamps will allow for a greater volume of silage to be stored.

The completed landform will slope down to the south and southeast, following the existing topography. The earthworks therefore form a conical wedge with silage clamp and slurry store at the thickest part, and with earthworks thinning to the southeast, east and northeast.

The construction is to be divided into three phases, commencing in the thickest portion around the silage clamps and slurry lagoon.

Soils already present on-site will also be utilised in the earthworks. These will be predominantly used towards the lower southeastern corner of the site in Phase 3 of construction.

A maximum final elevation of 75 mAOD is proposed around the silage clamps, where the earthworks will reach a maximum thickness of approximately 10 m. The floor of the silage clamps will be levelled at 71 mAOD. The top of the slurry lagoon will be at 71 mAOD and descend into the earthworks to 66.4 mAOD. The proposed construction raises the bottom elevation of the slurry lagoon above the existing floor by 0.3 m. An estimated 17 m to 12 m of in-situ Wadhurst Clay will separate the floor of the slurry lagoon and silage clamps from the underlying Ashdown Formation aquifer.

The walls of the silage clamps will be constructed using concrete panels, sprayed with a protective coating to safeguard the concrete against acidic degradation from leachate. Drainage channels behind the walls are included in the design. In the unlikely event of leakage through vertical joints between concrete panels these will intercept leachate and channel it towards the main leachate drainage system, which adheres to SSAFO regulations. The floors of the silage clamps are to be lined with acid resistant Hot Rolled Asphalt (HRA) that will be compacted to safeguard against leachate infiltration. Joints are to be filled with an acid-resistant, permanently elastic bitumen material or epoxy sealant.

The lagoon is to be constructed as per the "*Livestock manure and silage storage infrastructure for agriculture*" guidance notes provided by CIRIA (C759a and C759b, 2015). These

documents conform to the government's guidance for the storage of silage, slurry and agricultural fuel oil. Guidance for the storage of slurry in an earthwork lagoon states that slurry lagoons should:

- not be placed within 10 m of inland or coastal waters
- have walls that have a thickness of at least 1 m and be constructed out of impermeable soil (<1 x 10^{-9} m/s). The walls must meet anti-corrosion standards set in the *British Standard 5502-50:1993+A2:201*
- have 750 mm freeboard clearance between maximum slurry surface and lagoon top
- be large enough to hold four months' worth of slurry storage

4.1.1 Source material

Details of the waste to be imported to the site are listed in *Appendix 3591/HRA/A2*.

The waste supplied is expected to be from multiple sources. As such it will be subjected to strict assessment and classification in accordance with good practice, including protocols set out in Waste Acceptance Procedures (WAP), which are provided in *Appendix 3 of the Waste Recovery Plan*. This will ensure that only waste conforming to the permitted waste code will be accepted at the site and that the waste has been appropriately categorised, or deemed to be compliant with inert WAC (Section 2, Council Decision 2003/33/EC). Further, certain waste codes will carry additional operational restrictions which follow the standard rules for a deposit for recovery operation permit application (Ref: SR2015, No 39):

1. Road planings (waste types coded 17 03 02) shall be:

    (a) limited to use for construction of hard surface infrastructure such as roads, tracks, pathways and parking
    (b) only used within 30 cm of the final waste level except where they are used as temporary infrastructure
    (c) removed before further waste is deposited where used as temporary infrastructure

2. Topsoils or peat (from waste types coded 17 05 04 and 20 02 02) and soil from cleaning and washing beet (waste coded 02 04 01) shall be limited to use in the top 50 cm of the recovery activity and shall only be used to provide a growing medium

Wastes coded 19 12 12, are subject to additional restrictions, detailed below, and will be assessed for compliance with Inert WAC:

- restricted to crushed bricks, tiles, concrete and ceramics and soils from the mechanical treatment of construction/demolition waste
- metal from reinforced concrete will be removed
- will not include gypsum from recovered plasterboard

4.2 Groundwater control

The earthworks are to be constructed using waste materials as there is no structural benefit of utilising non-waste material. All waste materials will be placed above existing ground level, above the in-situ Wadhurst Clay aquiclude, and significantly above indicative groundwater levels within the Ashdown Formation. As such groundwater control or management is not required during construction of the earthworks or thereafter.

4.3 Earthwork surface drainage

The conceptual drainage for the earthworks is shown on *Drawing 3591/HRA/04*.

The proposed earthworks will form a conical wedge shape. Therefore, post-construction, rainwater incident to the surface will drain down the slope formed by the artificial topography, before meeting the existing ground surface. As shown on *Drawing 3591/HRA/04,* the run-off generated will drain towards the thinnest portions of the earthworks, towards the southeast, east and northeast. At the construction boundary run-off will be channelled towards the boundary stream in the southeast of the site by the natural topography. From this point the stream flows beyond the site boundary towards The Dingle in the southeast.

During the construction phase, a newly created perimeter ditch and berm will prevent any run-off during construction entering the boundary streams or tributaries of The Dingle. Any run-off will collect in the perimeter ditch and be directed to a holding lagoon in the southeast of the site. From here water will be allowed to discharge via a weir to the natural boundary stream. This surface water management will allow sediment entrained in the surface water to settle prior to discharge and will minimise any potential pollution to the natural watercourses in the vicinity.

The site works will be subject to a Construction Environmental Management Plan (CEMP) and Risk Assessment and Method Statement (RAMS). These will outline how potential negative environmental impacts during construction will be avoided, minimised, or mitigated, including control of surface water run-off and entrained silt as described above and shown on Drawing 3591/HRA/04 version 3 . This will prevent silt laden run-off entering the Great Crested Newt pond or the pond and stream to the south of the site, ensuring compliance with environmental laws and planning conditions. It will include protocols for monitoring the surface water holding

pond during the construction phase, reporting and incident response, serving as a daily reference for construction staff to safeguard the water environment.

5 CONCEPTUAL SITE MODEL SUMMARY

The schematic conceptual site model is shown on *Drawing 3591/HRA/06*.

5.1 CSM summary introduction

The conceptual site model is based on the *Source, Pathway, Receptor* risk management approach employed by the Environment Agency. As such these three components have been identified to establish the environmental baseline. The contaminant *sources* are presented in Section 4 where the site construction plans are discussed. The *Pathways* and *Receptors* have been identified in the previous sections, which outline the hydrological, geological, and hydrogeological system.

5.2 Receptors

The identified receptors down topographic gradient to the southeast are:

- R1: the boundary stream and pond
- R2: The Dingle, a tributary of the Bull River
- R3: Ashdown Formation Secondary A aquifer
- R4: Superficial deposit, comprising, Head deposits, a Secondary (undifferentiated) aquifer and Alluvium, a Secondary A aquifer

5.3 Source

Due to the safe practices employed in construction of the silage clamps and slurry lagoon, the leachate generated from use of these structures poses no risk to the wider environment as there is no identified pathway. As such the proposed development produces two sources of potential contaminants:

- S1: Inert soils accepted for use in the construction of the earthworks
- S2: Existing site materials

5.4 Potential pathways

The potential pathways from the proposed earthworks are:

- P1: Surface run-off from the proposed construction discharging from the holding pond and combining at the southeasterly boundary stream before draining towards The Dingle (R2)
- P2: Infiltration through the proposed earthworks and Wadhurst Clay Formation towards the Ashdown Formation aquifer (R3)
- P3: Infiltration directly to the Ashdown Formation aquifer (R3) as drainage from the site (P1) passes over the small outcrop down-gradient to the site

- P4: As surface water run-off (P1) flows to The Dingle there is potential for infiltration into the superficial deposits (R4)

These are discussed further in Part 2, the Hydrogeological Risk Assessment, below.

PART 2: HYDROGEOLOGICAL RISK ASSESSMENT

6 NATURE OF THE HYDROGEOLOGICAL RISK ASSESSMENT

Environment Agency guidance proposes a tiered approach to risk assessment such that the degree of effort and complexity reflects the potential risk posed by a particular site or situation, the sensitivity of the site setting, and the degree of uncertainty and likelihood of the risk being realised. To meet the requirements at this site a conceptual site model and basic qualitative risk screening have been undertaken. The conceptual site model is presented in Part 1 of this report, while the risk screening is summarised in Section 8.4 below. A risk screening exercise is used to determine whether a landfill or other waste disposal development represents, or potentially represents, a risk to groundwater or surface water resources.

6.1 CSM model summary

The identified source, pathways, and receptors are summarised in *Table 3591/HRA/T1*.

6.1.1 Identified source terms

The design of the silage clamps and slurry lagoon adhere to CIRIA (2015) guidance that covers any risk of leakage from the end use of the construction. End use contamination sources are thus deemed to be beyond the scope of this permit application. As such *Table 3591/HRA/T1* focusses on the contamination potential of the imported and existing materials utilised during construction.

6.1.2 Discounted pathways

- P2: Infiltration to the Ashdown Formation aquifer (R3) via the proposed earthworks then the Wadhurst Clay Formation is discounted due to the likely compaction of the construction materials and the minimum thickness (2 m) of Wadhurst Clay, which has an intrinsic low permeability and hence comprises unproductive stratum that acts as an aquiclude
- P3: Direct infiltration to the Ashdown Formation aquifer (R3) from P1 is discounted as the boundary stream flow effectively dilutes the source terms and prevents any substantial accumulation of standing water over the limited Ashdown Formation outcrop
- P4: The stream flow also inhibits pooling above the superficial deposits (R4) and a greater residence time in the stream enhances dilution of the source terms, so that P4 can also be discounted

The breaking of linkages between the source terms, S1 and S2, with receptors, R3 and R4, implies that these potential receptors should also be discounted from the contamination potential of the imported inert material.

3591/HRA/T1: Summary of identified and discounted receptors and pathways	
Hazard	▪ The total volume of imported material required to construct the earthworks is 152,000 m^3
Source	▪ S1: Soils accepted for use in the construction of the earthworks ▪ S2: Existing site materials
Potential primary pathway	▪ P1: Surface run-off from the proposed construction combining at the southeasterly boundary stream before draining towards The Dingle (R2)
Discounted secondary pathway	▪ P2: Infiltration through the proposed earthworks and Wadhurst Clay Formation towards the Ashdown Formation aquifer (R3) ▪ P3: Infiltration to the Ashdown Formation aquifer (R3) as drainage from the site (P1) passes over the small outcrop down-gradient to the site ▪ P4: As surface water run-off (P1) flows to The Dingle there is potential for infiltration into the superficial deposits (R4)
Potential primary receptor	▪ R1: the boundary stream and pond ▪ R2: The Dingle (Tributary of the River Bull)
Discounted secondary receptor	▪ R2: Ashdown Formation Secondary A aquifer ▪ R3: Superficial deposit, comprising Head deposits, a Secondary (undifferentiated) aquifer and Alluvium, a Secondary A aquifer

6.2 EA Tier 1 risk screening guidance

Environment Agency guidance indicates that "*Your qualitative risk screening should assess whether the potential discharge from your activity is acceptable and so will not require further assessment.*

This could be because:

- *the discharge has acceptably low concentrations of hazardous substances, or in concentrations that are the same as the natural background levels in the groundwater (whichever is the higher concentration)*
- *the discharge has concentrations of non-hazardous pollutants that are within the relevant environmental standards, or in concentrations that are the same as the natural background levels in the groundwater*
- *there's a very low risk to groundwater-fed receptors due to the presence of unproductive drift or unproductive bedrock strata (and there are no aquifers present or near your activity) and remoteness from surface waters*
- *the volume or hydraulic loading rate of the discharge is so small such that only minimal dilution in underlying groundwater will be needed to avoid pollution by non-hazardous pollutants.*"[2]

[2] Environment Agency Guidance. Groundwater risk assessment for your environmental permit. 3rd April 2018

7 QUALITATIVE RISK SCREEN OF CROUCH'S FARM CSM

7.1 Site design

The proposed construction of the improved slurry lagoon and three new silage clamps will require importation of inert waste under a bespoke Waste Deposit for Recovery Environmental Permit. The construction will enable areas for the collection and storage of agricultural products, which will produce leachate. However, as appropriate steps have been undertaken in the design of these areas to mitigate the risks posed by leachate effluent, this Hydrogeological and Surface Water Risk Assessment focusses solely on the hazards posed by the earthwork construction itself.

Surface water run-off from the earthworks construction area will be prevented from entering the newt pond to the east of the site and the boundary stream via the construction of a ditchcourse and berm on the ponds and streams upslope side. The ditchcourse will intercept and deflect any run-off from the earthworks to the southeast away from the pond and stream. A holding pond will be constructed in the southeast of the site, which will collect surface water run-off from the new perimeter discourse and allow settlement of fines before off-site discharge via a weir. Once vegetation is fully established over the slopes of the new earthworks the ditchcourse and berm will no longer be required. The drainage feature could be removed at this point allowing the pre-existing run-off to the pond to re-establish.

7.2 Source

As the quantity of waste to be imported exceeds the 60,000 m^3 maximum volumetric capacity for a standard rules permit, a comprehensive Waste Acceptance Procedure (WAP) has been planned for the construction. This will allow the inert waste accepted onto site to be appropriately utilised in construction.

The imported materials for use in the earthwork construction may undergo testing in accordance with the Waste Acceptance Procedure (WAP) so that they are compliant with Section 2, Council Decision 2003/33/EC requirements for inert waste and they can be identified with the waste codes permitted in the Approved Waste Recovery Plan. The accepted waste classified within these codes will adhere to the restrictions described above in Section 4.1.1..

Existing materials, such as topsoil containing organic matter that may degrade to release gasses and lower groundwater quality, will be utilised in the thinner section of the proposed construction, in the southeastern corner.

As a result of the above control measures, the risk posed by the utilisation of imported inert wastes and existing site derived soils within the proposed earthwork construction is considered

to be low as the control measures are intended to be of sufficient scope to safeguard groundwater and surface water quality.

7.3 Site sensitivity

The proposed construction at Crouch's Farm poses no risk to the sites of ecological interest nearby. The northern deciduous woodlands are up topographic gradient from the site while the southern and eastern deciduous woodlands are beyond surface water features that would divert surface run-off. Run-off from the site will be prevented from entering the newt pond via construction of a temporary ditch and berm to deflect run-off to the south and east of the site.

There are five springs within 3 km of Crouch's Farm. To the west of Crouch's Farm are the springs at Durrants Farm, which is a source for Framfield Stream and Hesmonds Stud, a de-regulated groundwater source that abstracts <20 m^3/d for commercial and drinking water uses. To the northeast are the three springs around Waldron. As the Wadhurst Clay that confines the area dips towards the southeast, the springs are not considered to be down groundwater gradient from Crouch's Farm. They are also not considered to be down surface drainage gradient. Durrants Farm and Hesmonds Stud springs are located within the Ouse Upper Operational Catchment, a different surface water catchment to Crouch's Farm; while The Dingle drains towards the southeast from Crouch's Farm, away from the springs to the northeast.

Nearby surface water features that fall within the Ouse Upper Operational Catchment are also outside the influence of surface water run-off from the proposed construction. These include the Framfield and Ridgewood streams.

The site is not within a Source Protection Zone or a Flood Risk Zone. The site is located within the Surface Water Drinking Water Safeguard Zone of the Cuckmere Upper Operational Catchment (Ref: SWSGZ4004) so that groundwater and surface water quality are protected under the Water Framework Directive. However the inert nature of the accepted construction materials at Crouch's Farm poses a low risk to local groundwater and surface water quality.

Surface water quality is currently classified as 'good' hydro-morphologically or 'moderate' biologically and physio-chemically within the Cuckmere Upper Operational Catchment; however, the chemical quality of the surface water is not assessed within the Bull River from Foxhunt Green to Lower Horsebridge Waterbody. Eight active permits allow effluent discharges into the surface water of the Cuckmere Upper Operational Catchment within a 3 km radius of Crouch's Farm. These releases of treated sewage effluent into the catchment are likely to lower the local water quality.

Potential exists for sediment to become entrained in surface water run-off from the site during the construction works at Crouch's Farm. Proposed surface water management features will collect and hold surface water allowing sediment to fall out of suspension before being discharged off-site. It is considered that this will significantly reduce potential for surface water external to the site to become contaminated. It is considered unlikely that residence times for surface water run-off from the construction area would be sufficient for it to pick up dissolved contamination. As a result measurable impacts on surface water quality are not expected.

The closest groundwater abstractions are unlikely to be affected by the proposed construction. The southeasterly dipping Wadhurst Clay indicates that groundwater may flow in a southeasterly direction within the Ashdown Formation. As such abstraction 10/41/292302 is likely to be up groundwater gradient from the proposed earthworks. Although abstraction 10/41/154201 is towards the southeast, its position on the topographic high on the other side of The Dingle's stream channel, combined with its low abstraction volume, means that it is unlikely to be of significant enough influence to be affected by the proposed earthworks. Licence 21/044 is within a higher stratum that overlies the Wadhurst Clay Formation, hence is also not at risk.

The presence of historic landfill and waste permit applications nearby, upon the Wadhurst Clay presents a precedent for the suitability of the low permeability geology for waste disposal.

Beneath the proposed earthworks at Crouch's Farm the Wadhurst Clay Formation is estimated to be a minimum of 2 m thick. CIRIA and governmental guidance suggest at least 1 m of clay liner to safeguard against effluent leakage from slurry lagoons. Further, no geological faults allowing for direct recharge are known within the site boundary or within a 1 km radius. Therefore, a hydraulic connection acting within a significant timeframe is not likely between the surface and the underlying Secondary A sandstone bedrock aquifer of the Ashdown Formation. As such the Wadhurst Clay Formation is considered to be an aquiclude that is able to significantly restrict flow to the underlying Ashdown Formation so that a direct infiltration pathway between the proposed construction materials and the Secondary A Aquifer Receptor is precluded.

The Wadhurst Clay aquiclude restricts recharge to the underlying Secondary A sandstone bedrock aquifer of the Ashdown Formation, and the watertable therein, so that no groundwater management is required during construction. It also acts as a natural geological barrier offering attenuation of any contaminants that could be entrained within the imported soils used in the earthworks construction.

7.4 Risk screening summary

Based on the assessment of the nature of the source and the sensitivity of the site location, it is considered that the proposed development poses negligible risk to the identified receptors. The following two conditions from the EA Tier 1 risk screening Guidance have been identified in the Conceptual Site Model due to the planned Waste Acceptance Procedures (WAP), Inert WAC testing and the operational restrictions applied to the waste codes within the construction:

- the discharge has acceptably low concentrations of hazardous substances, or in concentrations that are the same as the natural background levels in the groundwater (whichever is the higher concentration)
- the discharge has concentrations of non-hazardous pollutants that are within the relevant environmental standards, or in concentrations that are the same as the natural background levels in the groundwater

Further, the presence of the Wadhurst Clay aquiclude precludes direct infiltration into the Ashdown Formation beneath the proposed construction and acts as an attenuation barrier so that:

- there's a very low risk to groundwater-fed receptors due to the presence of unproductive drift or unproductive bedrock strata

As such it is considered that further detailed quantitative risk assessment is not required as per the Environment Agencies qualification for a Tier 1 risk screen.

8 REVIEW OF TECHNICAL PRECAUTIONS

Due to the low risk posed by the site it is considered that the proposed precautions detailed below are appropriate and sufficient to prevent any unacceptable discharge:

1. Strict controls on waste types, sourced and accepted
2. Strict adherence to Waste Acceptance Criteria and Procedures
3. Provision of a temporary ditchcourse and berm to deflect rainfall run-off from the earthworks construction area away from the newt pond and boundary stream
4. Risk based monitoring (see Section 9 below)
5. Non-requirement for leachate monitoring due to inert nature of accepted materials

Details of the Waste Acceptance Criteria and Procedures are contained within the accompanying *Waste Recovery Plan*.

9 REQUISITE SURVEILLANCE

9.1 Risk-based monitoring scheme

The site is not considered to be in a sensitive location, underlain by in-situ clays, and the nature of the waste is such that it does not pose a risk to the water environment. Groundwater monitoring is therefore not considered necessary.

As a precaution it is proposed to monitor surface water quality at the discharge from the holding pond to the boundary stream. Water quality will also be monitored up and down stream at the approximate locations shown on *Drawing 3591/HRA/04 Version 3*. It is proposed that water quality is monitored on a quarterly basis for the following parameters during the construction period:

- pH
- Conductivity
- Suspended solids
- Sulphate
- Lead
- Arsenic
- Chromium
- Copper
- Nickle
- Nitrate

Incoming waste will be subject to the testing regime outlined in the Waste Acceptance Procedure.

10 CONCLUSIONS

10.1 Summary

Crouch's Farm is not considered to be in a sensitive location due to a bedrock geology that prevents vertical flow from acting within significant timescales, a relatively deep watertable and an absence of sensitive receptors down-gradient of the site. Additionally, the source is considered to pose a low risk due to the material being placed above ground level, the inert nature of the proposed waste types and the proposed Waste Acceptance Procedures.

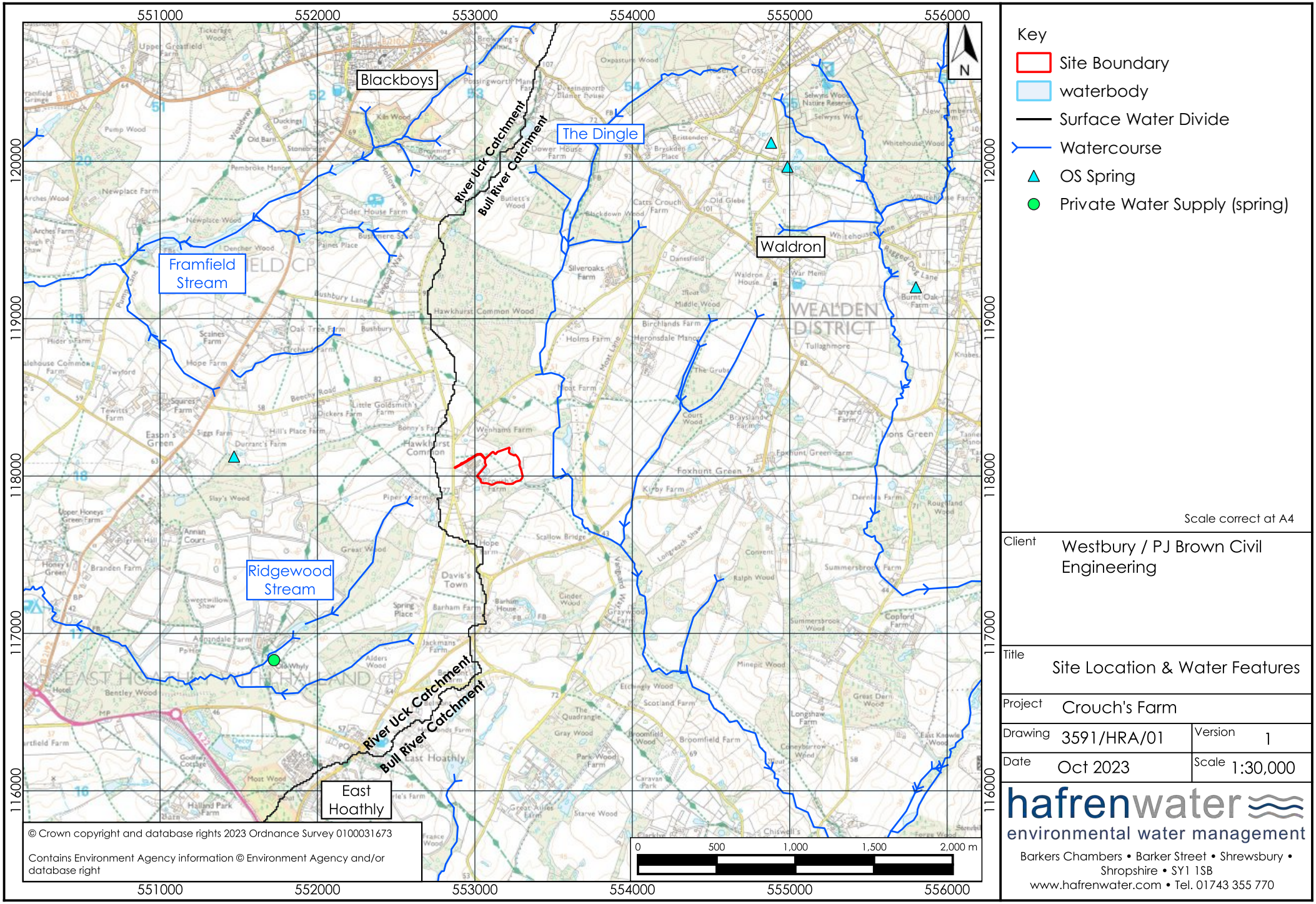
Any potential risk posed by the site would be mitigated by adherence to the Waste Acceptance Procedures and inert WAC testing as presented in the Environmental Permit Application and provision of a ditch and berm system to protect the newt pond and boundary stream from rainfall run-off from the construction area until such time as the slopes of the earthworks are fully vegetated. Due to the above it is considered that the site does not pose a risk to the groundwater or surface water environment. Precautionary surface water monitoring is proposed for the discharge from site together with locations up and downstream of the discharge.

10.2 Compliance with the Environmental Permitting (England and Wales) Regulations (2016)

This risk assessment has demonstrated that under normal operational and post-operational phases of construction with imported material, hazardous substances would not be present on-site and non-hazardous pollutants will not be present in concentrations such that pollution of nearby groundwater and surface water is caused.

It is therefore considered that the site will be compliant with respect to the Environmental Permitting (England and Wales) Regulations (2016).

DRAWINGS



Key

- Site Boundary
- waterbody
- Surface Water Divide
- Watercourse
- OS Spring
- Private Water Supply (spring)

Scale correct at A4

Client	Westbury / PJ Brown Civil Engineering
Title	Site Location & Water Features
Project	Crouch's Farm
Drawing	3591/HRA/01
Version	1
Date	Oct 2023
Scale	1:30,000

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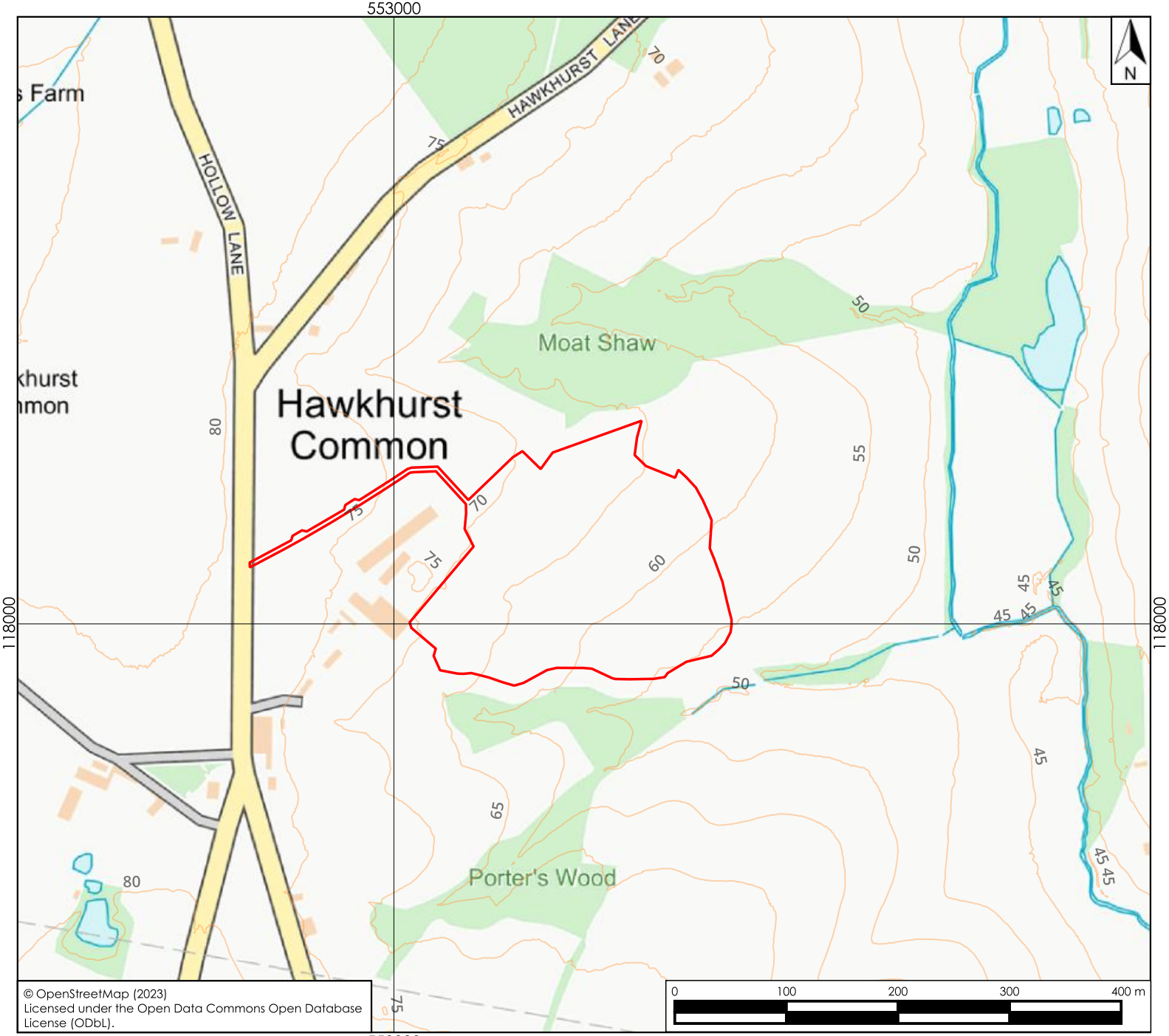

Key

Site Boundary

5m Contour (mAOD)

Scale correct at A4

Client	Westbury / PJ Brown Civil Engineering
Title	Site Setting
Project	Crouch's Farm
Drawing	3591/HRA/02
Version	1
Date	Oct 2023
Scale	1:5,000

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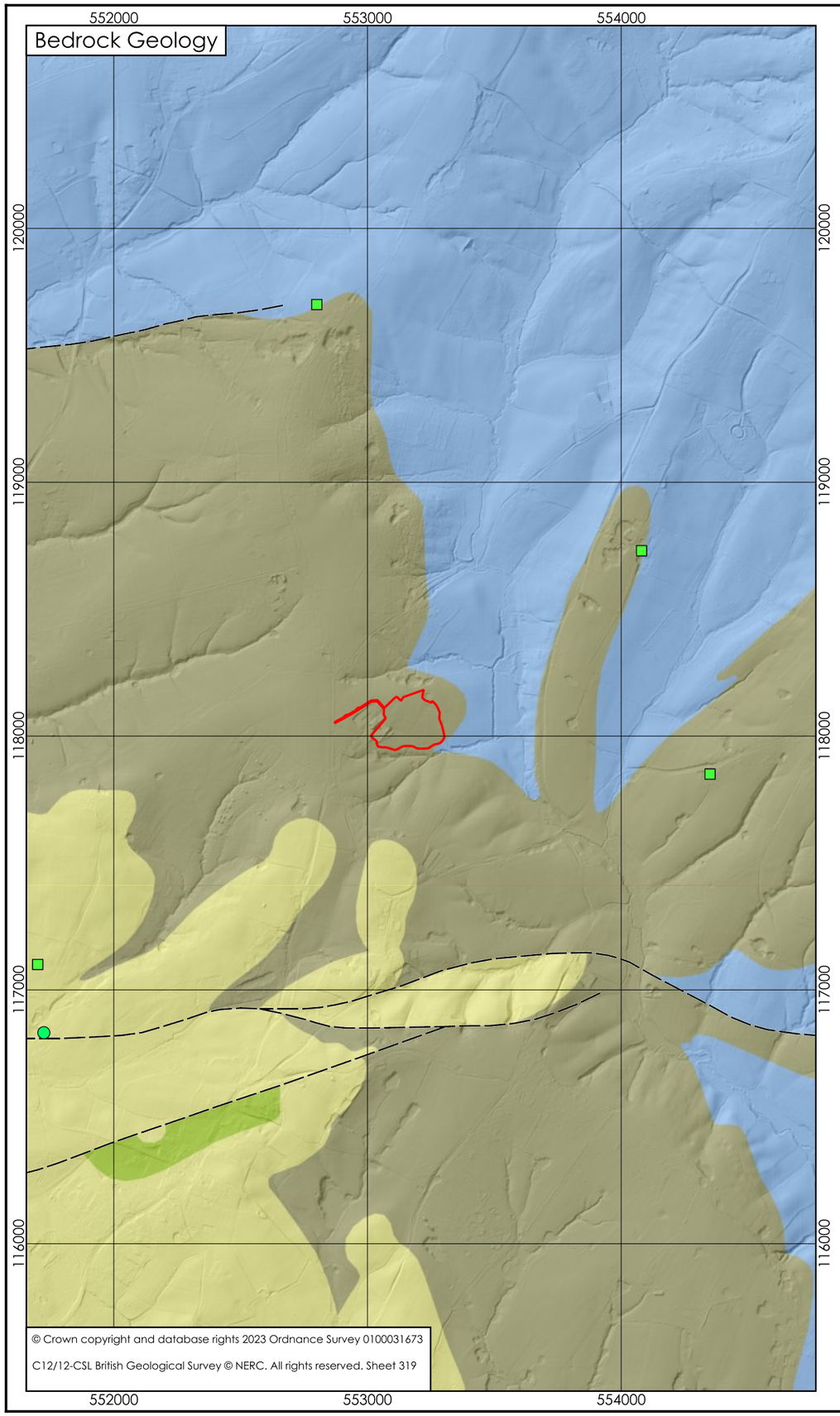

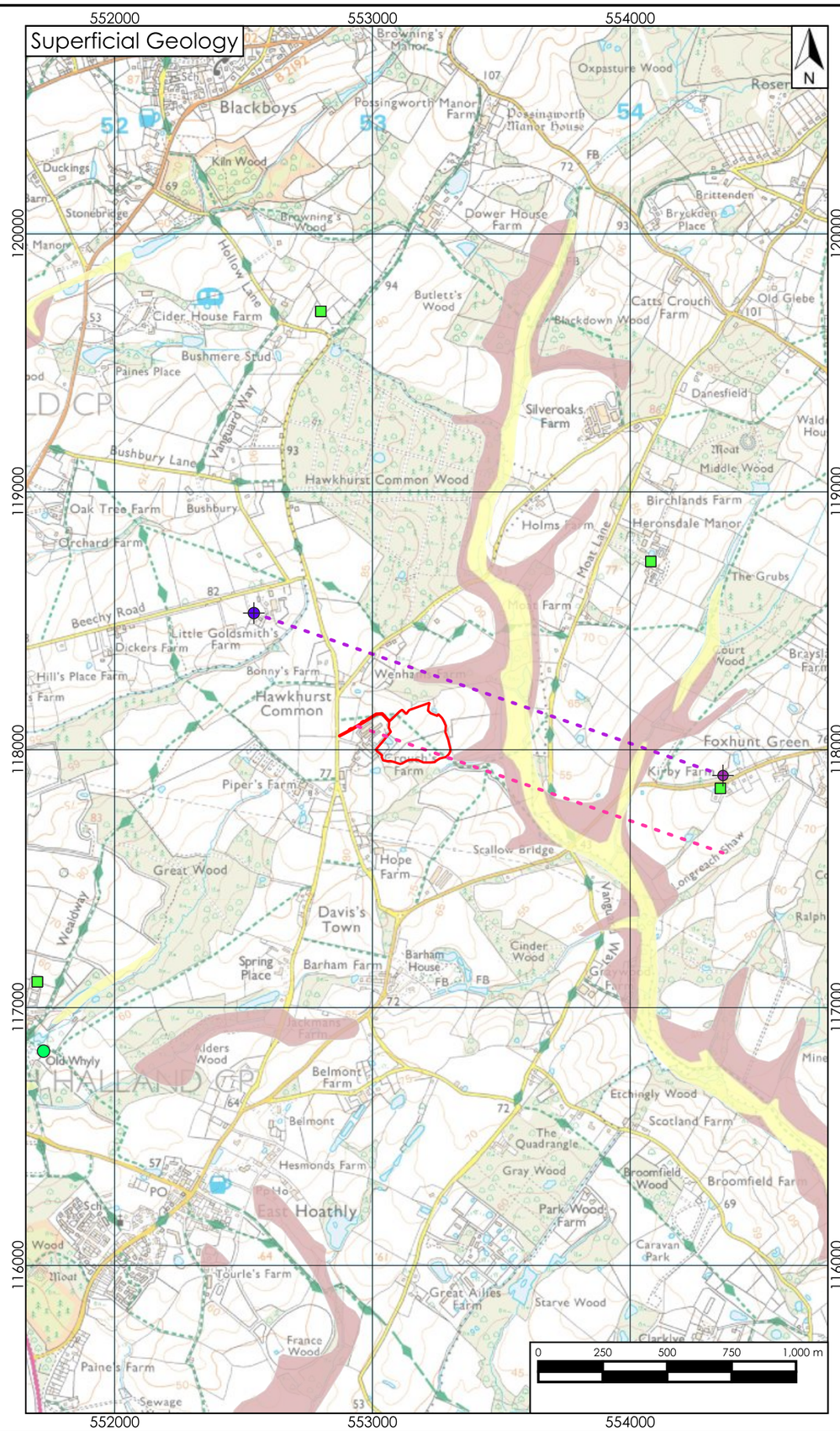

Key

- Site Boundary
- Cross Section A
- Cross Section B
- Little Goldsmiths Borehole
- Kirby Farm Borehole
- Licenced Groundwater Abstraction
- Private Water Abstraction

Bedrock Geology:

Tunbridge Wells Sand Formation (TW)

- Siltstone, Mudstone and Sandstone (TW)
- Mudstone (TW)

Wadhurst Clay Formation
- Mudstone

Ashdown Formation
- Sandstone, Siltstone and Mudstone

Fault

Superficial Geology:

- Head - Clay, Silt, Sand and Gravel
- Alluvium - Clay, Silt, Sand and Gravel

Scale correct at A3

Client	Westbury / PJ Brown Civil Engineering
Title	Bedrock & Superficial Geology
Project	Crouch's Farm
Drawing	3591/HRA/03
Version	1
Date	Oct 2023
Scale	1:20,000

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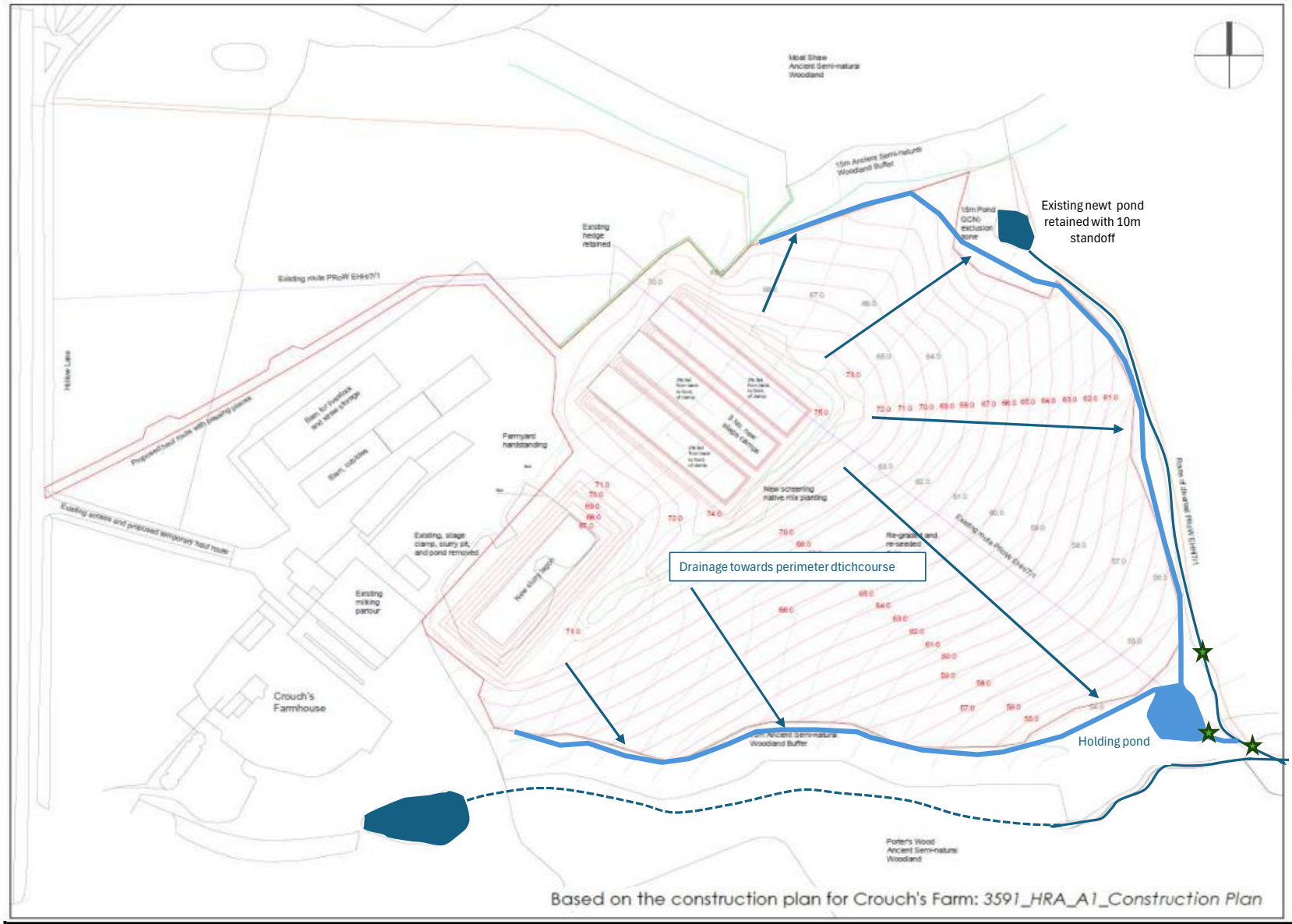


Contruction key

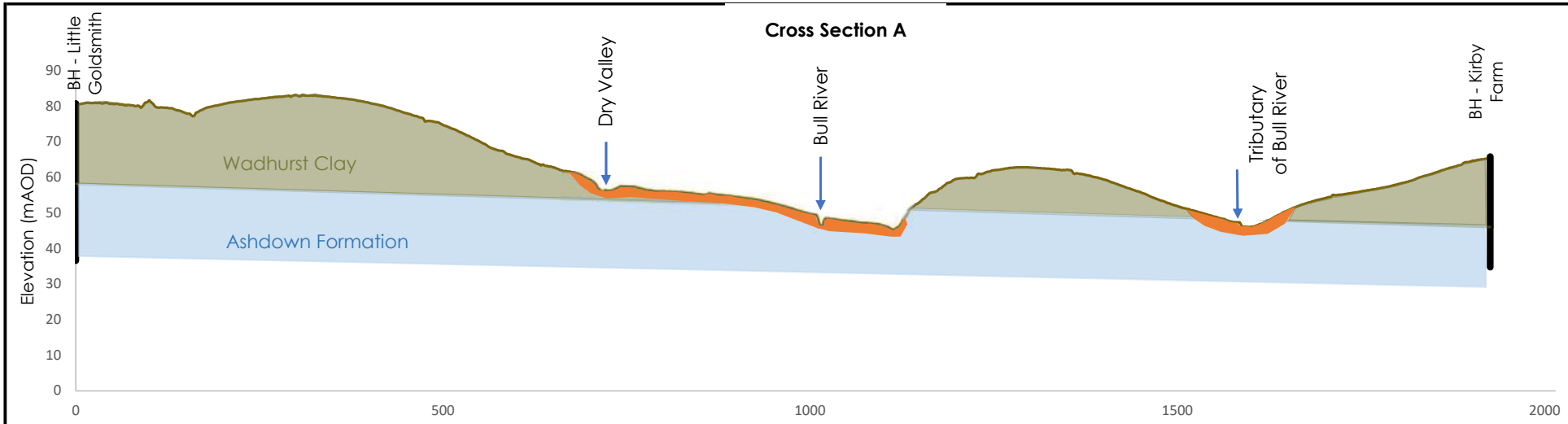
- Existing layout
- Existing contour
- Proposed contour
- 15m buffer of Ancient Semi-natural Woodland buffer
- Public Right of Way (PRoW) EHH/7/1 existing alignment
- Public Right of Way (PRoW) EHH/7/1 proposed alignment
- Proposed native scrub planting with a high percentage of evergreen species.planting to be protected from cattle and rabbits with fencing

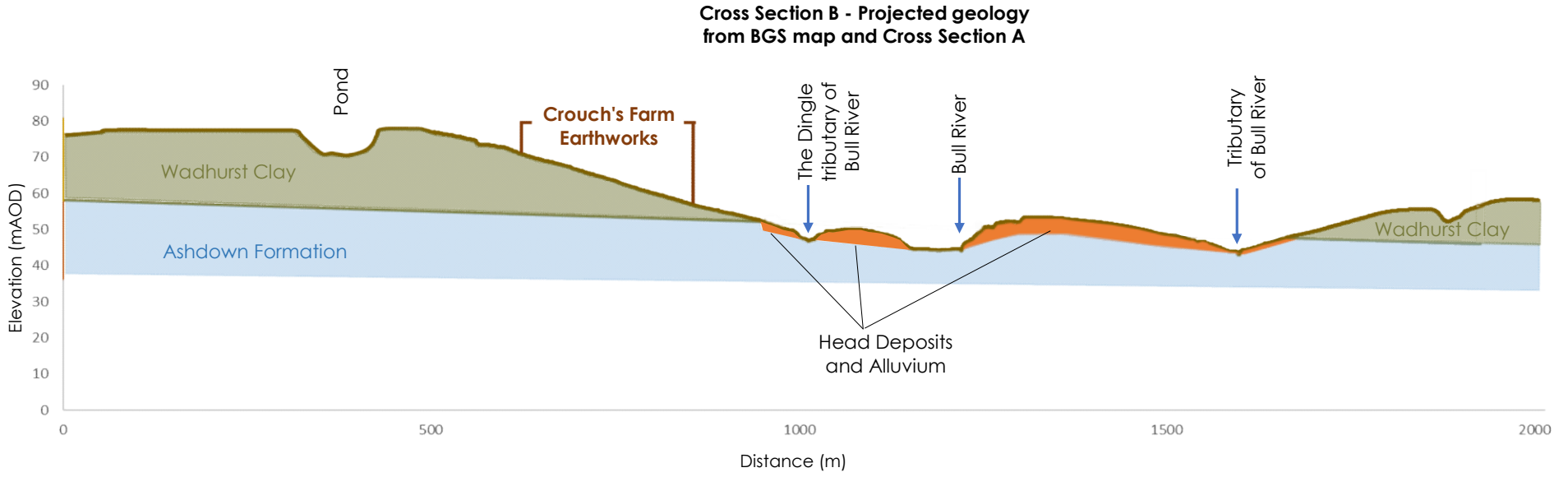
0 50m

Drainage key

- Surfacewater pond
- Watercourse
- Surfacewater drainage
- Potential connection
- Schematic of proposed ditch and berm and holding pond
- Proposed surface water monitoring point

Client:	PJ Brown Civil Engineering Burlands Farm West Sussex RH1 10JZ	Title:	Construction drainage
		Project: Crouch's Farm	Date: Sep-2025
		Drawing: 3591/HRA/04 version 2	Scale: Scale as per drawing





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Client: PJ Brown Civil Engineering
Burlands Farm
West Sussex
RH1 10JZ

Title: Geological Cross Sections A and B

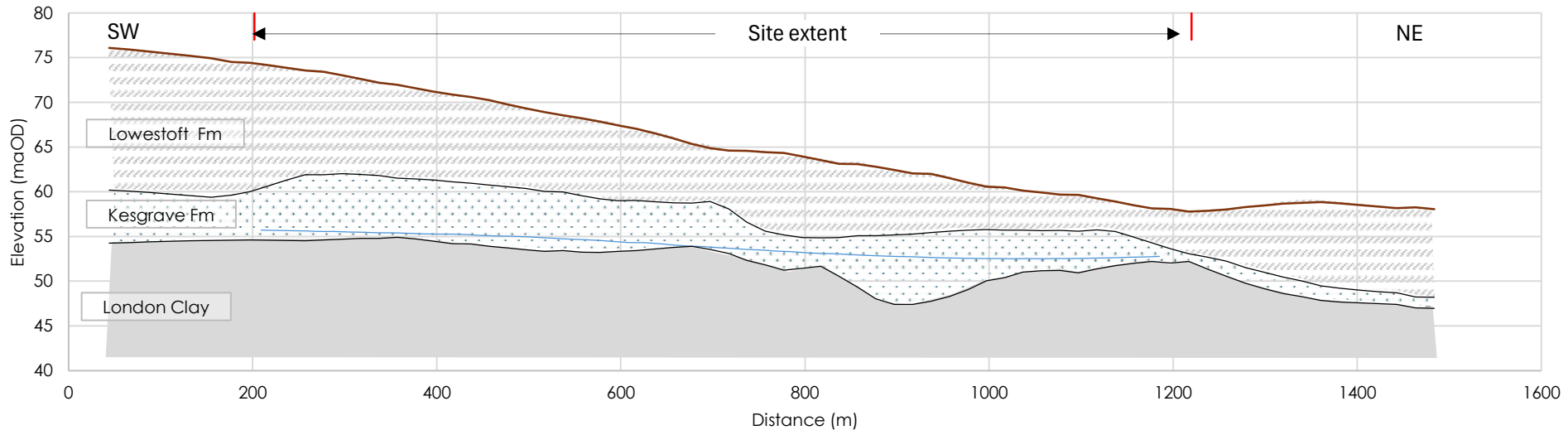
Project: Crouch's Farm

Date: Sep-2025

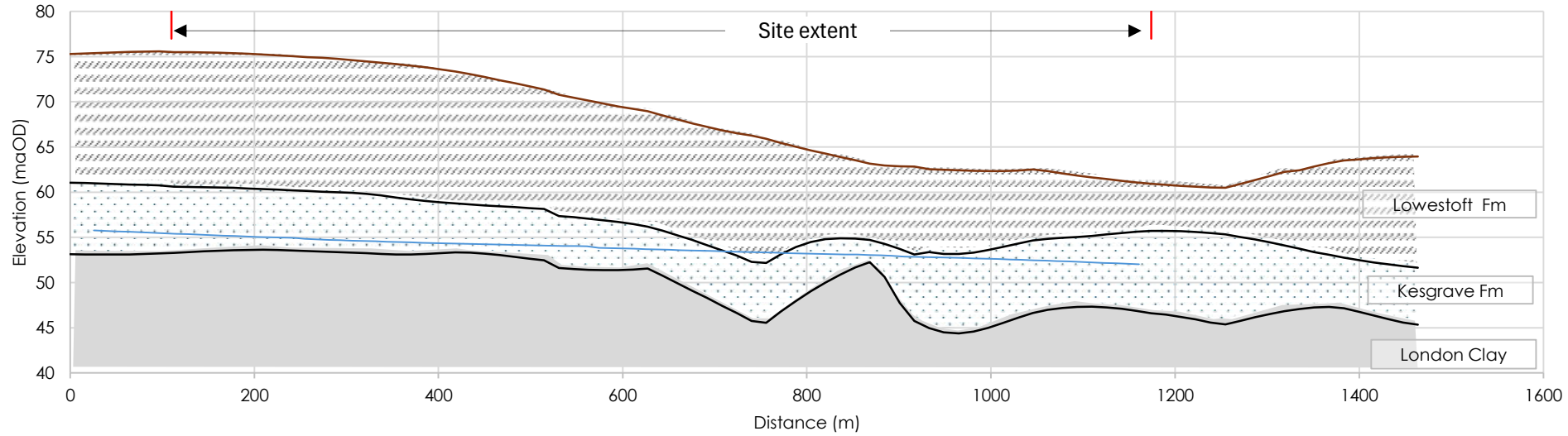
Drawing: 3591/HRA/05

Scale: Scale as per drawing

Cross section A-A'



Cross Section B-B'



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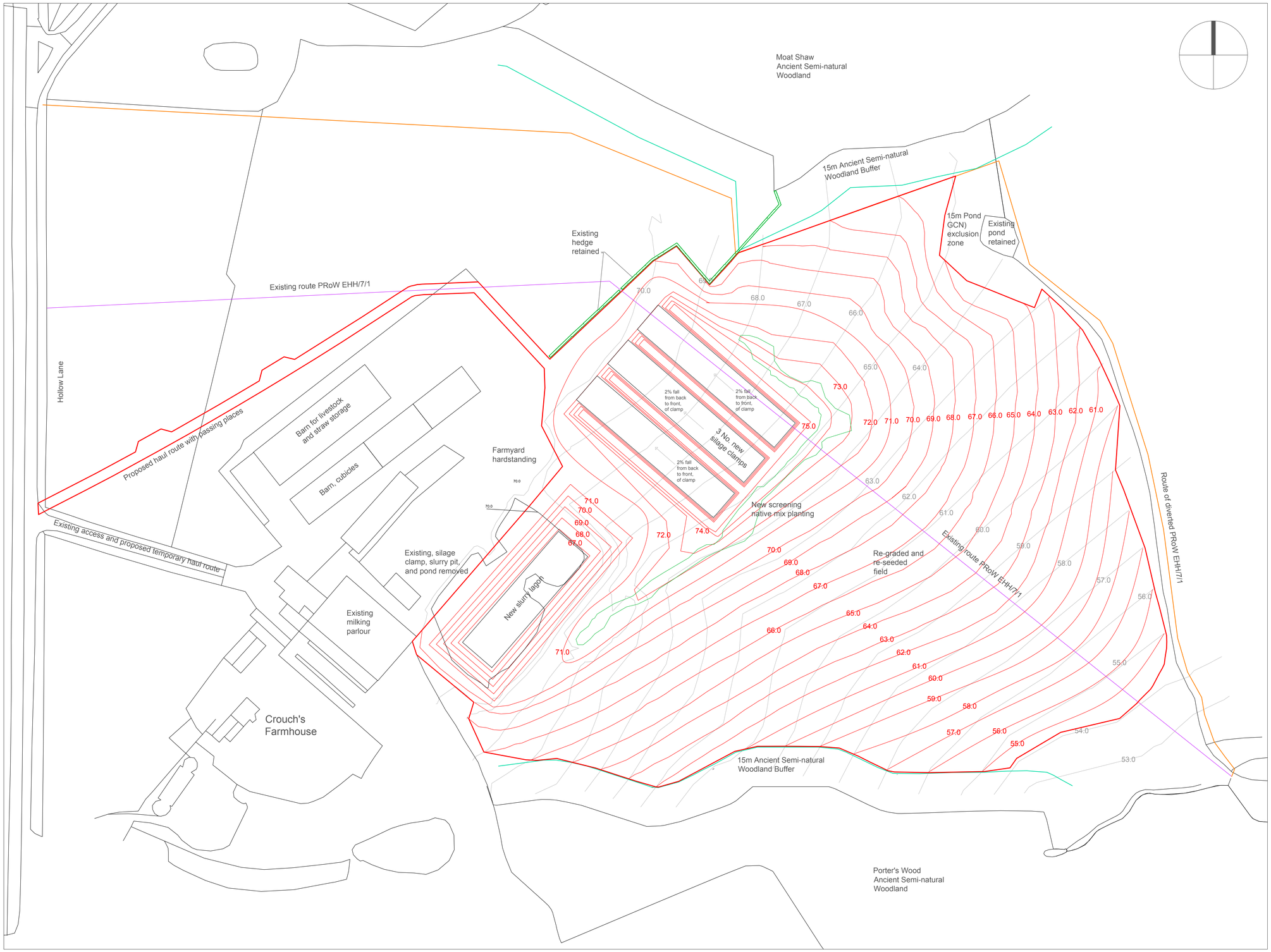
Client	Heatons Planning
Title	Geological cross sections
Project	Shellow Cross Farm Quarry
Drawing	3673/HIA/06
Version	1
Date	Sep-25
Scale	n/a

APPENDIX 3591/HRA/A1

Construction Plan



Key

- Existing layout
- Existing contour (61.0)
- Proposed contour (61.5)
- 15m buffer of Ancient Semi-natural Woodland buffer
- Public Right of Way (PRoW) EHH/7/1 existing alignment
- Public Right of Way (PRoW) EHH/7/1 proposed alignment
- Proposed native scrub planting with a high percentage of evergreen species.planting to be protected from cattle and rabbits with fencing

0 — 50m

Proposed landscape plan 1:750 @ A1, 1:1500 @ A3

PLEASE NOTE

FOR PLANNING PURPOSES ONLY.

Do not rely on accurate measurements from this plan

Revisions

A NH 23-08-21 Clamp dimensions revised

B NH 16-11-21 PRoW colours revised and scale amended

C NH 29-7-21 Existing hedge added

Harper Landscape Architecture LLP
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Drawing: Proposed landscape plan			Date: 15-07-21
Project/Client: Crouch's Farm JD Courtney			Scale: 1:750@A1
Job: 432	Drawing number: hla 432 02	Revision: C	Purpose: Planning

APPENDIX 3591/HRA/A2

Accepted Waste Codes

Extracted Waste Codes from Crouch's Farm Waste Recovery Plan

Exclusions
Wastes having any of the following characteristics shall not be accepted:

- Consisting solely or mainly of dusts, powders or loose fibres
- Wastes that are in a form which is either sludge or liquid.

Source	Sub-source	Waste code	Description	Additional restrictions
01 Waste resulting from exploration, mining, quarrying and physical and chemical treatment of minerals	01 01 wastes from mineral excavation	01 01 02	Wastes from mineral non- metalliferous excavation	Restricted to waste overburden and interburden only
	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 06	
		01 04 09	Waste sand and clays	
02 Waste from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing	02 04 wastes from sugar processing	02 04 01	Soil from cleaning and washing beet	
10 Wastes from thermal processes	10 12 wastes from manufacture of ceramic goods, bricks, tiles and construction products	10 12 08	Waste ceramics, bricks, tiles and construction products (after thermal processing)	
	10 13 waste from manufacture of cement, lime and plaster and articles and products made from them	10 13 14	Waste concrete	
17 Construction and demolition wastes	17 01 concrete, bricks, tiles and ceramics	17 01 01	Concrete	
		17 01 02	Bricks	
		17 01 03	Tiles and ceramics	
		17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	Metal from reinforced concrete must have been removed
	17 03 bituminous mixtures	17 03 02	Bituminous mixtures other than those mentioned in 17 03 01	Road planings only

Source	Sub-source	Waste code	Description	Additional restrictions
	17 05 soil stones and dredging spoil	17 05 04	Soil and stones other than those mentioned in 17 05 03	Restricted to topsoil, peat, subsoil and stones only (Topsoils or peat restricted to top 50 cm of construction)
19 Wastes from waste management facilities	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) only	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	Other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11	Restricted to crushed bricks, tiles, concrete and ceramics and soils from the mechanical treatment of construction / demolition waste. Metal from reinforced concrete must be removed. Does not include gypsum from recovered plasterboard
Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions	20 02 garden and park wastes	20 02 02	Soils and stones	Restricted to topsoil, peat, subsoil and stones only