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GLADMAN DEVELOPMENTS LIMITED

LAND WEST OF TATTENHALL ROAD, TATTENHALL

MINERAL RESOURCE ASSESSMENT

MAY 2025

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GLADMAN DEVELOPMENTS LIMITED

LAND WEST OF TANTTENHALL ROAD

MINERAL RESOURCE ASSESSMENT

MAY 2025

PREPARED BY:

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DRAWINGS	TITLE	SCALE
ST21822-01-001	Proposed Development Boundary	1:15,000
ST21822-01-002	Superficial Geology	1:15,000
ST21822-01-003	Bedrock Geology	1:15,000

EXECUTIVE SUMMARY

This Mineral Resource Assessment has been prepared in support of a planning application by Gladman Developments Limited for a proposed residential development on approximately 6.32 hectares of land west of Tattenhall road, Tattenhall (the Site).

The subject Site is located within a Mineral Safeguarding Area (MSA) for Sand and Gravel identified by the Cheshire West and Chester Council Local Plan (the Local Plan). Policy M2 of the Local Plan outlines the adopted mineral safeguarding policy and when non-mineral development is acceptable within a safeguarded area. The Local Plan identifies the MSA based on BGS mapping of inferred sub-alluvial deposits of sand and gravel beneath Alluvium present along Keys Beck which flows east to west along the southern boundary of the Site.

Boreholes within the Alluvium Deposit approximately 750 metres downstream of the Site find Till (or Boulder Clay) sits directly beneath the Alluvium. Sub-alluvial sand and gravel is not present. The borehole logs confirm the Alluvium comprises mostly clay to a thickness of approximately 4 metres. These logs confirm the safeguarded mineral does not occur within the area, and the proposed development is compatible with criteria set out by Policy M2 of the Local Plan, “mineral sterilisation will not occur”.

In any case the Alluvium deposit sits entirely within approximately 100 metres residential housing adjacent to the southern border, and extraction of sand and gravel would give rise to an unacceptable impact on amenity due to the level of noise and dust generated. If any minerals were present, they can therefore be considered already sterilised from extraction by housing to the south and are *“no longer of any existing or potential value”*.

1 INTRODUCTION

1.1 This Mineral Resource Assessment (MRA) has been prepared in accordance with instructions from Gladman Developments Limited (the Client) in support of a planning application for a residential development on approximately 6.32 hectares of land west of Tattenhall road, Tattenhall, within the Unitary Authority Area of Cheshire West and Chester (the Site).

1.2 The Site is within a Mineral Safeguarding Area (MSA) identified by the Cheshire West and Chester Council Local Plan. As such, evidence is required in order to determine whether:

i) the safeguarded minerals are present;

ii) the safeguarded minerals are of economic value.;

iii) the safeguarded minerals are sterilised or prejudiced by the proposed development;

iv) the safeguarded minerals can be extracted prior to the development; or

v) the need for the non-minerals development can be demonstrated to outweigh the need for the safeguarded minerals.

2 SITE

2.1 The proposed residential development forms a northern extension to the village of Tattenhall, and the Site lies approximately 8 kilometres southeast of Chester and 8 kilometres east of the Welsh border.

2.2 The Site currently comprises agricultural fields primarily used for grazing. The Site area is generally flat with a slight decline to the southwest corner. The Site is bound to the north by Greaves Meadow access road; Tattenhall Road to the east; and agricultural fields to the west.

2.3 To the south the Site is bound by Keys Brook which flows east to west along the southern boundary before reaching a confluence with Mills Brook approximately 750 metres west of the Site at Tattenhall Wastewater Treatment Works to form Golborne Brook. Keys Brook separates the Site from residential housing at Greenlands within the village of Tattenhall.

2.4 Approximately 3.11 hectares of the Site form the proposed Residential Development Area while around 2.81 hectares will remain as Natural/ Semi Natural Green Space including land along Keys Brook to form a natural screen around the proposed development.

2.5 The Site is centred around national grid reference SJ 4886 5932 and shown on Drawing ST21822-001.

3 GEOLOGY

3.1 Geologically, a distinction is made between "superficial deposits" and "solid geology". Superficial deposits are deposits of uncemented particles (such as sand, gravel or clay) which are found at, or close to, the surface. The solid rock generally found beneath the superficial deposits is called the "solid geology".

Superficial Geology

3.2 British Geological Survey (BGS) 1:50,000 Superficial Deposits mapping indicates Till can be found across the entirety of the Site. The BGS describe the general lithology of Till as *'sorted and unstratified drift, generally over consolidated, deposited directly by and underneath a glacier without subsequent reworking by water from the glacier. It consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape (diamicton)'*. A BGS borehole located at Greaves Farm attached at Appendix 1 in the northwest corner of the Site confirms the presence of the Till as 'clay' and 'clay and marl' to approximately 27.13 metres below the surface.

3.3 Mapping indicates a younger deposit of Alluvium overlies the Till along the southern boundary of the Site following Keys Brook. The BGS describe the general lithology of the Alluvium as *' the unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta, or as a cone or fan at the base of a mountain slope. Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present.'*.

3.4 The Alluvium deposit continues west of the Site and beyond the Tattenhall Wastewater Treatment Works along Golborne Brook. A ground investigation undertaken in 1979 at the Wastewater Treatment Works confirmed the presence of Alluvium along Keys Brook and Golborne Brook as silty CLAY with occasional fine gravel to a depth of approximately 4 metres below the surface before reaching Till. No sub-

alluvial sand and gravel deposits were identified beneath the Alluvium. A Borehole undertaken as part of this investigation is attached at Appendix 2.

3.5 Superficial geology is shown on Drawing ST21822-002.

Solid Geology

3.6 BGS 1:50,000 Bedrock geological mapping indicates the entirety of the Site is underlain by the Chester Formation of the Sherwood Sandstone Group (formerly known as Bunter Sandstone).

3.7 The BGS describe the general lithology across the Chester Formation within Cheshire as *'conglomerates and reddish brown, cross-bedded, pebbly sandstones with subordinate beds of red-brown mudstone. The conglomerates have a reddish brown sandy matrix and consist mainly of pebbles of brown or purple quartzite, with quartz conglomerate and vein quartz. In these areas the formation generally fines upwards, from dominantly conglomerates at the base, to interbedded conglomerates and sandstones, with sandstone and pebbly sandstone predominant in the upper part, and rare mudstones.'*

3.8 The base of the coal measures sits between 1-2 kilometres below the surface of the locality.

3.14 Bedrock geology beneath the Site is shown on Drawing ST21822-003.

4 MINERAL PLANNING POLICY

4.1 The National Planning Policy Framework (NPPF) requires mineral planning authorities to safeguard potentially important mineral resources in their area through their local planning policy. This ensures that there is a sufficient and steady supply of mineral resources to meet future requirements for infrastructure, energy and new construction.

4.2 The current planning policy for mineral development in the Unitary Authority Area of Cheshire West and Chester is contained within the Cheshire West and Chester Council Local Plan adopted in full on 18 July 2019 (the "Local Plan") the Local Plan outlines minerals planning policy until 2030. Cheshire West and Chester Council are expected to begin work on a new local plan in the summer of 2025 with adoption targeted by Autumn 2027.

4.3 Chapter 9 of part 2 of the Local Plan sets out the detailed strategy for managing the supply of minerals and the safeguarding of minerals and minerals infrastructure against encroachment or replacement by non-minerals development outlined by Policy ENV 9 of part 1 of the Local Plan. Policy M2 – "safeguarding areas - prior extraction of minerals" provides the detailed strategy for mineral safeguarding and states:

"In line with Local Plan (Part One) policy ENV 9, minerals safeguarding areas (MSAs) will safeguard Cheshire West and Chester's extent of finite natural resources from incompatible development. Within a minerals safeguarding area, as identified on the policies map, non-mineral development or hydrocarbon development will only be supported if the applicant can demonstrate that:

1. *mineral sterilisation will not occur; or*
2. *due to the quantity or quality of the mineral it is no longer of any existing or potential value; or*
3. *the mineral can be extracted satisfactorily prior to the incompatible development taking place; or*
4. *the incompatible development is of a temporary nature and can be completed and the site restored to a condition that does not inhibit extraction within the timescale that the mineral is likely to be needed and does not permanently sterilise the mineral; or*
5. *there is an overriding need for the incompatible development and the material planning benefits of the non-mineral or hydrocarbon development would outweigh the material planning benefits of the underlying or adjacent material; or*
6. *the development comprises one of the exempt types of development listed in the explanation."*

4.4 It should be noted there are no resources of hard rock, building stone, silica sand, coal, coalbed methane, shale gas, brick clay, or peat safeguarded by the Local Plan. A MSA for sand and gravel is located within the Site following the deposit of Alluvium.

4.5 Cheshire West and Chester detailed mineral safeguarding policy is attached within Appendix 3.

5 ASSESSMENT

5.1 Cheshire West and Chester Council Local Plan safeguards resources of sand and gravel in accordance with the BGS Mineral Resource Information Report and Map for Cheshire as a potential resource for sub-alluvial sand and gravel. No mineral resources are identified or safeguarded within the solid geology at the Site. The BGS Mineral Resource Map for Cheshire is attached as Appendix 4 for reference.

5.2 The Mineral Resource Information Report published by the BGS infers potential sub-alluvial sand and gravel resources beneath the Alluvium. Deposits of Alluvium occur across 'modern' floodplains and although not typically a mineral resource in itself, they can indicate the presence of sub-alluvial sand and gravel concealed beneath. The BGS Mineral Resource Information Report infers potential for sub-alluvial sand and gravel across all deposits of Alluvium in Cheshire, it is important to note the presence of these deposits is only inferred and the data used are noted as being "limited". Sub-alluvial sand and gravel may not therefore occur or occur to a thickness of an economic significance within the areas mapped.

5.3 Sub-alluvial sand and gravel is not a resource typically targeted for extraction, with deposits only generally extracted alongside River Terrace Deposits reducing the overall ratio of overburden. No river terrace deposits are identified in proximity to the Site area and no historic working of sand and gravel is marked by the BGS Mineral Resource Map for Cheshire.

5.4 The Alluvium deposit is a maximum of 90 metres wide and follows Keys Beck which flows east to west along the southern boundary and is too small to be of commercial value, particularly when considering the depth of overburden. The BGS Mineral Resource Information report notes that "narrow (<200 m width) spreads of sub-alluvial deposits are mainly excluded from the map. Their limited width is likely to preclude economic working of any sand and gravel present."

5.5 Within the Site the deposit sits entirely within 100 metres of residential housing of the Greenlands Estate to the south, and to close to be considered for mineral extraction due to significant impacts on amenity (noise, dust, etc.) with much of the area along the watercourse left as a green corridor by the proposed development. The MSA within the Site can therefore be considered already sterilised from mineral development and even if sand and gravel was present it is no longer of any existing or potential value. The proposed development is therefore compatible with criteria

outlined in Policy M2 of the Local Plan "due to the quantity or quality of the mineral it is no longer of any existing or potential value".

5.6 Boreholes bored at Tattenhall Wastewater Treatment Works approximately 750m west of the Site, within the same Alluvium deposit which follows Keys Beck did not encounter sub-alluvial sand and gravel and reached Till directly below the clayey Alluvium. It can therefore, be assumed sub-alluvial sand and gravel is not present beneath the Alluvium deposit identified within the Site. No mineral of potential economic value can therefore be sterilised, further supporting the proposed developments compatibility with Policy M2 as "mineral sterilisation will not occur".

6 SUMMARY AND CONCLUSION

6.1 BGS mapping of bedrock geology indicates the Chester Formation outcrops across the entirety of the Site. The Chester Formation is not a safeguarded resource within the Cheshire West and Chester Council Local Plan. No minerals are identified or safeguarded within the solid geology.

6.2 BGS mapping indicates an Alluvium deposit approximately 90 metres wide sits within the south of the Site following Keys Beck. Areas mapped for Alluvium within Cheshire have been inferred as potential sources of sub-alluvial sand and gravel by the BGS and safeguarded by Cheshire West and Chester Council.

6.3 BGS borehole records approximately 750 metres downstream indicate the Alluvium deposit is approximately 4 metres thick and is underlain by Till which occurs extensively across the Site and wider area. No sub-alluvial sand and gravel is identified by the borehole logs and the inferred resources by the BGS are not present within the area. The proposed development is therefore compatible with criteria outlined by Policy M2 of the Local Plan as "mineral sterilisation will not occur".

6.4 In any case the mineral occurs within 100 metres of residential receptors and extraction would result in an unacceptable impact on amenity from dust and noise and can be considered already sterilised from mineral development and even if sand and gravel was present, it "is no longer of any existing or potential value" meaning the proposed development is still compliant with criteria outlined by Policy M2.

APPENDICES

Appendix 1 – BGS Borehole at Greaves Farm

British Geological Survey

BGS ID: 162782 : BGS Reference: SJ45NE14
British National Grid (27700) : 348606,359405

(*11932) Wt.30870/0370 10,000 9/39 A.& E.W.Ltd. Gp.685 25 45NE/14

Name and Number of Shaft or Bore given by Geological Survey:
Water bore at TATTENHALL

County Cheshire
6" Quarter Sheet 47SW

SJ 45NE 14.

Geological Classification	Description	Thickness	Depth
	GREAVES FARM See 1" & 6" maps.		
	Bore made for Mr. P. Barlow. 2/9/1935 by Messrs Wyatt Bros, Wrayland Works, Whitchurch.		
	1" map: 109.		
	6" map: Cheshire 47SW.		
	Surface c. 100ft. O.D.		
	Clay	- 60 0	- 60 0
	clay and marl, soft patches.	- 29 0	- 89 0
	Sandstone	- 26 0	- 115 0
	Rock	- 11 6	- 126 6
	Rest water level 20ft. (6.10m) (not tested).		
	Water level 27ft. (8.23m) when pumping 100 gallons. Rest water level not tested.		
	Lining tubes: 5" diameter to 104ft. (31.70m)		

ft	m
	18.29
	27.13
	35.05
	38.40

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 162782 : BGS Reference: SJ45NE14
British National Grid (27700) : 348606,359405

(°11932) W1.30870/0370 10,000 9/39 A.& E.W.Ltd. Gp.685

SJ45/6

Name and Number of Shaft or Bore given by Geological Survey:
Water bore at TATTENHALL

County Cheshire
6" Quarter Sheet 47SW

47SW 14.

Geological Classification	Description	Thickness	Depth
	GREAVES FARM		
	See 1" & 6" maps.		
	Bore made for Mrs. P. Barlow. 2/9/1935 by Messrs Wyatt Bros., Wrayland Works, Whitchurch.		
	1" map: 109.		
	6" map: Cheshire 47SW.		
	Surface c. 100ft. O.D.		
	Clay	- 60 0	- 60 0
	clay and marl, soft patches.	- 29 0	- 89 0
	Sandstone	- 26 0	- 115 0
	Rock	- 11 6	- 126 6
	Rest water level 20ft. (not tested).		
	Water level 27ft. when pumping 1000 gals/hour. Rest water level not tested.		
	Lining tubes: 5" diameter to 104ft.		

Contact BGS: ngdc@bgs.ac.uk

Appendix 2 - BGS boreholes at Tattenhall Wastewater Treatment Works

British Geological Survey

BGS ID: 162799 : BGS Reference: SJ45NE31
British National Grid (27700) : 347850,359230

SJ45 NE 31

Norwest Holst Soil Engineering Ltd.

Borehole No. 1

BOREHOLE LOG

4785 3923

Contract No. F4108
Location Tattenhall
Client W.N.W.D.A.
Method of Boring Percussion
Diameter of Borehole 200mm

Sheet 1 of 1
Chainage
Ground Level 23.545 m.A.O.D.
Date 10th January 1979

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOPSOIL		0.30	23.2				
Firm brown and grey silty CLAY with occasional fine gravel		4.00	19.5		0.55 1.50 2.00 3.00 3.55		
Firm to stiff brown and grey silty stony CLAY		10.00	13.5		4.50 5.00 6.00 6.55 7.50 8.00 9.00 9.55		

Type of Sample

Is	S.P.T.	■	Undisturbed
Ic.	C.P.T.	×	Vane
O	Jar	Δ	Water
●	Bulk	▣	Piezometer

Remarks (Observations of Ground Water etc.)

Borehole dry

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 162800 : BGS Reference: SJ45NE32
British National Grid (27700) : 347850,359250

SJ 4510 52

Norwest Holst Soil Engineering Ltd.

Borehole No. **2**

BOREHOLE LOG

4785 5925

Contract No. F4108
Location Tattenhall
Client W.N.W.D.A.
Method of Boring Percussion
Diameter of Borehole 200mm

Sheet 1 of 1
Chainage
Ground Level 23.675 m.A.O.D.
Date 10th January, 1979

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOPSOIL		0.50	23.2		0.55		
Stiff brown silty CLAY with occasional fine gravel					1.50 2.00 3.00 3.55 4.50 5.00		
		5.00	18.7				
Stiff brown and grey sandy stony CLAY					6.00 6.55 -.50 8.00 9.00 9.55		
		10.00	13.7				

Type of Sample

Is S.P.T. ■ Undisturbed
Ic. C.P.T. × Vane
O Jar △ Water
● Bulk ▩ Piezometer

Remarks (Observations of Ground Water etc.)

Borehole dry

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 162801 : BGS Reference: SJ45NE33
British National Grid (27700) : 347850,359260

SJ 45 NE 35

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG

Borehole No. 3

4785 5926

Contract No. F4108
Location Tattenhall
Client W.N.W.D.A.
Method of Boring Percussion
Diameter of Borehole 200mm

Sheet 1 of 1
Chainage
Ground Level 23.670 m.A.O.D.
Date 30th January, 1979

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOPSOIL		0.50	23.2				
Stiff brown silty sandy CLAY with occasional fine gravel		4.50	19.2		0.55 1.50 2.00 3.00 3.55 4.50		
Stiff brown and grey silty stony CLAY with occasional sand lenses		10.00	13.7		5.00 6.55 7.50 8.00 9.00 9.55		

Type of Sample

Is S.P.T. ■ Undisturbed
Ic. C.P.T. × Vane
O Jar △ Water
● Bulk ▩ Piezometer

Remarks (Observations of Ground Water etc.)

Borehole dry

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 162802 : BGS Reference: SJ45NE34
British National Grid (27700) : 347850,359280

SJ45NE 34

Norwest Holst Soil Engineering Ltd.

Borehole No. **4**

4785 5928

BOREHOLE LOG

Contract No. F4108
Location Tattenhall
Client W.N.W.D.A.
Method of Boring Percussion
Diameter of Borehole 200mm

Sheet 1 of 1
Chainage
Ground Level 23.410 m.A.O.D.
Date 10th January, 1979

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOPSOIL		0.50	22.9		0.55		
Firm brown silty sandy CLAY with occasional fine gravel		4.00	19.4		1.50 2.00 3.00 3.55		
Stiff brown and grey silty stony CLAY		10.00	13.4		4.50 5.00 6.00 6.55 7.50 8.00 9.00 9.55		

Type of Sample

S.P.T. — Undisturbed
C.P.T. — Vane
Jar — Water
Bulk — Piezometer

Remarks (Observations of Ground Water etc.)

Borehole dry

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 162803 : BGS Reference: SJ45NE35
British National Grid (27700) : 347870,359240

Norwest Holst Soil Engineering Ltd.

Borehole No. 5

BOREHOLE LOG

Contract No. F4108
Location. Tattenhall
Client. W.N.W.D.A.
Method of Boring. Percussion
Diameter of Borehole. 200mm

Sheet. 1 of 1
Chainage.
Ground Level. 24.685 m.A.O.D.
Date. 10th January, 1979

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOPSOIL.		0.75	23.9		0.50		
Stiff brown silty CLAY with occasional fine gravel					1.00 2.00 2.50 3.50 4.00 4.55		
		5.00	19.7				
Stiff brown and grey silty stony CLAY with occasional layers of soft silty laminated CLAY					5.50 6.00 7.00 7.55 8.50 9.00 10.00		
		10.00	14.7				

Type of Sample

S	S.P.T.	■	Undisturbed
C	C.P.T.	×	Vane
O	Jar	Δ	Water
●	Bulk		Piezometer

Remarks (Observations of Ground Water etc.)

Borehole dry

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 162804 : BGS Reference: SJ45NE36
British National Grid (27700) : 347870,359250

SJ45NE 36

Norwest Holst Soil Engineering Ltd.

Borehole No. 6

BOREHOLE LOG

4787 5925

Contract No. E4108
Location Tattenhall
Client W.N.W.D.A.
Method of Boring Percussion
Diameter of Borehole 200mm

Sheet 1 of 1
Chainage
Ground Level 24.65 m.A.O.D.
Date 10th January 1979

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOPSOIL		1.00	23.7		0.50, 1.00		
Firm to stiff brown silty CLAY with occasional fine gravel		6.00	18.7		2.00, 2.55, 3.50, 4.00, 5.00, 5.55		
Stiff brown and grey silty stony CLAY		10.00	14.7		6.50, 7.00, 8.00, 8.55, 10.00		

Type of Sample

- Is S.P.T. — Undisturbed
- Ic. C.P.T. — Vane
- O Jar — Δ Water
- ● Bulk — Piezometer

Remarks (Observations of Ground Water etc.)

Borehole dry

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 162805 : BGS Reference: SJ45NE37
British National Grid (27700) : 347870,359270

SJ 45NE 51

Norwest Holst Soil Engineering Ltd.

Borehole No. 7

4787 5927

BOREHOLE LOG

Contract No. F4108
Location. Tattenhall
Client. W.N.W.D.A.
Method of Boring. Percussion
Diameter of Borehole. 200mm

Sheet 1 of 1
Chainage
Ground Level 24.245 m.A.O.D.
Date 10th January, 1979

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOPSOIL		0.50	23.7		0.55		
Stiff brown and grey mottled silty CLAY		3.00	21.2		2.00 3.00		
Stiff brown silty stony CLAY		10.00	14.2		3.55 4.50 5.00 6.00 6.55 7.50 8.00 9.00 9.55		

Type of Sample

S.P.T. Undisturbed
C.P.T. Vane
Jar Water
Bulk Piezometer

Remarks (Observations of Ground Water etc.)

Borehole dry

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 162806 : BGS Reference: SJ45NE38
British National Grid (27700) : 347890,359240

SJ 45NE 58

Norwest Holst Soil Engineering Ltd.

Borehole No. 8

BOREHOLE LOG

4789 5924

Contract No. F4108
Location Tattenhall
Client W.N.W.D.A.
Method of Boring Percussion
Diameter of Borehole 200mm

Sheet 1 of 1
Chainage
Ground Level 24.970 m.A.O.D.
Date 10th January, 1979

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
MADEGROUND: Ash and hardcore		0.50	24.5		0.55		
Firm to stiff red-brown and grey silty CLAY with occasional fine gravel		3.00	22.0		1.50 2.00 3.00		
Stiff brown and grey silty stony CLAY		10.00	15.0		3.55 4.50 5.00 6.00 6.55 7.50 8.00 9.00 9.55		

Type of Sample

Is S.P.T. ■ Undisturbed
Ic. C.P.T. × Vane
O Jar Δ Water
● Bulk ▩ Piezometer

Remarks (Observations of Ground Water etc.)

Borehole dry

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 162807 : BGS Reference: SJ45NE39
British National Grid (27700) : 347890,359260

SJ 4510 54

Norwest Holst Soil Engineering Ltd.

Borehole No. 9

4789 5926

BOREHOLE LOG

Contract No. F4108
Location Tattenhall
Client W.N.W.D.A.
Method of Boring Percussion
Diameter of Borehole 200mm

Sheet 1 of 1
Chainage
Ground Level 24.940 m.A.O.D.
Date 10th January, 1979

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
CONCRETE		0.15	24.8				
MADEGROUND: Ash and hardcore		0.50	24.4				
Firm brown and grey laminated silty CLAY		3.00	21.9		1.00 2.00 2.55		
Stiff brown and grey silty stony CLAY		10.00	14.9		3.50 4.00 5.00 5.55 6.50 7.00 8.00 8.55 10.00		

Type of Sample

Is S.P.T. ■ Undisturbed
Ic. C.P.T. × Vane
O Jar Δ Water
● Bulk ⊕ Piezometer

Remarks (Observations of Ground Water etc.)

Borehole dry

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 162812 : BGS Reference: SJ45NE44
British National Grid (27700) : 348040,359140

SJ 4814 44

Norwest Holst Soil Engineering Ltd.

Borehole No. **HA5**

BOREHOLE LOG

4804 5914

Contract No. FA108
Location. Tattenhall
Client. W.N.W.D.A.
Method of Boring. Hand Auger
Diameter of Borehole. 0.20m

Sheet 1 of 1
Chainage
Ground Level m.A.O.D.
Date. 10th January 1979

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
TOPSOIL		0.30					
Stiff brown silty sandy CLAY with occasional fine gravel					O 1.00		
					O 2.00		
		3.00			O 3.00		

Type of Sample

Is S.P.T. ■ Undisturbed
Ic. C.P.T. × Vane
O Jar Δ Water
● Bulk ▣ Piezometer

Remarks (Observations of Ground Water etc.)

Borehole dry

Water levels are subject to seasonal or tidal variations and should not be taken as constant

Contact BGS: ngdc@bgs.ac.uk

Appendix 3 - Cheshire West and Chester Council Detailed Mineral Safeguarding Policy

Policy 49: Minerals and Other Extractive Activities - Supply

Policy 49A: Extraction

Favourable consideration will be given to proposals for the extraction of minerals, where:

(a) *it can be demonstrated that there are local, regional and/or national market requirements for the mineral that cannot be satisfied by greater efficiency at existing workings or other alternative sources; or*

(b) *it would assist in maintaining, as a minimum, a ten-year landbank of permitted reserves for aggregates within a recognised market area.*

And in all cases, their impact on local communities and the environment has been assessed and does not have an adverse residual effect after appropriate mitigation having regard to:

(i) *the effect on local communities, individual houses, sensitive receptors and neighbouring land uses by reason of disturbance, noise, dust, blasting, vibration or other pollution or disturbance;*

(ii) *the effect on landscape and visual impact of the proposals;*

(iii) *the transport implications (including the strategic trunk road and rail network), and in particular the scale and nature of traffic likely to be generated, and its implications for site access, road capacity, road safety, and the environment generally;*

(iv) *the effect on the quality and quantity of water environment including the ecology of watercourses and wetlands, and on water supply and flood protection interests;*

(v) *the effect on natural heritage, habitats and the historic environment;*

(vi) *ensuring there are no unacceptable adverse cumulative impacts arising from development proposals; and*

(vii) *ensuring there are no adverse effects on the integrity of a European designated site(s).*

Note: *A Waste Management Plan must be submitted as part of any application for planning permission.*

Policy 49B: Restoration

Restoration, after-use and aftercare proposals will require to be agreed in advance of operations; modifications to conserve locally or nationally important geological sections will be supported and encouraged. Operators are encouraged to consider after-uses that would add to the cultural, recreational and environmental assets of the area. After excavation ceases, restoration will be completed in the shortest time practicable. Appropriate *'on demand'* financial bonds for restoration will be required.

Note: *Detailed advice about the full range of financial guarantees that may be used to secure restoration will be contained within separate Supplementary Guidance.*

Appendix 4 - Cheshire Mineral Resource Map

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Office of the Deputy Prime Minister

CHESHIRE

(comprising Cheshire, Boroughs of Halton and Warrington)

Mineral Resource Information in Support of National, Regional and Local Planning

Mineral Resources

Scale 1:100 000

Compiled by G.E.Norton, A.J. Bloodworth*, D.G. Cameron, D.J. Evans, G.K. Lott, S.J. Hobbs, and D.E. Highley.
Project Leader: D.E. Highley.
Digital cartography by N.A. Spencer, British Geological Survey.
Published 2006.

*This map comprises part of a summary of the 'Mineral Resources of the North-West England Region'.
For more information see www.mineralsuk.com

BIBLIOGRAPHIC REFERENCE

Norton, G.E. and 8 others, 2006. Mineral Resource Information for Aggregates, Regional and Local Planning: Cheshire (consultancy Cheshire and the Boroughs of Halton and Warrington). British Geological Survey Commissioned Report CR/06/099N.

Production of this map was commissioned and funded by the Office of the Deputy Prime Minister (Contract MP0677).

SAND & GRAVEL

Superficial deposits

- Sub-alluvial: Inferred resources
- Sub-alluvial: Indicated resources (only in areas assessed by BGS)
- River Terrace deposits
- Glaciofluvial deposits
- Glaciofluvial deposits: Concealed (only in areas assessed by BGS)
- Boundary of area assessed for sand and gravel at the indicated resource level
- Approximate extent of area worked for silica sand

PEAT

SANDSTONE

- Crushed rock and Building stone: Millstone Grit/Coal Measures, Chatsworth Grit and sandstones in Bowland Shale Formation) — Carboniferous

MINERAL PLANNING PERMISSION (as at 01.09.05)

Source: Mineral Planning Authorities

- Surface planning permission (valid and expired)
- Underground planning permission other than coal (valid and expired)

MINERAL WORKINGS

- Chelford — Active site
- Arclid Grange — Inactive (including yet to be worked), worked-out and/or restored site

Mineral commodity

CBM	Coalbed Methane	Oil	Oil	SiS	Silica Sand
Cl	Clay & Shale	Peat	Peat	SiR	Silica Rock
Fr	Fireclay	Sg	Sand and Gravel	Sst	Sandstone
Gas	Natural Gas	Salt	Salt	Sec	Secondary Aggregate
Min	Mineral, unspecified	San	Sand		

- Active coal-fired power station
- Active underground mine
- Active Brinefield

ENVIRONMENTAL DESIGNATIONS (as at 01.01.06)

- National nature conservation designations (SSSIs and NNRs)
- International nature conservation designations (SACs, SPAs and Ramsar sites)
- National Park: Peak District (part)
- Scheduled Monument

ADMINISTRATIVE AREAS

- Mineral Planning Authority
- District

BUILDING STONES

Historically the area has been a prolific source of Carboniferous and Permo-Triassic sandstones for local building purposes.

The oldest stone of the area, since quarried extensively for building, are the Carboniferous sandstones of the Millstone Grit Group, these are along the eastern margin from Macclesfield to Congleton Edge, with important quarries at Chapel House (Bollington), Shutlingsloe (Wildboarclough), Bollington (Kerridge Hills), Henbreast (Alton Bank/Alderley), The Cloud and Mow Cop Hill (Staffordshire Grit) and Hare Dell (Chatsworth Grit) and Ridge Rocks. The sweeping dipping nature of the beds to the south-east were the principal cause of their economic decline. The overlying sandstones of the Pennine Coal Measures Group were also extensively quarried for building stone, notably at Kerridge Hill (Millstone Sandstone).

The most notable, and widespread, of the dwelling Permo-Triassic Sherwood Sandstone Group has been widely used in the past for building purposes, most notably from quarries in Chester, for the cathedral fabric, and at Soddenton, Chrosbiton, Weverham, Sagerton, Handley, Tilstonfall, Tarvin, Hall and Beeston.

The predominantly red-brown (occasionally white) sandstones of the Helsby Sandstone Formation were also once extensively quarried, at Runcorn, Frodsham, Lymm, Helsby, Beeley, Dunsmore's Hill, Delamere, Kelsall, Peckmoor and Eaton, and over the years in numerous buildings across their outcrop in the west of the area, the Supreme at Runcorn were, in the 19th century, the largest in Europe and supplied stone to the cities of Liverpool and Manchester as well as for export.

The Triassic Kibblestone Formation was once an important source of flagg stone used for hearth stones and window cills and was quarried at Helsby, Frodsham and Tarporley.

There are currently 5 active building sandstone quarries in the area all within the Millstone Sandstone of the Carboniferous outcrops, in the Kerridge Hill / Macclesfield area.

PLANNING PERMISSIONS FOR MINERAL EXTRACTION

The extent of all known extant and former planning permissions for mineral working is shown on the map, irrespective of their current status. The information was digitised from the original planning permissions held by the Mineral Planning Authorities (MPAs) and from Planning Enquiry and other documents supplied by Warrington Borough Council. In addition, planning permission information was digitally acquired from Ministry of Housing and Local Government maps for the area and also recorded in the data. The data has been updated and amended by the British Geological Survey, Keele, during September 2005. Any queries regarding the data shown should be directed to these authorities at the addresses shown below. The polygons mean active, former and restored mineral workings and, occasionally, unworked deposits.

Planning Permissions, expressed areas where a commercial operator is to work mineral has been made, a successful application has been dealt with through the provisions of the Town and Country Planning legislation and the permitted reserve will have been validated to a greater or lesser extent. Current planning status is not qualified on the map but is available in the underlying database.

Contact addresses:

Cheshire County Council, Environmental Planning Services, Backford Hall, Backford, Chester CH1 6PZ. Tel 01244 603120. Fax 01244 603333. web address: www.cheshire.gov.uk

Halton Borough Council, Environmental Services Department, Grosvenor House, Halton Lea, Runcorn WA7 2GW. Tel 0151 424 2061. Fax 0151 471 7381. web address: www.halton.borough.gov.uk

Warrington Borough Council, Minerals and Waste Planning, Community Services Department, New Town House, Buttermarket Street, Warrington WA1 2NH. Tel 01925 444400. Fax 01925 447700. web address: www.warrington.gov.uk

METALLIFEROUS MINERALISATION

On the margins of the sedimentary sequence associated with the Permo-Triassic Basin there are areas of barite and sulphur mineralisation, with more occurrences of lead and silver-lead also previously worked. These have been worked since Roman times, but were a particularly productive resource in the 18th, 19th and early 20th centuries and were extensively mined in this period. The most area of such mineralisation is the Alderley Edge area, where there are numerous veins, the most productive of which are the Bruntwood and Engine Vein veins along fault zones. At Bollington - Shutlingsloe area Hancarville, this mineralisation is found in a similar setting on the western margin of the basin, and is characterised mainly by barite occurrences in the Millstone Sandstone Formation.

BGS has investigated the potential for economic mineralisation in the Cheshire Basin on and in a wider mineralisation(ing) project. It was concluded that there might be more base metal mineralisation at other locations, as depth in the Cheshire Basin (Rees et al., 1966). The Cheshire Basin, Basin Mechanism, Basin Movement and mineral resources in a Permo-Triassic rift setting.

CRUSHED ROCK AGGREGATE

A wealth of hard rocks, when crushed, are suitable for use as aggregates. The technical suitability for different applications depends on their physical characteristics, such as crushing strength and resistance to impact and abrasion. Higher quality aggregates are required for roadstone with failure for road surfacing, or mixing with cement to produce concrete. For applications such as construction fill and drainage media, with less demanding specifications, lower quality materials are acceptable.

Cheshire has vast resources of all hard rock aggregate and production is some 215,000 tonnes in 2002). Permitted reserves of crushed rock aggregate were 526 million tonnes at the end of 2003 (source: 9th Regional Aggregates Working Party). In Cheshire, the only hard rock used for crushed rock aggregate is sandstone, which occurs in the western margins of the Permian to Triassic basin, various Carboniferous sandstones of the Coal Group, Millstone Grit Group and Pennine Coal Measures Group) have previously been used for crushed rock although there are currently working quarries only in the Millstone Sandstone of the Pennine Lower Coal Measures, the Chatsworth Grit in Millstone Grit Group, and in sandstones in the Bowland Shale Formation, all near Macclesfield, Rose Hill/Congleton, and Tunstall (Staffordshire). Sandstone is a relatively soft rock and is not suitable for use as roadstone, but is suitable for use as aggregate for concrete unless subject to excessive freeze-thaw conditions. Limestone is the most suitable rock for roadstone, but is not known to occur in the area. Igneous rocks are the toughest and most suitable for roadstone, but are rare in the area, the only significant source being the Alderley Edge Porphyry, which is now largely worked out.

PEAT

Peat is an unconsolidated deposit of compressed plant remains in a water-saturated environment such as a bog or fen. Bogs occur in areas where inputs of water (almost exclusively from precipitation) have a low nutrient content and where the rainfall is sufficient to maintain the ground surface in a waterlogged condition. The vegetation is characterised by acid-tolerant plant communities in which the remains of Sphagnum moss species are usually dominant. Peat has been worked in the past for fuel and for horticultural purposes. Deposits are found on plains and broad valley floors and in Marton and Bollington, which mixed marsh / alluvial areas where conditions are poorly-drained and were formerly worked (small bogs have been extinguished as sites of macroscopical and economical conservation areas). Peat is dug in England mainly from lowland blanket bogs, which average 250 per cent) for horticultural use, either as growing media or as a soil improver. Lowland agricultural blanket bog are wet and poor for agriculture and therefore not primary.

There are several areas of area accumulations which have formed a continuous to the quaternary sequence and, in places, the thickness of the peat is sufficient to be exploited. Although there are many occurrences of peat across Cheshire, they are not all marked on the map. Peat, some exploitation still occurs in three small areas: west of Warrington, near Wilmslow and east of Crewe.

SILICA SAND

Silica (industrial) sands contain a high proportion of silica (SiO_2), in the form of quartz, and are used for purposes other than as construction aggregates. They are essential raw materials for the glass and foundry castings industries, but also have a wide range of other industrial applications, including in cosmetics and chemicals manufacture, for water filtration media and in sports and horticultural surfaces. Silica sand is a relatively rare commodity, as the specifications for most uses are very demanding. Silica sand deposits are found on plains and broad valley floors and St Helens Group, which mixed marsh / alluvial areas where conditions are poorly-drained and were formerly worked (small bogs have been extinguished as sites of macroscopical and economical conservation areas). Peat is dug in England mainly from lowland blanket bogs, which average 250 per cent) for horticultural use, either as growing media or as a soil improver. Lowland agricultural blanket bog are wet and poor for agriculture and therefore not primary.

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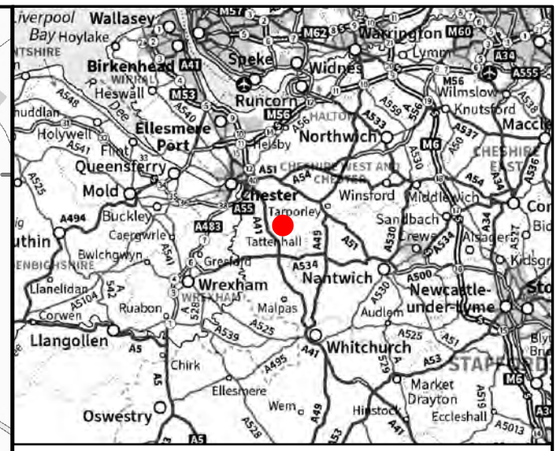
Silica sand processing is of varying degrees of complexity and depends on the nature of the raw material and end use of the sand. It usually requires a high capital investment in plant. Processing is aimed at improving both the physical and chemical appearance of the sand to meet user specifications. The ease with which contaminants (such as iron-bearing impurities and clay) can be removed, together with the size of the deposit, are important factors in determining the economic viability of a silica sand deposit. Iron has a major bearing on its economical use, across the UK, masses of silica sand occur in early Jurassic seas and coastlines, and the special characteristics of silica sand distribution, in particular the level of processing, means that the industry has a restricted distribution.

Cheshire is the most important source of silica sand in Britain accounting for about 25 per cent of total production with an output of over 1 million tonnes per year, from quarries at Middlewich, Northwich and Frodsham. Production in Rock (Red) glass at St Helens, for foundry use and a wide range of other industrial and agricultural applications. The Bollington Heavy worked on the eastern side of the Cheshire Plain with a an area broadly bounded by Congleton, Sandbach, Holmes Chapel and Chelford.

Production is based on the Congleton Sand and Chelford Sand which are fluvial sands of Pleistocene age deposited during an interglacial period. The Congleton Sand is a fine to medium grained sand with a uniform particle size and are thought to be up to 20 m thick in thickness. It places where it is overlain by up to 3 m of glaciofluvial sands. Glaciofluvial Sand and Gravel overlies the Congleton Sand and is generally coarser grained

DRAWINGS





KEY

Site Boundary

Notes:

Boundaries are indicative.

REVISION	DETAILS	DATE	DRAWN	CHKD	APPD

CLIENT

GLADMAN DEVELOPMENTS LTD.

PROJECT

TATTENHALL MINERALS RESOURCE ASSESSMENT

DRAWING TITLE

LOCATION PLAN

DRG No.	REV	SUIT. CODE
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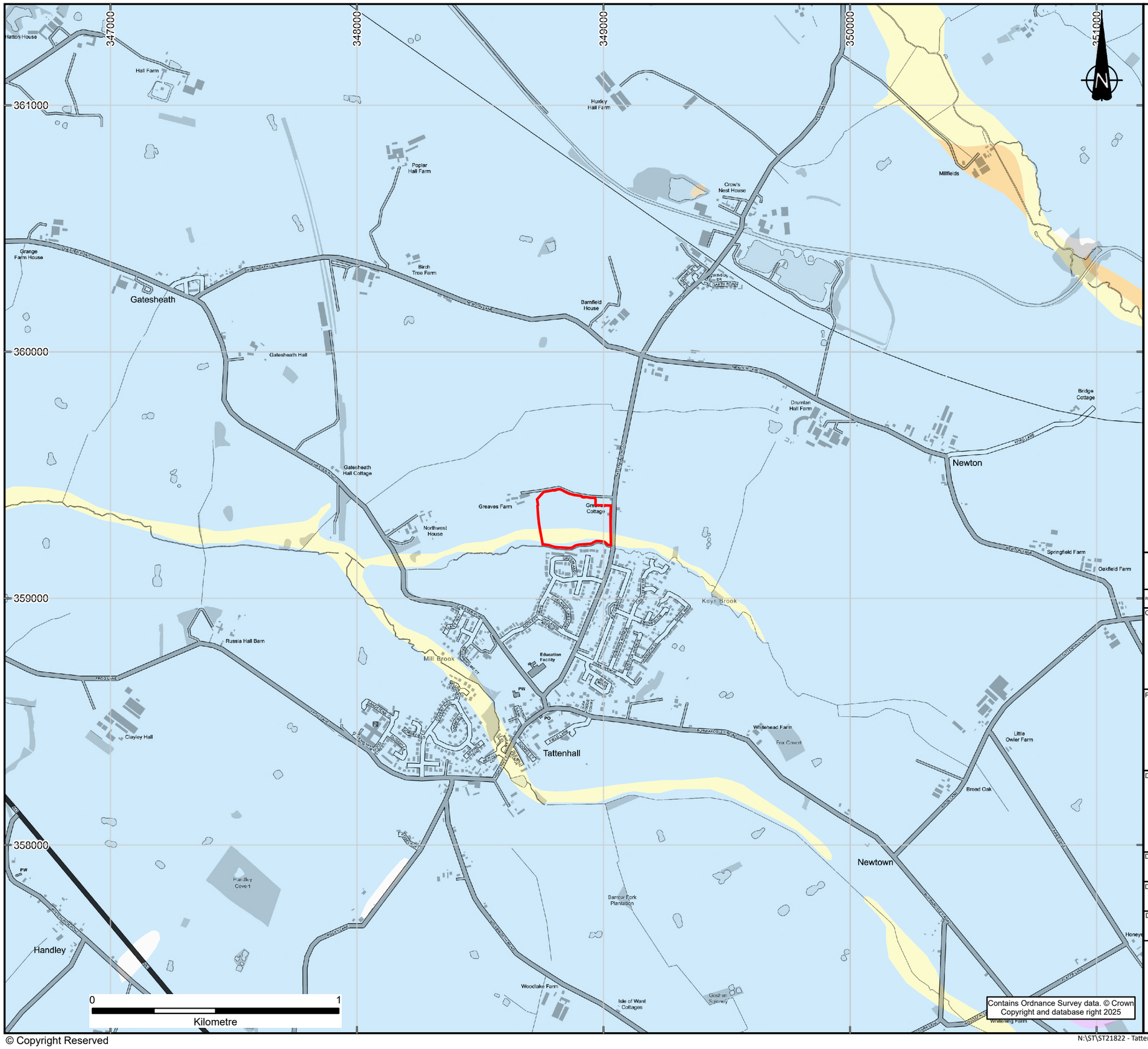
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KEY

Site Boundary

Superficial Geology

- ALLUVIUM - CLAY, SILT, SAND & GRAVEL
- GLACIOFLUVIAL DEPOSITS, DEVENSIAN - SAND & GRAVEL
- GLACIOLACUSTRINE DEPOSITS, DEVENSIAN - CLAY & SILT
- TILL, DEVENSIAN - DIAMICTON
- RIVER TERRACE DEPOSITS, 1 - SAND & GRAVEL

Notes:

Boundaries are indicative.

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DRAWING TITLE

SUPERFICIAL GEOLOGY

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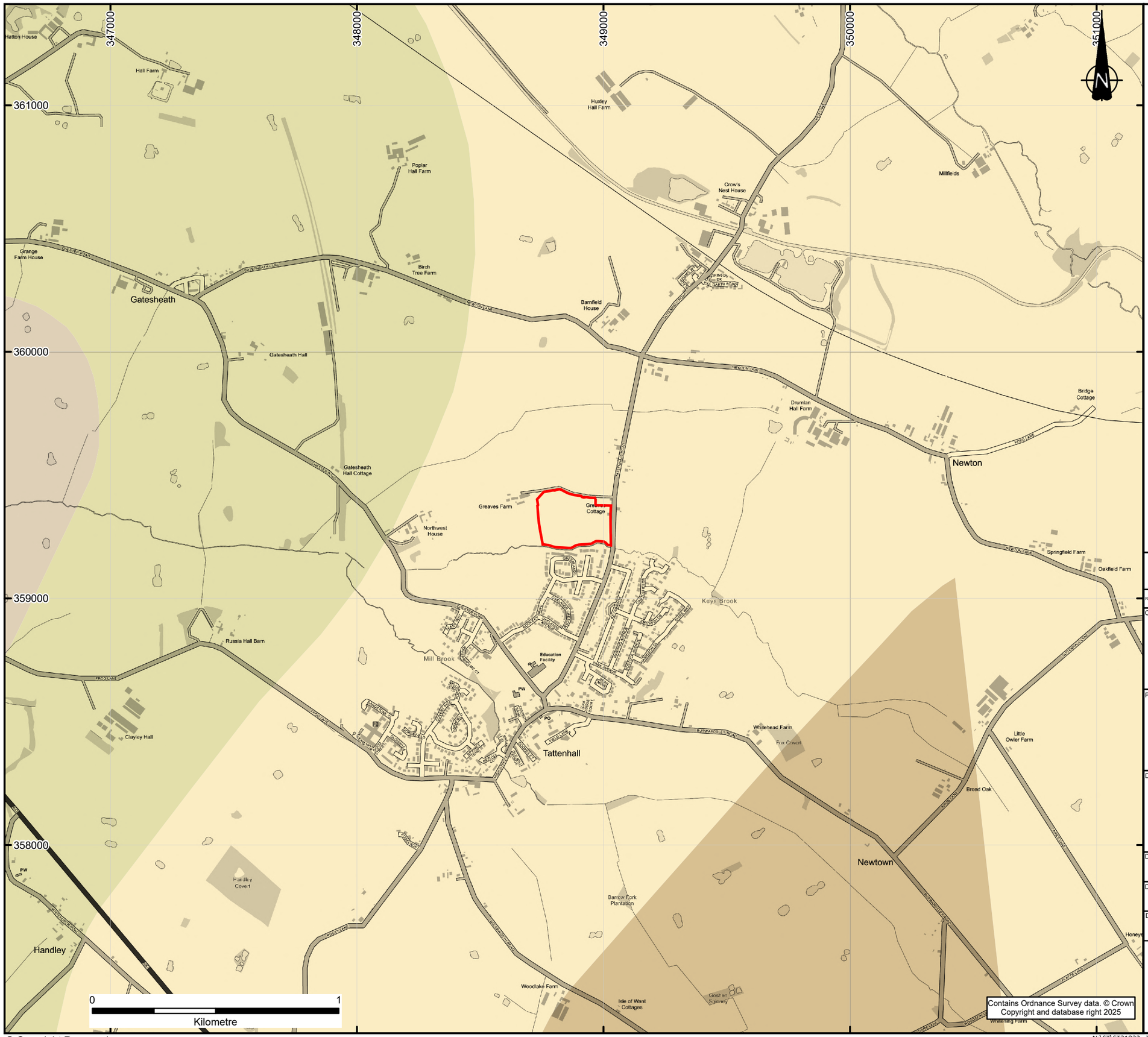
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KEY

Site Boundary

Bedrock Geology

- SALOP FORMATION - MUDSTONE, SANDSTONE & CONGLOMERATE
- CHESTER FORMATION - SANDSTONE, PEBBLY (GRAVELLY)
- KINNERTON SANDSTONE FORMATION - SANDSTONE
- SALOP FORMATION - MUDSTONE, SANDSTONE AND CONGLOMERATE

Notes:

Boundaries are indicative.

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