Wendover Cricket Club
Proposed Development of
New Ground on Upper Icknield Way

Flood Risk Assessment
& SUDS Statement

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Agripower
Contractors Est. 1964

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Agripower Contractors Est. 1964

Contents

1 BACKGROUND & SCOPE OF APPRAISAL

This statement & assessment has been prepared in connection with the full planning application for the relocation of Wendover Cricket Club, Ellesborough Road; Wendover, HP22 6EL which will be lost as a result of the construction of the HS2 route from London to Birmingham. The relocation includes the construction of a cricket pitch, car parking, access road and a cricket pavilion.

Flooding is a major issue in the United Kingdom. The impacts can be devastating in terms of the cost of repairs, replacement of damaged property & loss of business. The objectives of the Flood Risk Assessment (FRA) are therefore to establish the following:

- Whether a proposed development is likely to be affected by current or future flooding from any source stop.
- whether the development will increase flood risk elsewhere within the flood plain.
- whether the measures proposed to address these effects and risks are appropriate
- whether the site will pass part be of the exception test (where applicable)

Agripower Limited have been commissioned by Wendover Cricket Club to prepare a flood risk assessment for the proposed development of their new club ground on Upper Icknield Way, Wendover.

This appraisal has been undertaken in accordance with the requirements of the national planning policy framework (2019) and the national planning practise guidance suite (March 2014) that has been published by the department for communities and local government.

2 DEVELOPMENT DESCRIPTION & PLANNING CONTEXT

2.1 Site Location

The site is located at OS co-ordinates E 487500, N208925, 130m AOD (approximate centre) and covers an area of 2.96 hectares. The location of the site in relation to the surrounding area his shown in figure 1.

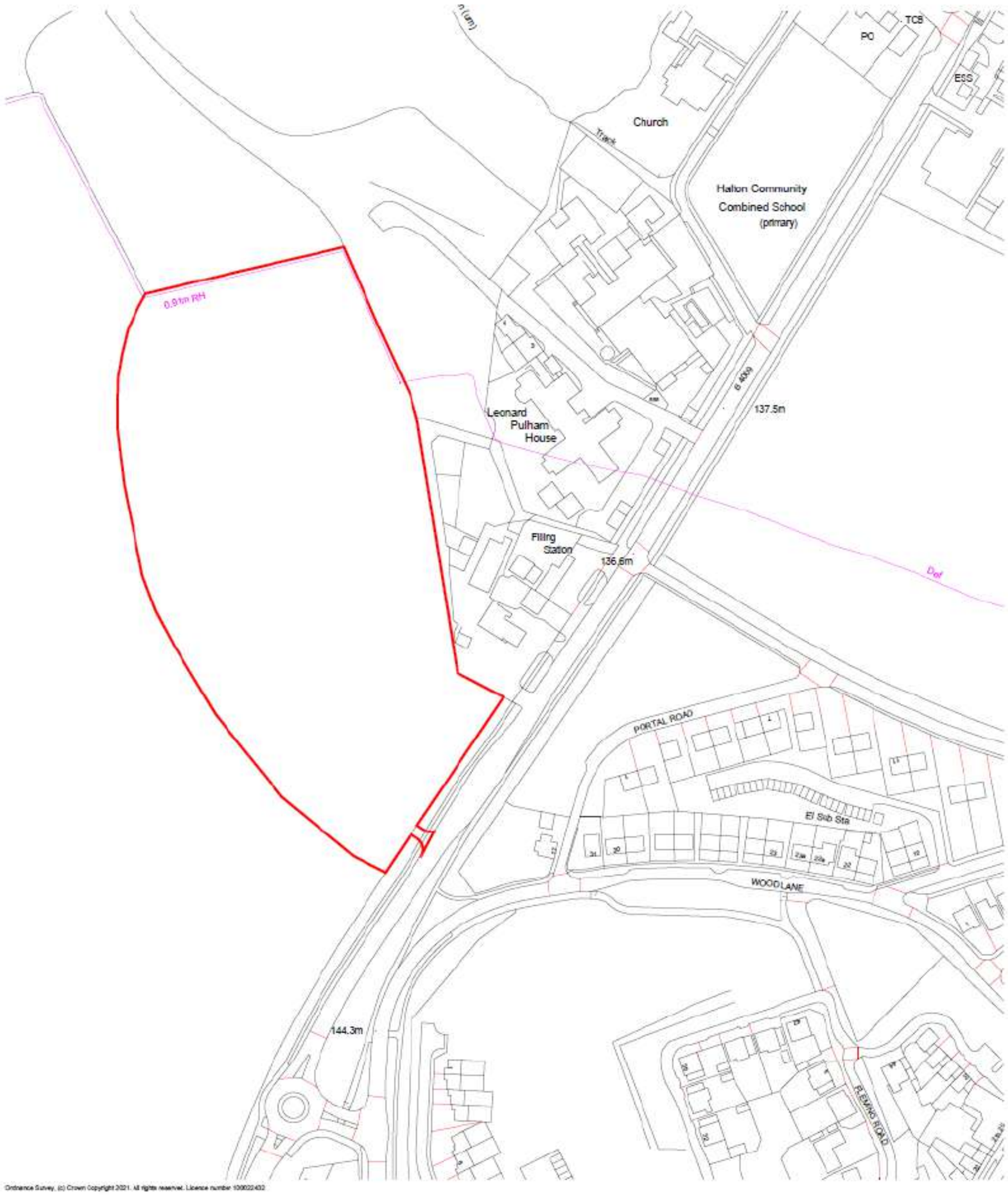


Figure 1 - Location map (contains Ordnance Survey Data © Crown copyright and database right 2021)

2.2 Proposed Development

The proposals for development comprise the construction of a new cricket ground associated sporting facilities together with new clubhouse and car parking.

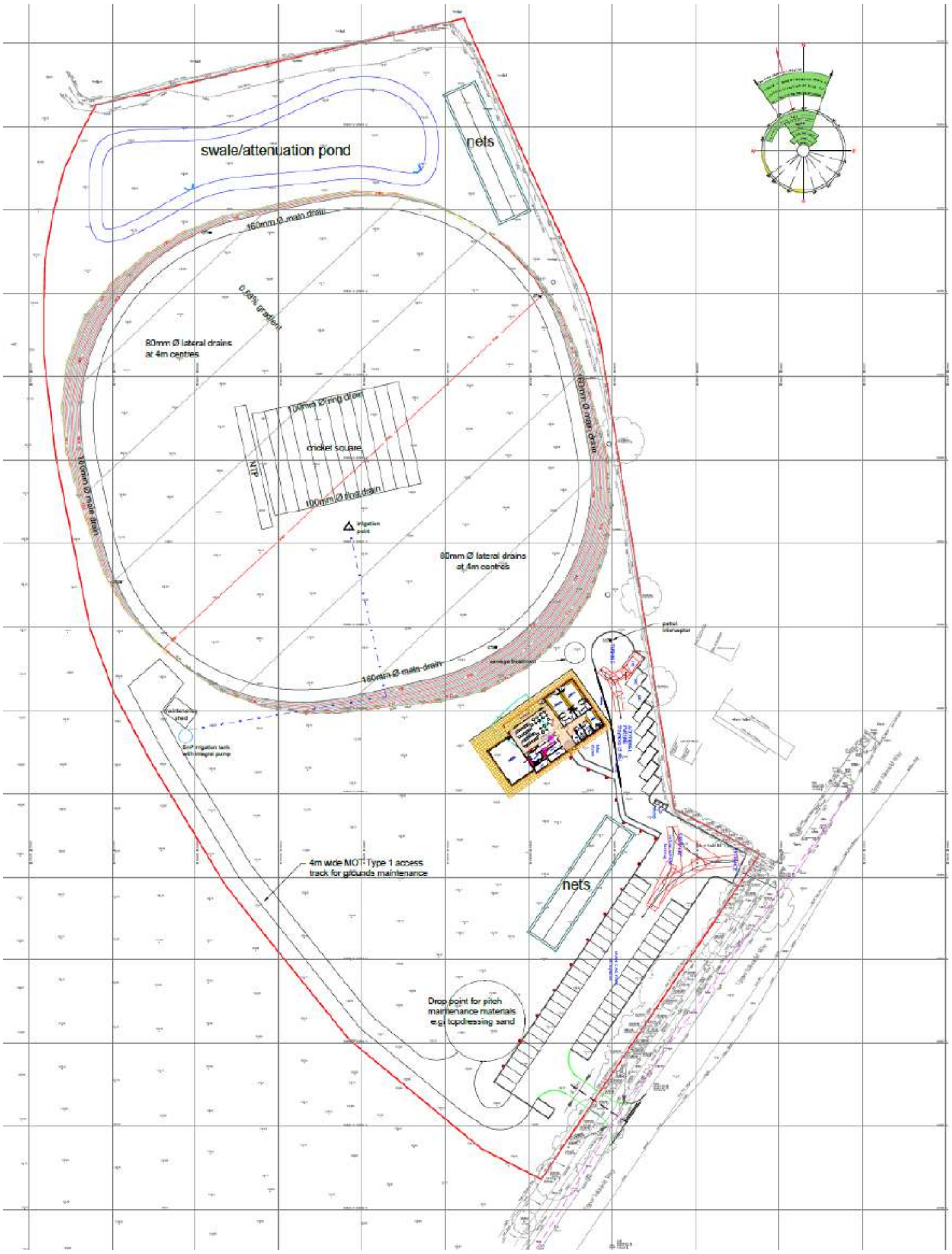


Figure 2 - Proposed Site Layout

2.3 The Sequential Test

Local planning authorities are encouraged to take a risk-based approach to proposals for development in or affecting flood risk areas through the application of the sequential test. The objectives of this test are to steer new development away from higher risk areas towards those areas at low risk of flooding. However, in some locations where developable land is in short supply there can be an overriding need to build in areas that are at risk of flooding. In such circumstances, the application of the sequential test is used to ensure that the lower risk sites developed before the higher risk ones.

The National Planning Policy Framework (NPPF) requires the sequential test to be applied at all stages of the planning process and generally the starting point is the Environment Agency's 'Flood Map for Planning' (Figure 3). These maps and the associated information are intended for guidance and cannot provide details for individual properties. They do not take into account other considerations such as existing flood defences, alternative flooding mechanisms and detailed site based surveys. They do, however, provide high level information on the type and likelihood of flood risk in any particular area of the country. The flood sounds are classified as follows:

Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site.

Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Figure 3 - EA's 'Flood Map for Planning' (© Environment Agency)

Figure 3 shows that the development site is located within flood zone 1 and therefore is deemed to have less than 1 in 1000 annual probability of river or sea flooding.

3 DEFINITION OF FLOOD HAZARD

3.1 Site Specific Information

Information from a number of sources has been referenced to appraise the true risk of flooding at this location. This section summarises the additional information collected as part of this FRA.

Site specific topographic surveys - a topographic survey has been undertaken for the site and a copy of this is included in the appendix. From the survey it can be seen that the site (currently an arable field), slopes away from the Upper Icknield Way. The boundary with the road is a distance of approximately 100m. The road level at the higher end is approximately 142m AOD and 138.52m AOD at the lower end. The existing footpath and verge are approximately 250mm higher than the road at either end. There is a natural landfall (bank) into the field with a level change of 1-1.13m for the majority, which reduces to nothing in the last 20m.

Within the site itself the land falls to the northwest with a slope of 8% (1 in 12) over the first 100m to a natural slope break where the gradient shallows to 2% (1 in 50) for the remainder. The lowest recorded level on the site is 127.18m AOD.

General mapping of the area shows that to the north of the site is Rowborough Copse, Wendover Heights Veterinarian Surgery to the east, Upper Icknield Way to the south and agricultural ground to the west which is bordered by the Grand Union Canal some 500m away.

Geology – Reference to the British Geological Society (BGS) map shows that the underlying solid geology in the location of the subject site is West Melbury Marky Chalk formation and Zig Zag Chalk Formation. The overlying superficial comprises stiff to very stiff / medium dense to dense light grey CHALK MARL, comprised of clayey silty gravel, gravel is fine to coarse weakly cemented clayey silt, with occasional cobbles of clayey silt.

Historic Flooding – No information on historic flooding in this area has been provided or revealed through desktop studies.

3.4 Sources of potential flooding

The main sources of flooding have been assessed as part of this appraisal. The specific issues relating to each one and its impact on this development are discussed below. Table three at the end of this section summarises the risks associated with each of the sources of flooding.

Flooding from Rivers - as already indicated the site lies within flood zone 1 and therefore is not at risk from river flooding.

Flooding from the Sea - not applicable.

Flooding from Surface Water - surface water, or over land flooding typically occurs in natural valley bottoms as normally dry areas become covered in flowing water and in low spots where water made pond. This mechanism of flooding can occur almost anywhere, but is likely to be of particular concern in any top of graphical low spot, or where the pathway for run off is restricted by terrain or man-made obstructions.

The EA's flood risk from surface water map (Figure 4) shows the development site is located in an area classified as having a low to very low risk of surface water flooding. This is supported by the absence of historic records of flooding from this source in this location. It is there for that considered that the risk of flooding from this source is a low.

The definition of low probability of flooding is that the extent of surface water flooding has between a 1% (1 in 100) and 0.1% (1 in 1000) chance of happening each year. It should be noted that the area within the development site showing as low probability is covered by the sports pitch itself which will undergo ground modification to adjust levels suitable for play and therefore this would reduce the effect of surface water flooding too very low.

Figure 4 - EA's Flood Risk from Surface Water Map (© Environment Agency)

Flooding from Groundwater - water levels below the ground rise during wet winter months and fall again in the summer as water flows out into rivers. In very wet winters, rising water levels may lead to the flooding of normally dry land as well as reactivating flow in bournes (streams at only flow for part of the year).

The underlying geology in this area refer to section 3.1 is typically impermeable and therefore cannot be associated with groundwater flooding.

Flooding from Sewers - in urban areas, red water is typically drained into surface water sewers or sewers containing both surface and waste water known as combined sewers. Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked, or has inadequate capacity; this will continue until the water drains away.

Information on sewer assets has been obtained from Thames Water, see figure 5 below. From this plan we can see that there are no sewers, which if surcharged which has an impact on the proposed development site.

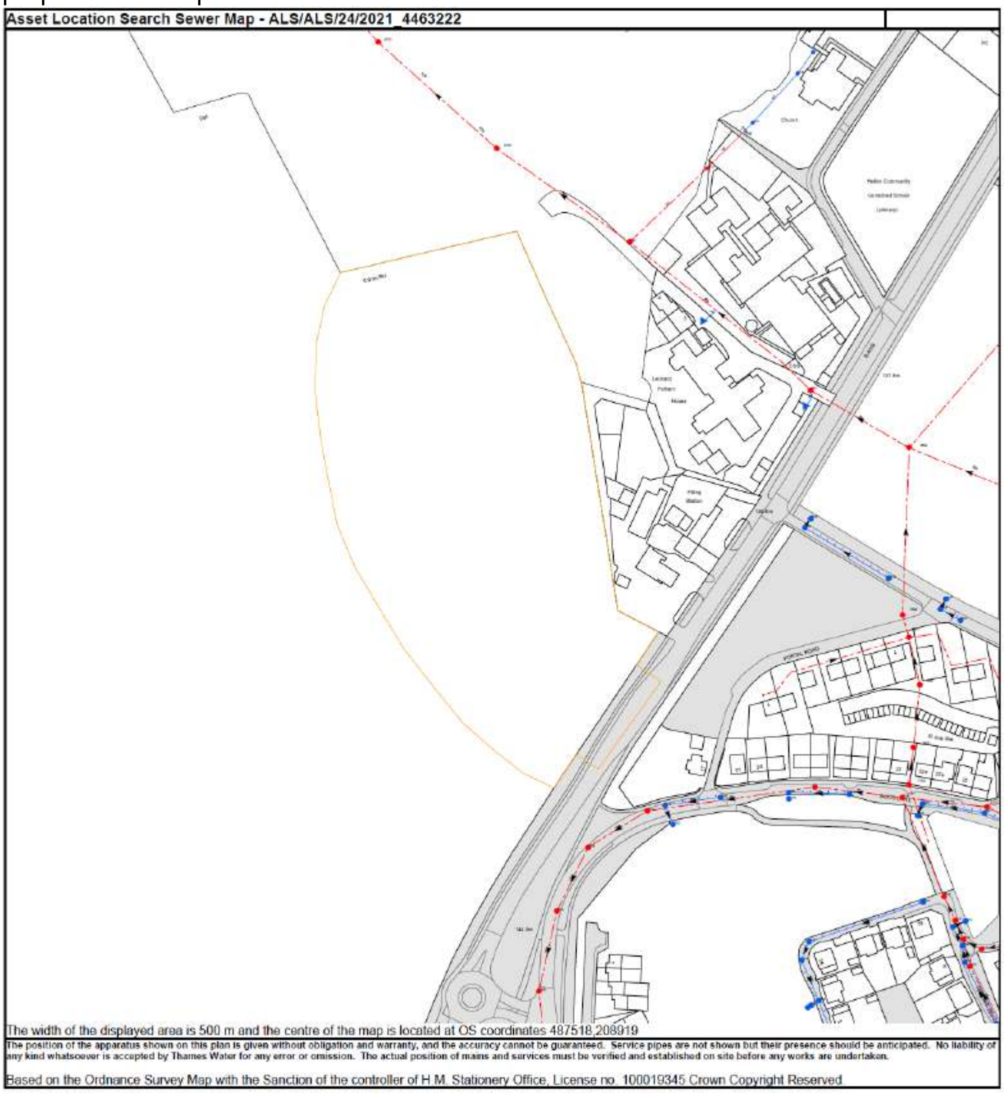


Figure 5 - Thames Water Sewer Map

Flooding from reservoirs, canals and other artificial sources – non-natural artificial sources of flooding can include reservoirs, canals, and lakes where water is retained above natural ground level. In addition, operational and redundant industrial processes including mining, quarrying, sand and gravel extraction may also increase the depth of flood water in areas adjacent to these features.

the potential effects of flood risk management infrastructure and other structures also needs to be considered. For example, reservoir or canal flooding may occur as a result of the facility being overwhelmed and or as a result of dam or bank failure.

The only feature as such nature within close distance to the site is the grand union canal some 500 metres to the west. However, reference to OS mapping indicates that the canal ground level is 5 to 6 metres below that of the different site and therefore causes no risk to the development site even in the outdent event of a severe bank breach.

3.5 Risk Summary

A summary of the overall risk of flooding from each source is provided in the table below.

Source of Flooding	Initial Level of Risk	Appraisal method applied at the initial flood risk assessment stage
Rivers	Low	OS mapping and the EA's flood map for planning
Sea	N/A	OS mapping and the EA's flood map for planning
Surface Water	Low	EA's flood risk from surface water map and historic records
Groundwater	Low	BGS geology mapping
Sewers	Low	Thames Water asset maps
Artificial Sources	Low	OS mapping and aerial height data

4 CLIMATE CHANGE

The global climate is constantly changing, but it is widely recognised that we are now entering a period of accelerating change. Over the last few decades there have been numerous studies into the impact of potential changes in the future and there is now an increasing body of scientific evidence which supports the fact that the global climate is changing as a result of human activity. Past present and future emissions of greenhouse gases are expected to cause significant global climate change during this century.

The nature of climate change at a regional level will very: for the UK, projections of future climate change indicate that more frequent short duration, high intensity rainfall and more frequent periods of long duration rainfall could be expected.

These effects will tend to increase the size of flood zones associated with the rivers, and the amount of flooding experience from other inland sources. The rise in sea level will change the frequency of occurrence of high water levels relative to today's sea levels. It will also increase the extent of the area at risk should sea defences fail. Changes in wave heights due to increase water depths as well as possible changes in the frequency duration and severity of storm events are also predicted.

4.1 Planning Horizon

To ensure that any recommended mitigation measures are sustainable and effective throughout the lifetime of the development, it is necessary to base the appraisal on the extreme flood level that is commensurate with the planning horizon for the proposed development. The NPPF and supporting planning practise guidance suite the state that residential development should be considered for a minimum of 100 years, but that the lifetime of a non-residential development depends on the characteristics of the development. In this circumstance, the proposals are for a sportsground, clubhouse and associated facilities and consequently, whilst the sporting facilities could be assessed for a 30 year lifetime, a precautionary approach has been adopted and the scheme has been assessed for a 100 year lifetime.

4.2 Potential Changes in Climate

Extreme Sea Level
Global sea levels will continue to rise depending on greenhouse gas emissions and the sensitivity of the climate system. The relative sea level rise in England also depends on the local vertical movement to the land which is generally falling in the South East and rising in the north and West.

As a dependant site is not subject to coastal flooding this element is deemed to be not applicable.

5 OFFSITE IMPACTS & OTHER CONSIDERATIONS

5.1 Displacement of Floodwater

Construction within the flood plain has the potential to displace water and increase the risk elsewhere by raising flood levels. A compensatory flood storage scheme can be used to mitigate this impact, ensuring the volume of water displaced is minimised.

The proposed development has been shown to remain and affected and the design flood condition and is not at significant risk of flooding from any source consequently, the development will not displace flood water and compensatory storage flood storage will not be necessary.

5.2 Public Safety & Access

The NPPF states that safe access and escape should be available to and from new developments located within areas at risk of flooding. The practice guide goes on to state that access routes should enable occupants to safely access and exit their dwellings during design flood conditions that her killer access should be available to allow the emergency services to safely reach the development.

The risk of flooding from all sources has been shown to below. Consequently, safe access and egress to and from the site can be achieved on both foot and by vehicle.

6 FLOOD MITIGATION MEASURES & SuDS

The key objectives of flood risk mitigation are:

- To reduce the risk of the development being flooded.
- To ensure continued operation and safety during flood events.
- To ensure that the flood risk downstream of the site is not increased by increase run off.
- To ensure that the development does not have an adverse impact on flood risk elsewhere.

The following section of this report examines ways in which the risk of flooding at the development site can be mitigated.

In terms both the site being at risk from external sources the area of proposed event has been shown to be at low risk of flooding from all sources and therefore mitigation is not considered necessary.

6.1 Current Downstream Flow of Surface Water – Rural Runoff

The development site has previously discussed measures 2.96 hectares. Using Microdrainage software an assessment has been made of the site using the ICP SUDS rural run off calculator and this has determined that the current rural run off rate for the one year event, QBAR Rural is 12.6 litres per second. The calculation is shown in the appendix.

6.2 Sustainable Drainage Systems (SuDS)

The use of sustainable drainage systems to reduce the impact of development on the natural water environment has become increasingly common over the past decade, in response to government guidance and the proactive approach of regulatory agencies such as the Environment Agency (EA) and the National Planning Policy Framework. Limited discharge consents for surface water outfalls are now routinely applied to development sites across the UK and the rate of water leaving development sites is controlled using storage techniques such as ponds, tanks and pervious pavements. The volume of water is also reduced by using infiltration techniques such as soakaways, where ground conditions permit.

6.3 Design Parameters

FSR Data

Return Period	100 years
M5 – 60 (mm)	20
Rainfall ratio	0.406
Climate change factor	40%
Infiltration Rate	0.021 m/hr (5.88 x 10^{-6} m/s)
Peak discharge allowance	12.6 l/s
Catchment area cricket field	11,926m²
Catchment	2,418m²

Please refer to the iGeo Ground Investigation Report in the Appendix which gives details of the soakage test and trial pit log.

6.4 Outline Design

The proposal is based on the construction of an attenuation basin at the northern end of the site which has a top of bank area of 1,777m² and a maximum depth of 1m. The cricket pitch will have a land drainage scheme installed comprising 160 mm perforated main drains to which junction and 80 mil lateral land drains at 4 metre centres. this land drainage scheme will discharge directly to the attenuation basin.

Drainage from the car park will be collected by a series of gullies which will flow through a petrol interceptor and from there again discharge directly to the attenuation basin.

Similarly, rainfall collected on the new Sports Club roof and surrounded paving will discharge to the attenuation basin.

The remaining areas of the development will effectively remain unchanged and therefore any surface water flow will discharge across ground as is the case currently.

6.5 Results

The design is tested using microdrainage software. The results as this analysis can be seen in the appendix from which you will note that the cricket field and hard surfacing areas we're treated as two separate entities. From each test and output hydrograph was calculated at each hydrograph was tested against the attenuation basin design.

Storm events for both winter and summer run from generations of 30 minutes to 10,080 minutes and the critical event is highlighted in red. For discharge from hard surface areas, this is the 1,440 minute winter event and the discharge from the cricket outfield this is the 960 minute winter event.

The maximum water depth are respectively 340 mm and 475 mm giving a combined maximum water level in the basin of 815 mm.

The half drain time he seemed to be 1283 minutes for the hard surface areas add 934 minutes for the cricket outfield this satisfies the requirement of 50% drain down within 24 hours.

7 CONCLUSION

The overarching objective of this report is to appraise the risk of flooding at the proposed new sportsground development Wendover Cricket Club to ensure that the proposals for development are acceptable and that any risk of flooding is appropriately mitigated. In addition, the NPPF also requires the risk of flooding off site to be managed to prevent any increase in flood risk as a result of the development proposals.

An assessment of the risk of flooding has identified that the development is at low risk of flooding from all sources. Further to this, it has been demonstrated that the development will not increase the flooding to the surrounding area and in fact will reduce the amount of flow to the adjoining arable field.

In conclusion, the development will therefore meet the requirements of the NPPF.

8 APPENDIX

Environment Agency

Flood map for planning

Your reference	Location (easting/northing)	Created
Wendover CC	**487515/208928**	**9 Sep 2021 10:53**

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

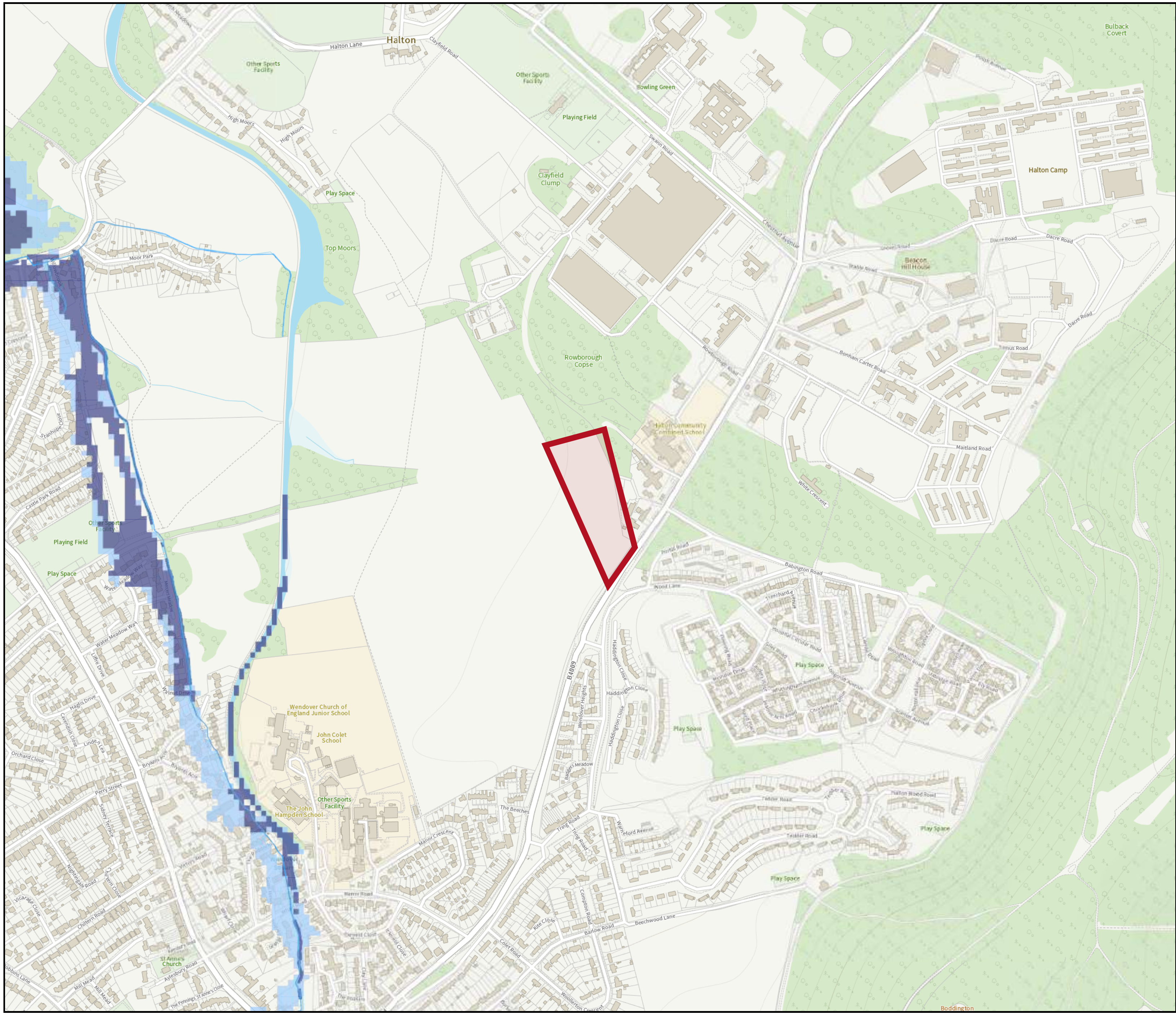
- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn’t include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Environment Agency



Flood map for planning

Your reference
Wendover CC

Location (easting/northing)
487515/208928

Scale
1:10000

Created
9 Sep 2021 10:53

Selected area

Flood zone 3

Flood zone 3: areas benefitting from flood defences

Flood zone 2

Flood zone 1

Flood defence

Main river

Flood storage area

0 100 200 300m

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Our Ref: iGeo-21-111A – BRE365 Soakage Test Report 22 June, 2021

SITE: WENDOVER CRICKET CLUB, UPPER ICKNIELD WAY, WENDOVER, HP22 5PN

Introduction
iGeo Ltd were asked to attend site on behalf of *Agripower Limited* of Great Missenden, in order to carry out a BRE DG365 soakage test at the proposed location an infiltration basin or soakaway for the proposed new cricket pitches.

The ground on the site was observed to gently sloping down in a north-north-westerly direction, with the proposed infiltration basin or soakaway in the lowest part of the cricket club's land.

The British Geological Survey sheet for the area shows the anticipated geology to be the *West Melbury Marly Chalk Formation* (Lower Chalk). Approximately 1km to the northwest the underlying *Gault & Upper Greensand Formation* is present, indicating that the *West Melbury Chalk* might not be too thick. It is not uncommon for superficial deposits to cap the chalk, even if not shown on the geological mapping. Approximately 350m to the south and also to the east the *Melbourn Rock Member* is shown to be present, therefore could also reasonably be expected to be present depending upon the accuracy of the geological mapping. The geological maps are included in the appendices.

Ground Investigation
An engineer from iGeo Ltd attended site on 14th June 2021. A single trial pit (SA1) was excavated at the location of the proposed infiltration basin or soakaway using an 8-tonne excavator with a toothed bucket. The target depth was ~2.5m, however the chalk was found to be too dense to progress beyond 1.9m deep.

The trial pits were logged and sampled from in accordance with BS5930:2019 from the surface. The trial pit log and location plan are included in the appendices.

The trial pit encountered a stiff (medium dense), becoming very stiff (dense) light grey chalk marl, comprised of clayey silty gravel, the gravel is fine to coarse weakly cemented clayey silt, with occasional cobbles of clayey silt. It is considered this material is of the *West Melbury Marly Chalk Formation*, although it could be indicative of the nearby *Melbourn Rock Member.* The pit was dry and stable at the maximum depth achievable (1.9m).

The tests were carried out to BRE DG365 (2016) *'Soakaway Design'*. However, as the *West Melbury Marly Chalk* can contain a clay content, this may reduce its infiltration potential. Due to the importance of adhering to BRE365, including carrying out three fills of the pit, without extrapolated values, also the need to maintain a safe test pit during the monitoring period, with the requirement for accurate results, the 'stone filled' method was adopted.

After the pit was logged and measured, a screened and perforated standpipe was installed vertically into the pit for monitoring purpose. The trial pit was then backfilled to the surface with a single sized 20mm stone (laboratory testing confirmed 42.1% voids).

An electronic datalogger was then secured in the standpipe before the pit was filled with water to approximately 0.8m from the the surface. The data logged values were compensated for changes in atmospheric pressure using an onsite *barotroll*. Water levels where then electronically recorded over a period of time.

A second fill of the trial pit was carried out on the 15th June 2021 after the water had fully drained away, with the third fill being carried out on the 16th June. The dataloggers were collected on the 17th June.

BRE DG365 (2016) *'Soakaway Design'* Test Results
The datalogger values of SA1 are attached in the appendices showing the continuous monitoring, also selected values extracted from to calculate the BRE365 soil infiltration rates.

The following soil infiltration rates were calculated:

First fill	4.228×10^{-6} m/s
Second fill	5.401×10^{-6} m/s
Third fill	5.880×10^{-6} m/s

Unusually, the infiltration was faster with subsequent fills of the soakage pit. It is considered that this is due smearing of the excavation sides whist being dug and/or washing out of fines between the marl gravels and cobbles.

As further infiltration is likely to result in faster outflow, it is recommended that the result from the third fill (5.880×10^{-6} m/s) is used for infiltration basin or soakaway sizing.

It should be noted that the dry conditions were present throughout the monitoring period.

Ground Stability Hazards
Due to it being considered possible that there may be an elevated risk of dissolution features being present on the site due to the chalk formation, a *Mining and Natural Cavities Database* search and mapping was obtained for the site to further risk assess the potential for Ground Dissolution Features to be present (see the appendices).

The database concluded there was 'no hazard potential' of *ground dissolution*, *compressible ground*, *running sand*, or *shrinking/swelling clay* on site. A 'very low hazard potential' was listed for *collapsible ground*. It should be noted that the hazard potential for *ground dissolution* increases to 'very low' 159m to the south-east. Also, some parts of the chalk marl can contain a high enough clay content to render the materials potentially shrinkable.

The database records a 'rare' risk of non-coal mining in the area. It also does not show any records of natural cavities within 1,000m of the site, however being a rural area, this is not surprising.

It is important to note that these hazard potential areas are computer generated mapping, therefore a site-specific geo-hazard report may designate the potential or risk to be higher or lower.

Although the *Envirocheck* risk / hazard potentials above are either ‘very low’ or ‘no hazard potential’, the risks should not be completely dismissed. For further advice a specialist geo-hazards consultant should be contacted.

Yours sincerely

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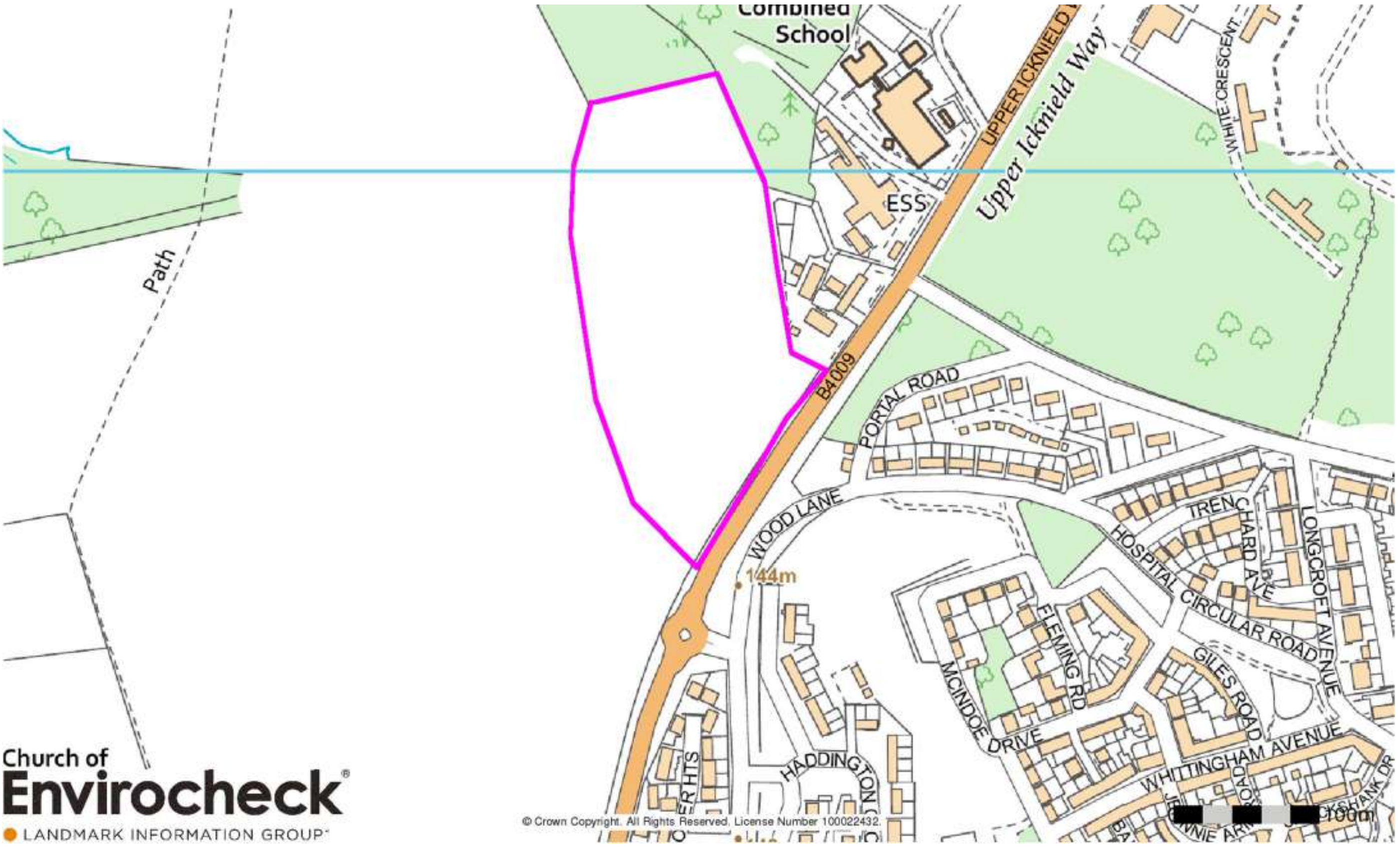
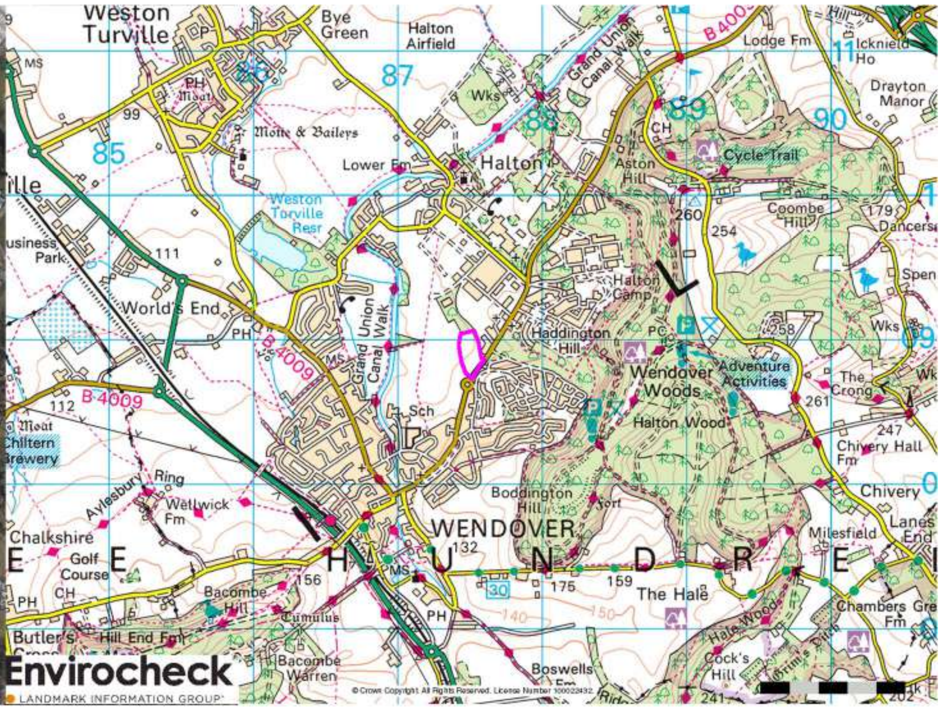
PAGE: 1	iGeo-21-111	SITE LOCATION
DATE:22.06.21	Wendover Cricket Club, Wendover	





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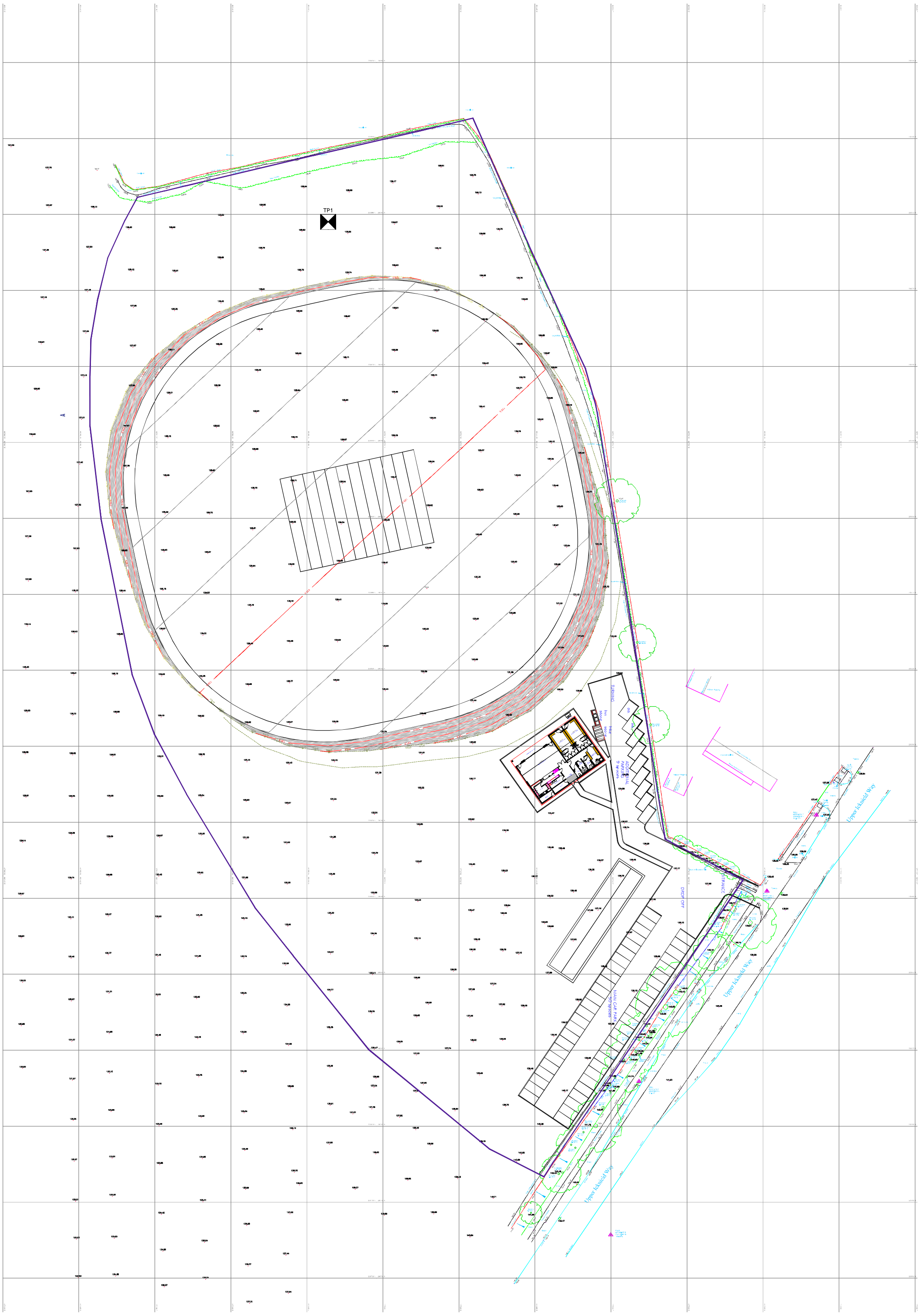
DATE:22.06.21	Wendover Cricket Club, Wendover	



rev	detail	by	date	project title	drawing no.	client
				Wendover Cricket Club Relocation Scheme	21045-01	Wendover Cricket Club

drawing status: planning
revision: -

drawing title: Proposed Layout

date	scale	drawn	checked
22.6.21	1:500 A1	JA	GL

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PAGE: 3

DATE:22.06.21

iGeo-21-111

Wendover Cricket Club, Wendover

TRIALPIT SA1

DESCRIPTION	REDUCED LEVEL m	DEPTH m	LEGEND	SAMPLE TYPE	SAMPLE DEPTH	THICKNESS m	SPT N	REMARKS
		0.00						Stone filled soakage test
Firm grey silty CLAY, with occ fine & medium chalk marl gravel [Topsoil]				D	0.15	0.25		-- 21111/SA1 / 0.1D Trial pit average dimensions: 1.6m long 1.1m wide 1.8m deep
		0.25						
Stiff / medium dense light grey CHALK MARL, comprised of clayey silty gravel, gravel is fine to coarse weakly cemented clayey silt, with occ cobbles of clayey silt [West Melbury Marly Chalk Formation]				D	0.60	0.65		-- 21111/SA1 / 0.6D
		0.90						Very hard digging below 0.9m
Very stiff / dense light grey CHALK MARL, comprised of clayey silty gravel, gravel is fine to coarse moderately well cemented clayey silt, with cobbles of clayey silt [West Melbury Marly Chalk Formation]				D	1.20	1.00		-- 21111/SA1 / 1.2D 50mm standpipe installed on completion (base 1m perforated, geosock & mesh), top section plain pipe) The pit was then backfilled to the surface with a 40mm single sized flint gravel Very little progress by 1.8m with the 8 tonne excavator with a toothed bucket
		1.90						No further progress possible The trial pit was observed to be dry and stable on completion

iGeo Limited

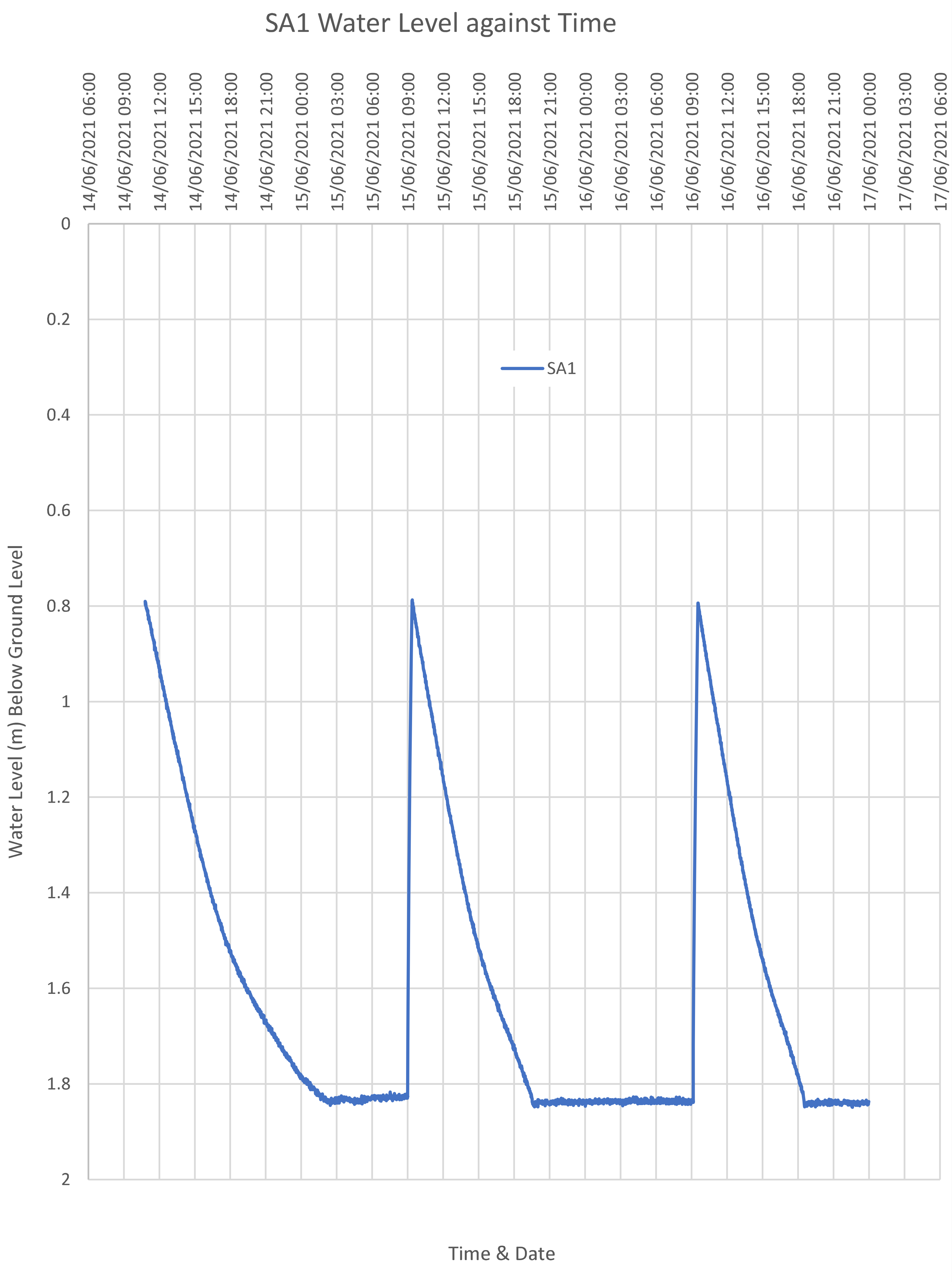
183 Long Lane Tilehurst Reading RG31 6YW

REMARKS: Trial pit formed with an 8 tonne excavator on 14th June 2021

U100=100mm dia. UNDISTURBED SAMPLE | U38=38mm dia. UNDISTURBED SAMPLE | D=SMALL DISTURBED SAMPLE

B=BULK SAMPLE | W=WATER SAMPLE | SPT=STANDARD PENETRATION TEST | CPT=CONE PENETRATION TEST

PAGE: 4	**iGeo-21-111**	**SOAKAGE TEST DATA**
DATE:22.06.21	**Wendover Cricket Club, Wendover**	



iGeo-21-111

Wendover Cricket Club, Wendover

BRE365 CALCULATIONS

Soakaway Design Calculations to BRE365 (DG 365 Revised 2016)

Soakage Test Number SA1

Trial Pit Soakage Test

Soakage Pit Length [m]	1.60
Soakage Pit Width [m]	1.10
Soakage Pit Depth [m]	1.80
TP Test Base (if different) [m]	1.80
Pit Voids [%]	42.1

(100% if an open pit, 30% or measured if stone)

Borehole Soakage Test

Borehole Diameter [m]	
Standpipe Diameter [m]	
Borehole Depth [m]	
BH Test Base (if different) [m]	
Bentonite Seal Depth [m]	
Borehole Surround Voids [%]	

(100% if an open Borehole 30% if stone)

First Fill

Date (dd/mm/yy)	Hours (24hr)	Mins	Elapsed Time	Depth to Water (m)	Collapsing Observed ('C')
14/06/21	10	48	0	0.790	
14/06/21	11	24	36	0.860	
14/06/21	11	59	71	0.930	
14/06/21	12	35	107	0.998	
14/06/21	13	08	140	1.069	
14/06/21	13	50	182	1.141	
14/06/21	14	29	221	1.211	
14/06/21	15	08	260	1.280	
14/06/21	15	48	300	1.349	
14/06/21	16	34	346	1.419	
14/06/21	17	27	399	1.490	
14/06/21	18	34	466	1.562	
14/06/21	20	02	554	1.629	
14/06/21	21	45	657	1.700	
14/06/21	23	30	762	1.770	

Remarks:

Second Fill

Date (dd/mm/yy)	Hours (24hr)	Mins	Elapsed Time	Depth to Water (m)	Collapsing Observed ('C')
15/06/21	09	23	0	0.787	
15/06/21	09	49	26	0.860	
15/06/21	10	19	56	0.931	
15/06/21	10	52	89	1.000	
15/06/21	11	19	116	1.069	
15/06/21	11	52	149	1.141	
15/06/21	12	22	179	1.212	
15/06/21	12	53	210	1.281	
15/06/21	13	27	244	1.352	
15/06/21	14	04	281	1.422	
15/06/21	14	44	321	1.490	
15/06/21	15	32	369	1.561	
15/06/21	16	30	427	1.627	
15/06/21	17	33	490	1.700	
15/06/21	18	39	556	1.769	

Remarks:

Third Fill

Date (dd/mm/yy)	Hours (24hr)	Mins	Elapsed Time	Depth to Water (m)	Collapsing Observed ('C')
16/06/21	09	33	0	0.794	
16/06/21	09	57	24	0.860	
16/06/21	10	25	52	0.930	
16/06/21	10	53	80	1.002	
16/06/21	11	22	109	1.070	
16/06/21	11	49	136	1.139	
16/06/21	12	20	167	1.215	
16/06/21	12	48	195	1.280	
16/06/21	13	20	227	1.353	
16/06/21	13	53	260	1.419	
16/06/21	14	28	295	1.488	
16/06/21	15	12	339	1.557	
16/06/21	15	59	386	1.627	
16/06/21	16	57	444	1.699	
16/06/21	17	49	496	1.770	

Remarks:

First Fill results

Test effective depth [m] 1.01

Vp75 [m] = 1.0425 Tp75 [mins] = 132.56

Vp25 [m] = 1.5475 Tp25 [mins] = 461.32

Soil Infiltration Rate [m/s] = 4.228E-06

Onsite Extrapolation Ratio = 0.6 (over 1 extrapolated)

Second Fill results

Test effective depth [m] 1.01

Vp75 [m] = 1.04 Tp75 [mins] = 104.96

Vp25 [m] = 1.55 Tp25 [mins] = 362.61

Soil Infiltration Rate [m/s] = 5.401E-06

Onsite Extrapolation Ratio = 0.7 (over 1 extrapolated)

Third Fill results

Test effective depth [m] = 1.01

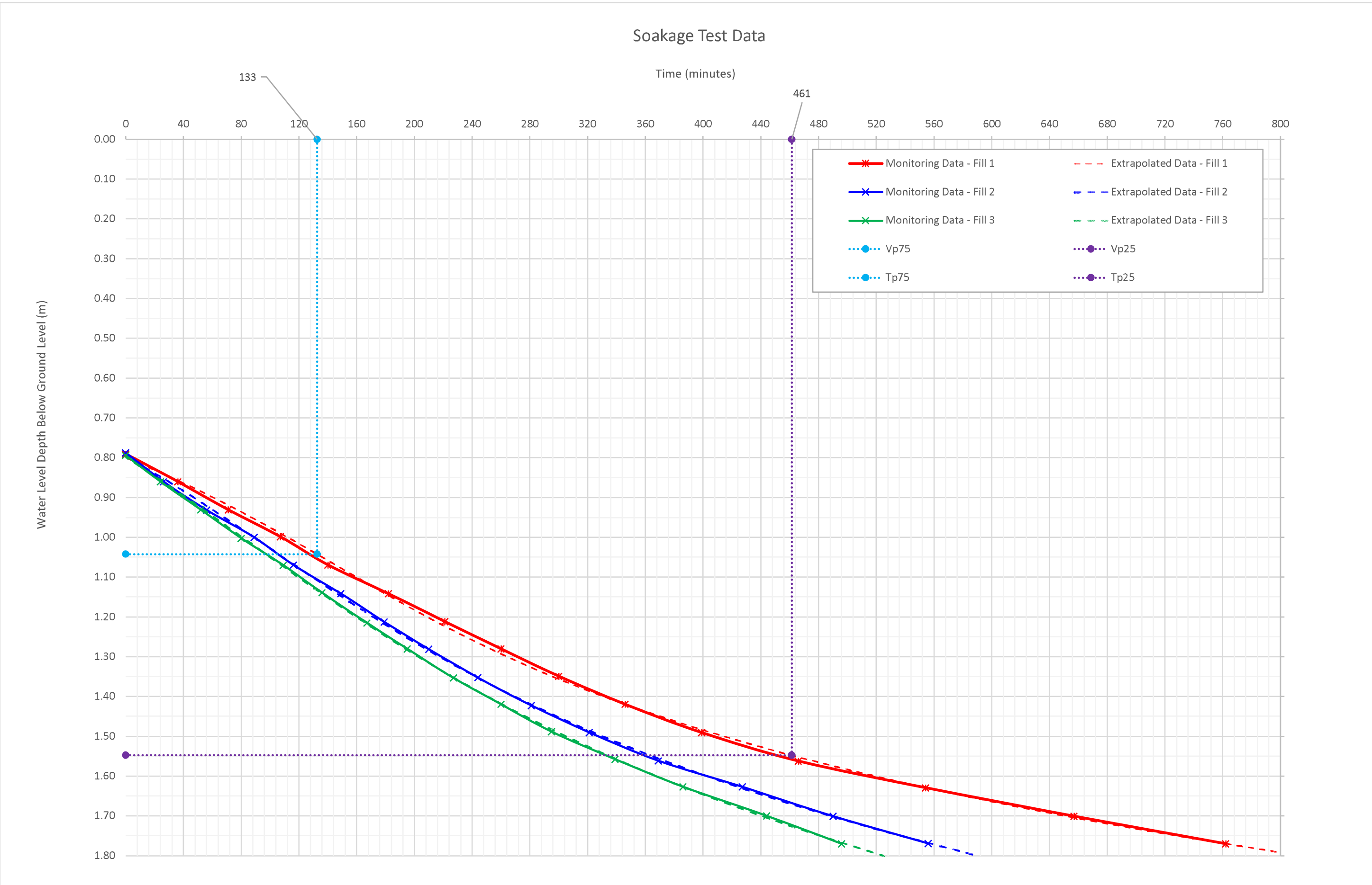
Vp75 [m] = 1.05 Tp75 [mins] = 98.29

Vp25 [m] = 1.55 Tp25 [mins] = 334.29

Soil Infiltration Rate [m/s] = 5.880E-06

Onsite Extrapolation Ratio = 0.7 (over 1 extrapolated)

Slowest Soil Infiltration Rate [m/s] = 4.228E-06

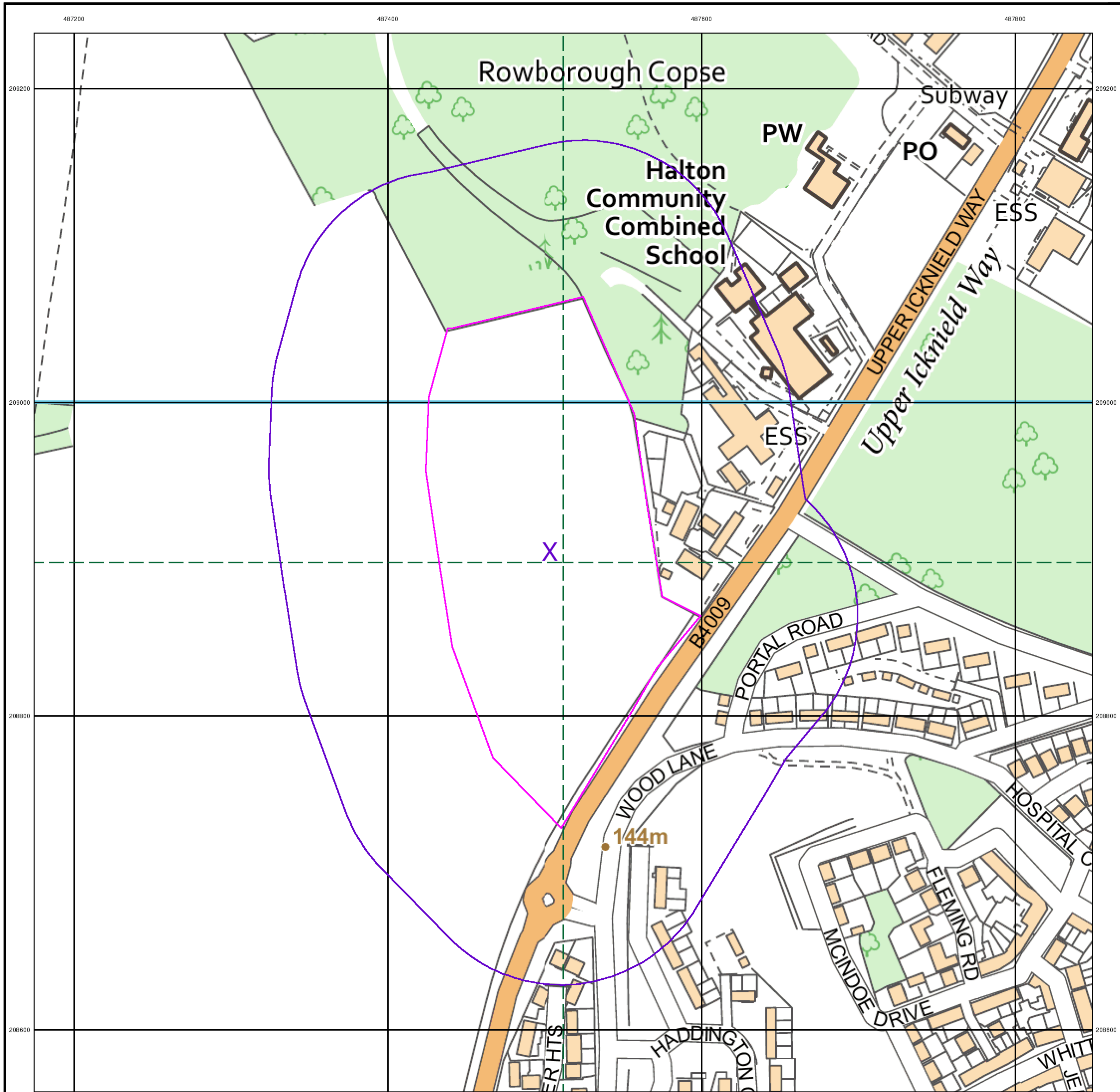


Particle Density and Voids Percentage - Summary of Results

Project No.	Project Name
iGeo-21-111A	Wendover Cricket Club, Icknield Way, Wendover

Hole No.	Sample			Soil Description	Particle Density Mg/m^3	Voids Percentage %	Remarks
	Ref	Top	Type				
SA1		0	B	40mm Single Sized Flint Gravel	2.56	42.10	

	Sheet no	1	Tested by	
All tests performed in accordance with BS1377:1990 unless specified otherwise	Date Printed	22/06/2021	Approved by	



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Historical Land Use Information (1:2,500)

General

Specified Site | Specified Buffer(s) | X Bearing Reference Point | Map ID
Several of Type at Location

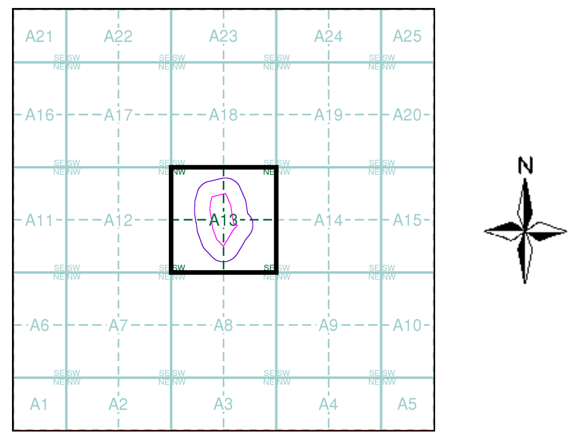
Potentially Contaminative Industrial Uses (Extractive Industries Activity)

	Point	Line	Polygon
Extractive Industries Activity from 1855 - 1909			
Extractive Industries Activity from 1893 - 1915			
Extractive Industries Activity from 1906 - 1937			
Extractive Industries Activity from 1924 - 1949			
Extractive Industries Activity from 1950 - 1980			

Subterranean Features

	Point	Line	Polygon
Subterranean Features			

Mining and Ground Stability - Segment A13



Order Details

Order Number: 280815658_1_1
Customer Ref: iGeo-21-111A
National Grid Reference: 487500, 208910
Slice: A
Site Area (Ha): 3.7
Plot Buffer (m): 100

Site Details

Wendover Cricket Club, Icknield Way, Halton, Wendover, HP22 5PN

Geology 1:50,000 Maps Legends

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	HEAD1	Head, 1	Clay, Silt, Sand and Gravel	Not Supplied - Quaternary
	CWF	Clay-with-flints Formation	Clay, Silt, Sand and Gravel	Not Supplied - MIOCENE

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	CKR	Chalk Rock Member	Chalk	Not Supplied - Turonian
	LESE	Lewes Nodular Chalk Formation and Seaford Chalk Formation (Undifferentiated)	Chalk	Not Supplied - Turonian
	WZCK	West Melbury Marly Chalk Formation and Zig Zag Chalk Formation (Undifferentiated)	Chalk	Not Supplied - Cenomanian
	MR	Melbourn Rock Member	Chalk	Not Supplied - Cenomanian
	HNCK	Holywell Nodular Chalk Formation and New Pit Chalk Formation (Undifferentiated)	Chalk	Not Supplied - Cenomanian
	GUGS	Gault Formation and Upper Greensand Formation (Undifferentiated)	Mudstone, Siltstone and Sandstone	Not Supplied - Albian

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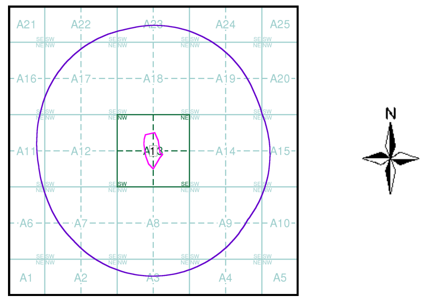
Geology 1:50,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps.
The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:50,000 Maps Coverage

Map ID:	**1**
Map Sheet No:	**238**
Map Name:	**Aylesbury**
Map Date:	**1990**
Bedrock Geology:	**Available**
Superficial Geology:	**Available**
Artificial Geology:	**Not Available**
Faults:	**Not Supplied**
Landslip:	**Not Available**
Rock Segments:	**Not Supplied**

Geology 1:50,000 Maps - Slice A



Order Details:

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Customer Reference:	iGeo-21-111A
National Grid Reference:	487500, 208910
Slice:	A
Site Area (Ha):	3.7
Search Buffer (m):	1000

Site Details:

Wendover Cricket Club, Icknield Way, Halton, Wendover, HP22 5PN

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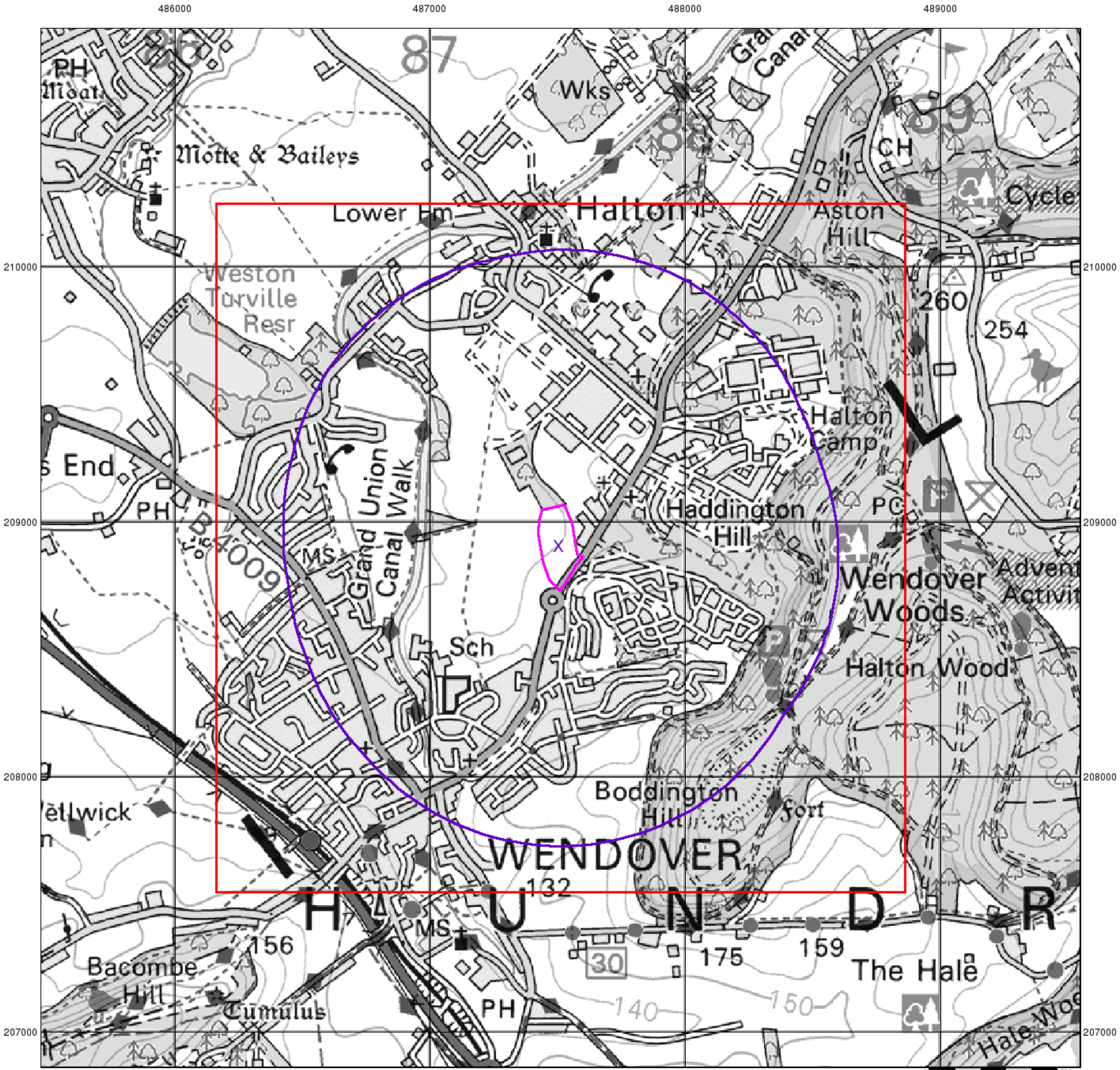
Web: www.envirocheck.co.uk



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Artificial Ground and Landslip

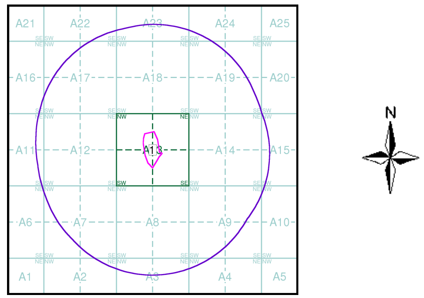
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- Infilled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice A



Order Details:

Order Number:	280815658_1_1
Customer Reference:	iGeo-21-111A
National Grid Reference:	487500, 208910
Slice:	A
Site Area (Ha):	3.7
Search Buffer (m):	1000

Site Details:

Wendover Cricket Club, Icknield Way, Halton, Wendover, HP22 5PN

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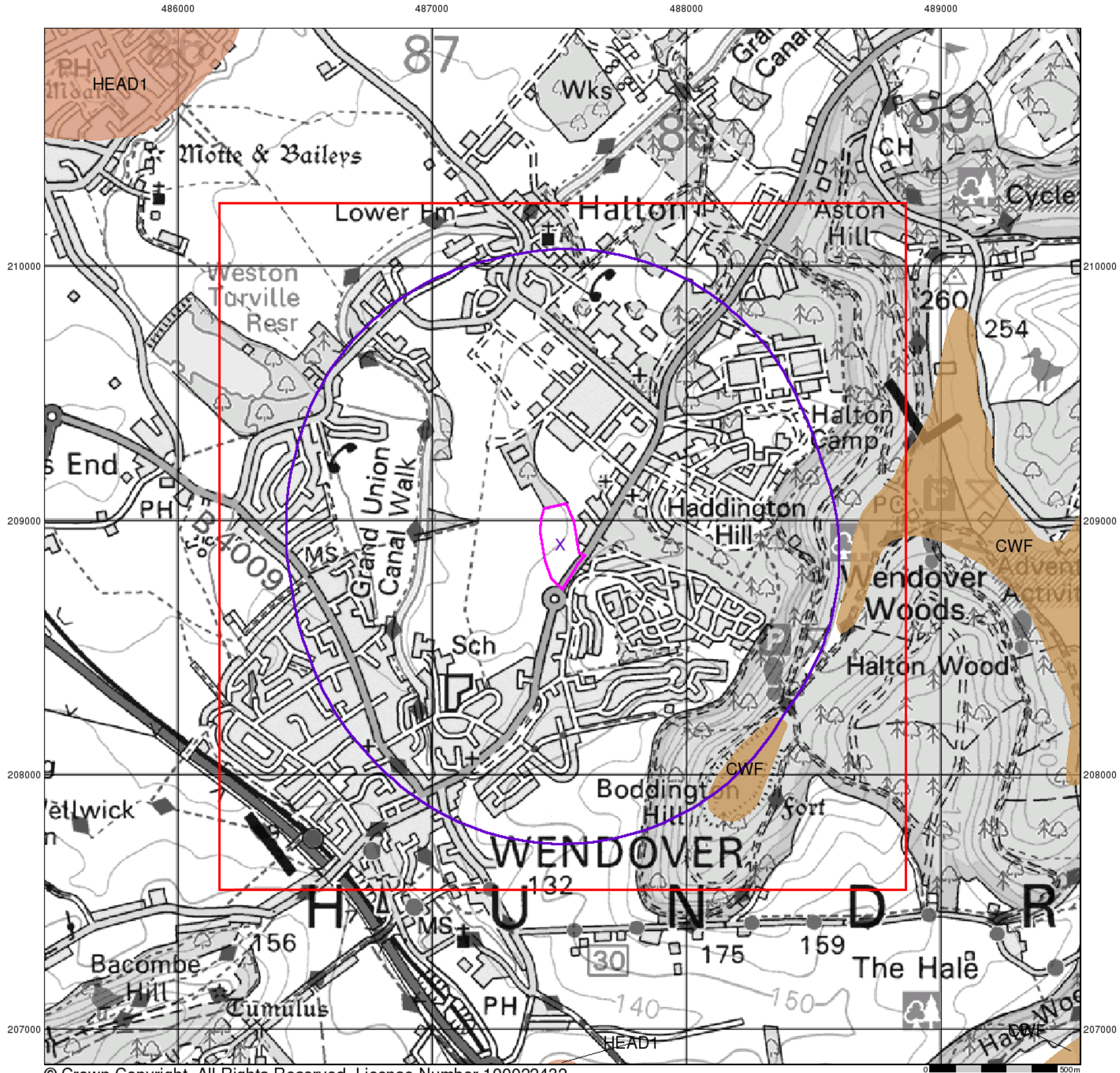

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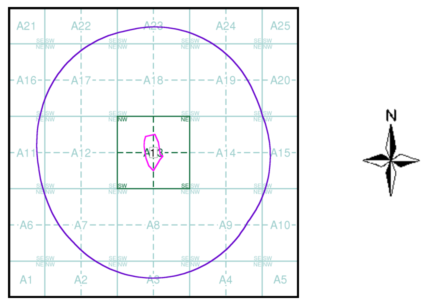
Superficial Geology

Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A



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Customer Reference:	iGeo-21-111A
National Grid Reference:	487500, 208910
Slice:	A
Site Area (Ha):	3.7
Search Buffer (m):	1000

Site Details:

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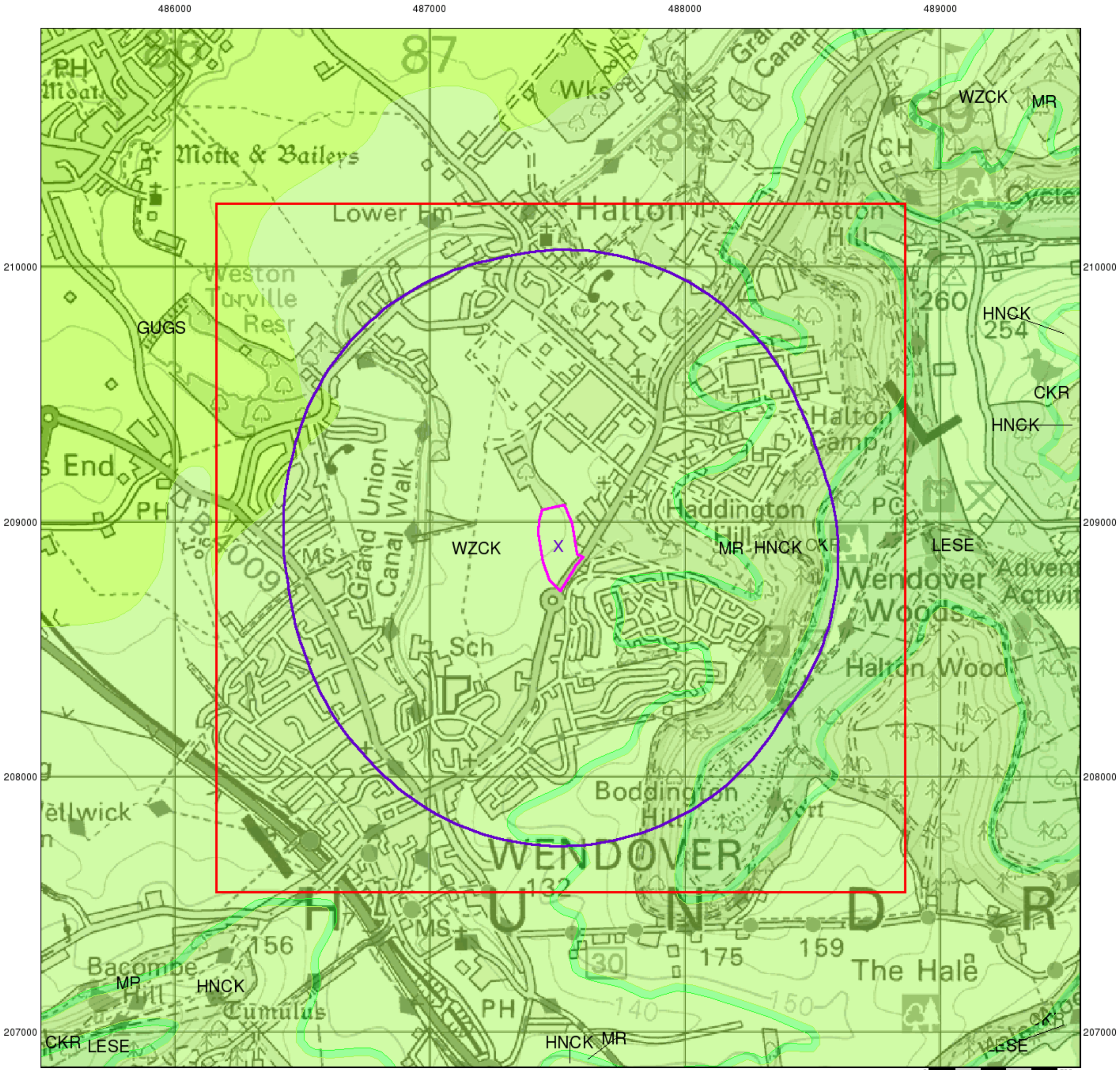

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Bedrock and Faults

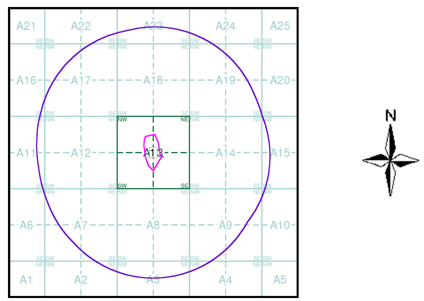
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seam, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but cut across the strata and post date its deposition.

Bedrock and Faults Map - Slice A



Order Details:

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Customer Reference:	iGeo-21-111A
National Grid Reference:	487500, 208910
Slice:	A
Site Area (Ha):	3.7
Search Buffer (m):	1000

Site Details:

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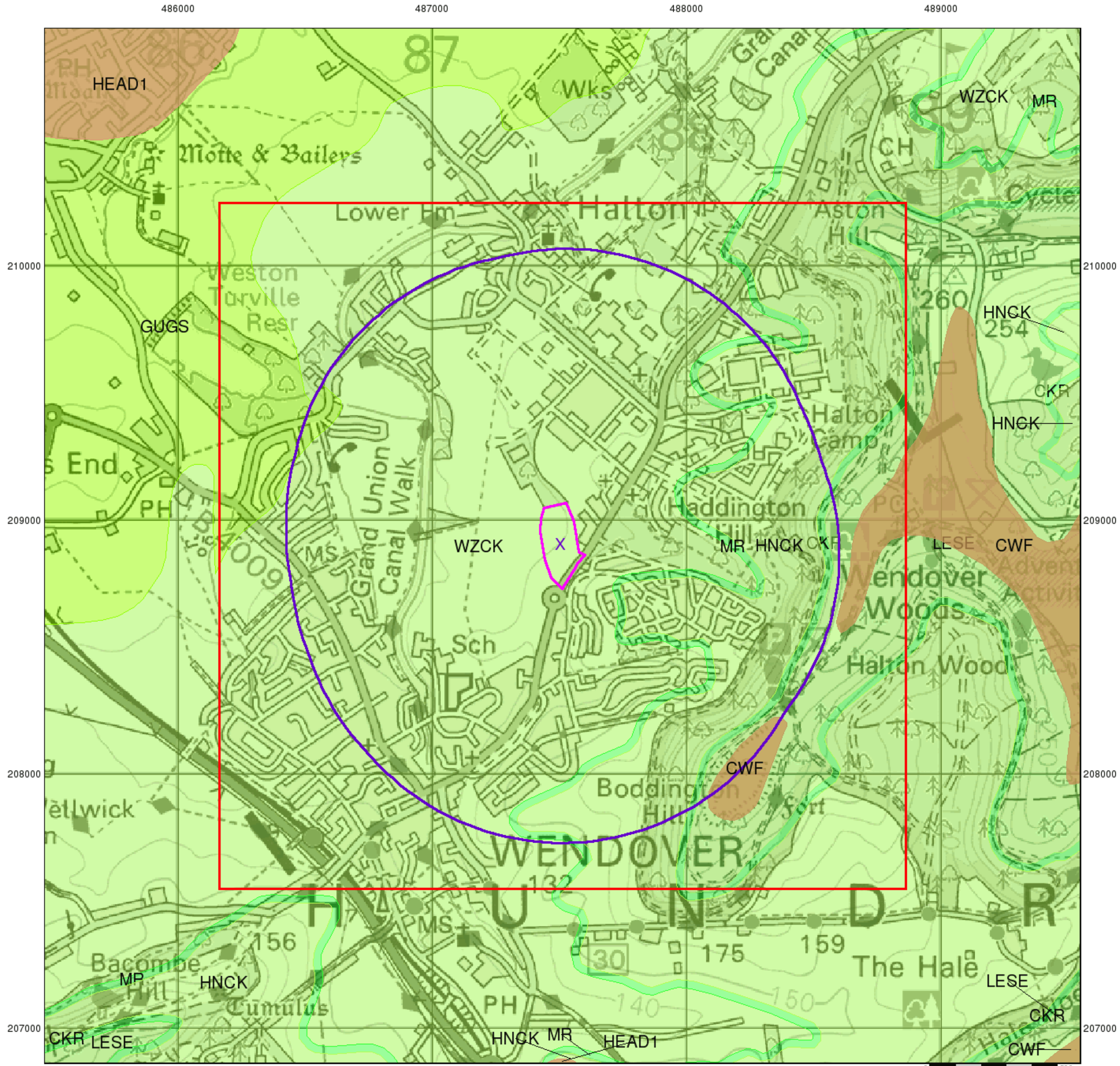

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Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

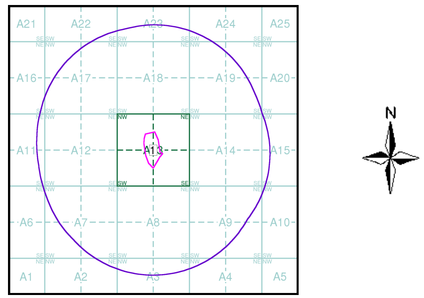
Additional Information

More information on 1:50,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice A



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Customer Reference:	iGeo-21-111A
National Grid Reference:	487500, 208910
Slice:	A
Site Area (Ha):	3.7
Search Buffer (m):	1000

Site Details:

Wendover Cricket Club, Icknield Way, Halton, Wendover, HP22 5PN

Envirocheck® Report:

Mining and Ground Stability Datasheet

Order Details:

Order Number:
280815658_1_1

Customer Reference:
iGeo-21-111A

National Grid Reference:
487500, 208910

Slice:
A

Site Area (Ha):
3.7

Search Buffer (m):
1000

Site Details:

Wendover Cricket Club
Icknield Way
Halton
Wendover
HP22 5PN

Client Details:

Mr D Deane
iGeo Ltd
183 Long Lane
Tilehurst
Reading
Berkshire
RG31 6YW

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Contents

Report Version v53.0

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Mining and Natural Cavities Data					
BGS Recorded Mineral Sites	pg 1				2
Coal Mining Affected Areas			n/a	n/a	n/a
Man Made Mining Cavities					
Mining Instability			n/a	n/a	n/a
Natural Cavities					
Non Coal Mining Areas of Great Britain	pg 1	Yes		n/a	n/a
Potential Mining Areas					
Historical Land Use Information (1:2,500)					
Extractive Industries or Potential Excavations from 1855-1909 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1893-1915 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1906-1937 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1924-1949 (100m)				n/a	n/a
Extractive Industries or Potential Excavations from 1950-1980 (100m)				n/a	n/a
Subterranean Features (100m)				n/a	n/a
Historical Land Use Information (1:10,000)					
Air Shafts					
Disturbed Ground					
General Quarrying					
Heap, unknown constituents					
Mineral Railway					
Mining & quarrying general					
Mining of coal & lignite					
Quarrying of sand & clay, operation of sand & gravel pits					
Former Marshes					
Potentially Infilled Land (Non-Water)					
Potentially Infilled Land (Water)	pg 2			1	
Ground Stability Data (1:50,000)					
CBSCB Compensation District			n/a	n/a	n/a
Brine Pumping Related Features					
Brine Subsidence Solution Area					
Potential for Collapsible Ground Stability Hazards	pg 3	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 3	Yes		n/a	n/a
Potential for Ground Dissolution Stability Hazards	pg 3	Yes	Yes	n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 3	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 3	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 3	Yes		n/a	n/a
Salt Mining Related Features					

Report Version v53.0

Mining and Natural Cavities Data

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Recorded Mineral Sites				
1	Site Name: Beacon Hill Chalk Pit Location: Wendover, Buckinghamshire Source: British Geological Survey, National Geoscience Information Service Reference: 250258 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: Melbourn Rock Member Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A19SW (NE)	727	1	488132 209466
	BGS Recorded Mineral Sites				
1	Site Name: Beacon Hill Chalk Pit Location: Wendover, Buckinghamshire Source: British Geological Survey, National Geoscience Information Service Reference: 250258 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A19SW (NE)	727	1	488132 209466
	Coal Mining Affected Areas In an area which may not be affected by coal mining				
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A13NW (NE)	0	1	487504 208905

Historical Land Use Information (1:10,000)

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
2	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1884	A12NE (W)	336	-	487090 209011

Ground Stability Data (1:50,000)

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	CBSCB Compensation District The site does not fall within the brine compensation area.				
	Brine Subsidence Solution Area The site does not fall within the brine subsidence solution area.				
3	**Potential for Collapsible Ground Stability Hazards** Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (NE)	0	1	487504 208905
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (NE)	0	1	487504 208905
4	**Potential for Ground Dissolution Stability Hazards** Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (SE)	159	1	487712 208752
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (NE)	0	1	487504 208905
	Potential for Landslide Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (NE)	0	1	487504 208905
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (NE)	0	1	487504 208905
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (NE)	0	1	487504 208905

The following mapping has been analysed for Historical Land Use Information (1:2,500):

1:2,500	Mapsheet	Published Date
Ordnance Survey Plan	SP8709	1971
Ordnance Survey Plan	SP8708	1972

The following mapping has been analysed for Historical Land Use Information (1:10,000):

1:10,560	Mapsheet	Published Date
Hertfordshire	024_00	1882
Hertfordshire	025_00	1884
Hertfordshire	032_00	1884
Buckinghamshire	034_00	1884
Hertfordshire	025_SW	1900
Hertfordshire	032_NW	1900
Buckinghamshire	034_NW	1900
Buckinghamshire	034_SW	1900
Hertfordshire	032_NW	1925
Hertfordshire	025_SW	1926
Hertfordshire	025_SW	1938
Ordnance Survey Plan	SP81SE	1960
Ordnance Survey Plan	SP80NE	1961
1:10,000	**Mapsheet**	**Published Date**
Ordnance Survey Plan	SP80NE	1976
Ordnance Survey Plan	SP81SE	1981

Mining and Cavities Data	Version	Update Cycle
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	May 2021	Bi-Annually
Coal Mining Affected Areas The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Man Made Mining Cavities Stantec UK Ltd	May 2021	Bi-Annually
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Natural Cavities Stantec UK Ltd	May 2021	Bi-Annually
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Historical Land Use Information (1:2,500)	**Version**	**Update Cycle**
Subterranean Features Landmark Information Group Limited	February 2020	Bi-Annually
Ground Stability Data (1:50,000)	**Version**	**Update Cycle**
CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	As notified
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	April 2020	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Brine Subsidence Solution Area Johnson Poole & Bloomer	December 2020	Annual Rolling Update

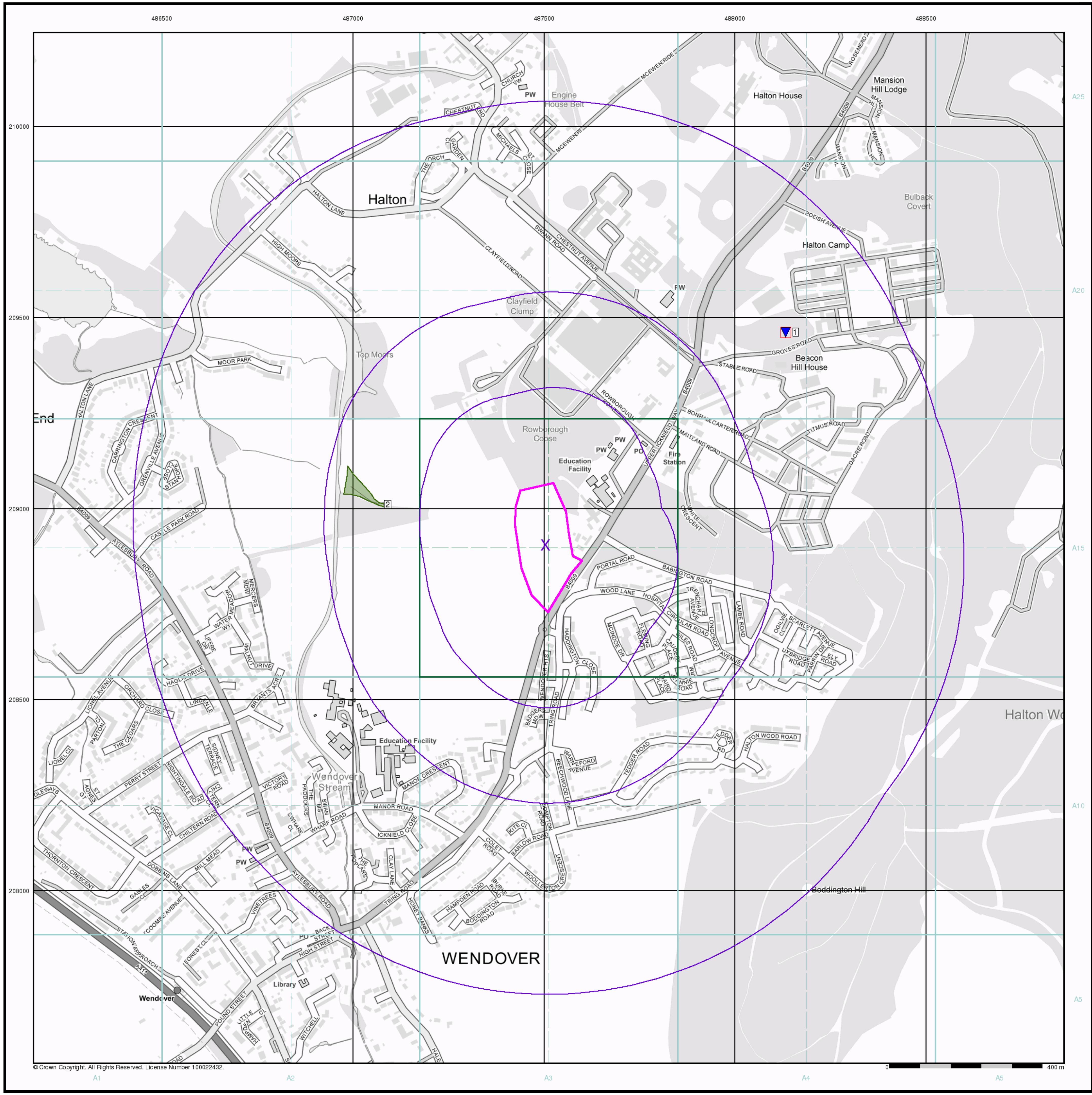
Data Suppliers

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
British Geological Survey	
The Coal Authority	
Ove Arup	
Stantec UK Ltd	
Wardell Armstrong	
Johnson Poole & Bloomer	

Useful Contacts

Contact	Name and Address	Contact Details
1	**British Geological Survey - Enquiry Service** British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk



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Historical Land Use Information (1:10,000)

General

Specified Site
Specified Buffer(s)
Bearing Reference Point
Map ID
Several of Type at Location

Potentially Contaminative Industrial Uses (Past Land Uses - Mining)

Point / Line / Polygon

- Air Shafts
- Disturbed Ground
- General Quarrying
- Heap, unknown constituents
- Mineral Railway
- Mining and Quarrying General
- Mining of Coal & Lignite
- Quarrying of Sand and Clay, Operation of Sand and Gravel Pits

Historical Land Use

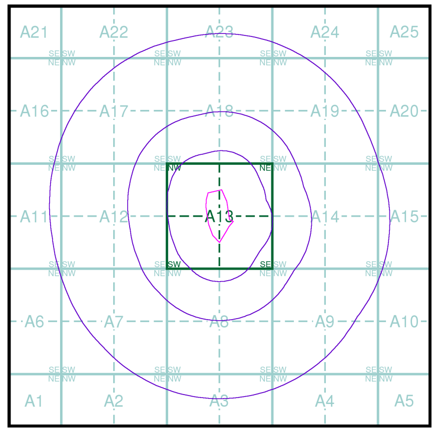
Point / Line / Polygon

- Potentially Infilled Land (Non-Water)
- Potentially Infilled Land (Water)
- Former Marsh

Mining Data

- Potential Mining Area
- BGS Recorded Mineral Site

Mining and Ground Stability - Slice A



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Order Details

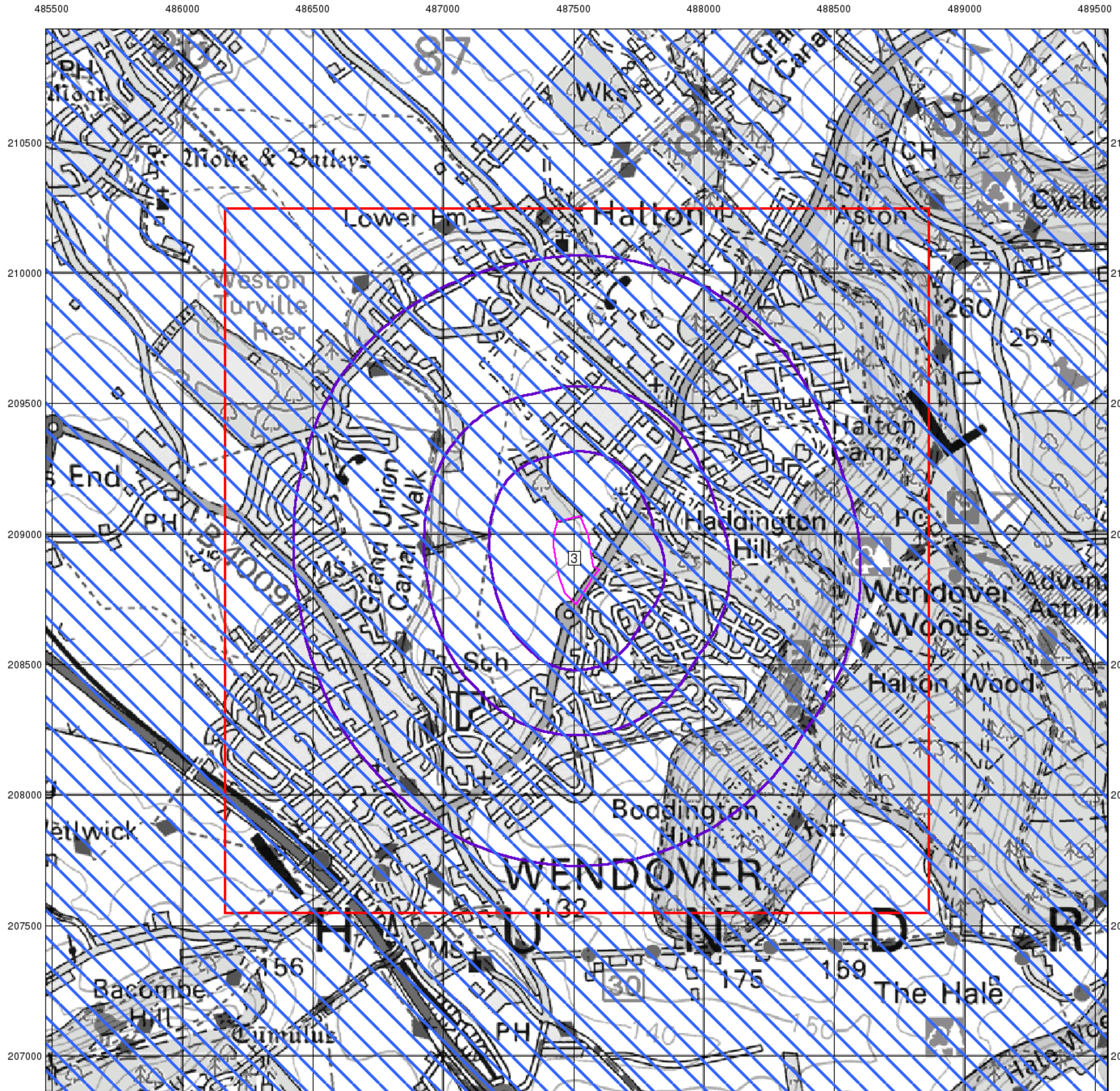
Order Number:	280815658_1_1
Customer Ref:	iGeo-21-111A
National Grid Reference:	487500, 208910
Slice:	A
Site Area (Ha):	3.7
Search Buffer (m):	1000

Site Details

Wendover Cricket Club, Icknield Way, Halton, Wendover, HP22 5PN

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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Ground Stability Data (1:50,000)

General

Specified Site
Specified Buffer(s)
Bearing Reference Point
Slice
Map ID

Potential for Compressible Ground Stability Hazards

High
Low
Moderate
Very Low

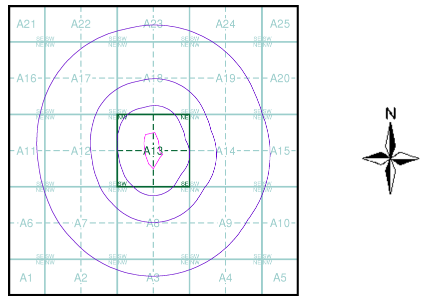
Potential for Collapsable Ground Stability Hazards

High
Low
Moderate
Very Low

Brine Pumping and Salt Mining

	Point	Polygon
Brine Pumping Related Feature		
Salt Mining Related Feature		

Mining and Ground Stability - Slice A



Order Details

Order Number:	280815658_1_1
Customer Ref:	iGeo-21-111A
National Grid Reference:	487500, 208910
Slice:	A
Site Area (Ha):	3.7
Search Buffer (m):	1000

Site Details

Wendover Cricket Club, Icknield Way, Halton, Wendover, HP22 5PN

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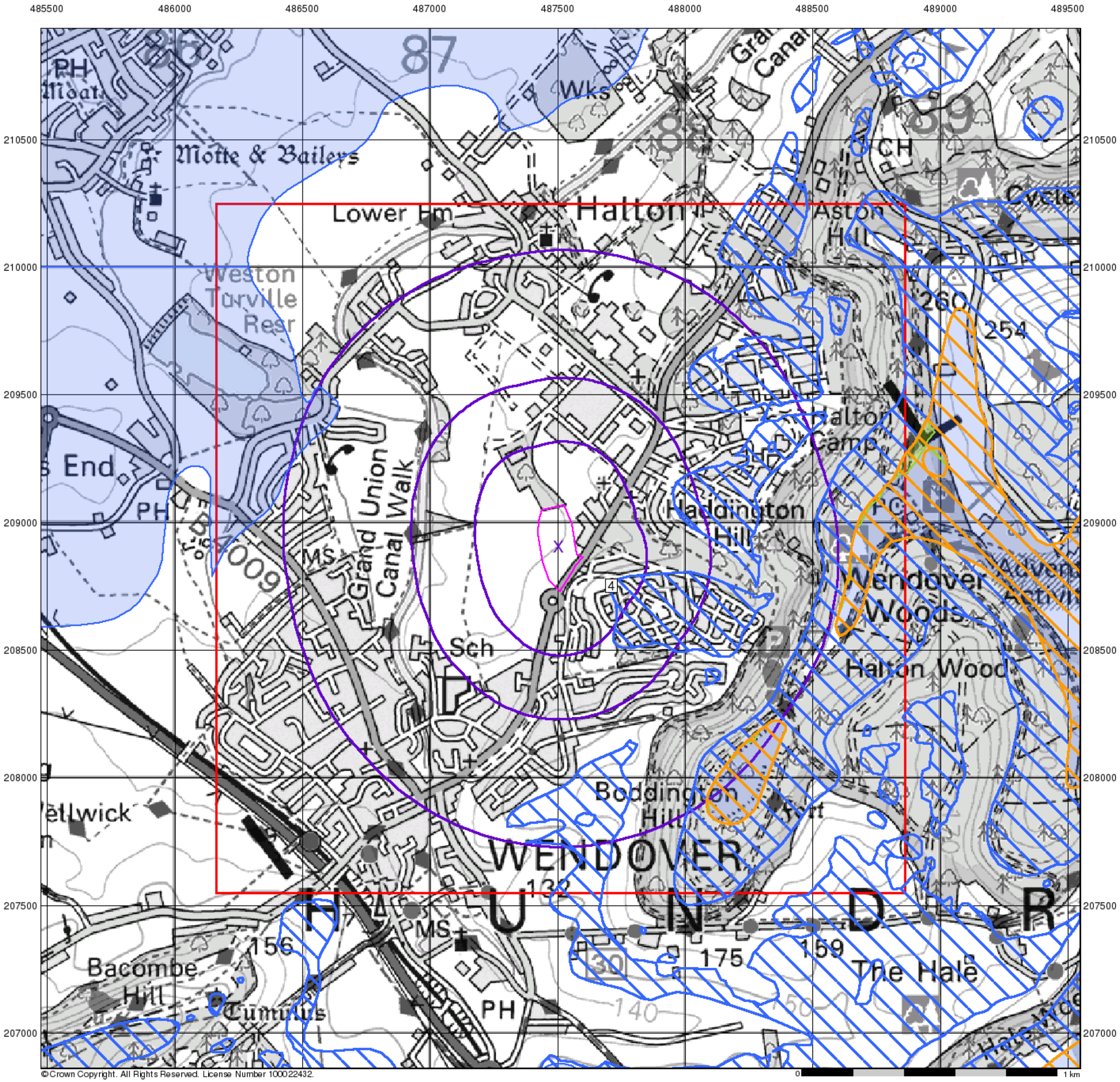

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Ground Stability Data (1:50,000)

General

Specified Site
Specified Buffer(s)
Bearing Reference Point
Slice
Map ID

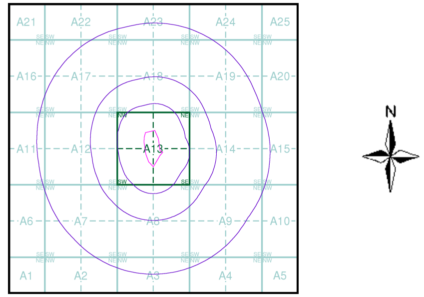
Potential for Landslide Ground Stability Hazards

High
Low
Moderate
Very Low

Potential for Ground Dissolution Stability Hazards

High
Low
Moderate
Very Low

Mining and Ground Stability - Slice A



Order Details

Order Number:	280815658_1_1
Customer Ref:	iGeo-21-111A
National Grid Reference:	487500, 208910
Slice:	A
Site Area (Ha):	3.7
Search Buffer (m):	1000

Site Details

Wendover Cricket Club, Icknield Way, Halton, Wendover, HP22 5PN

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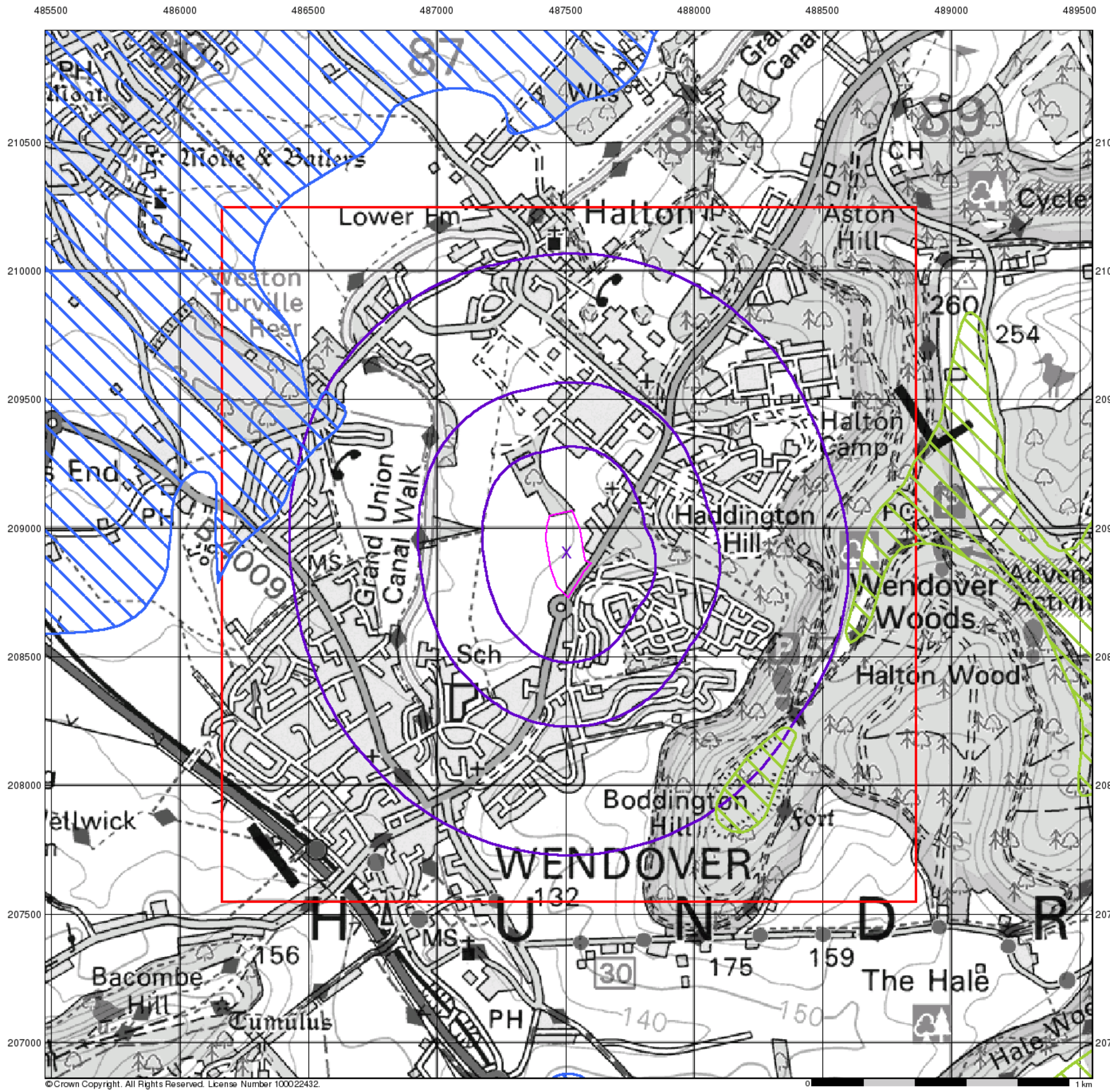

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Ground Stability Data (1:50,000)

General

Specified Site
Specified Buffer(s)
Bearing Reference Point
Slice
Map ID

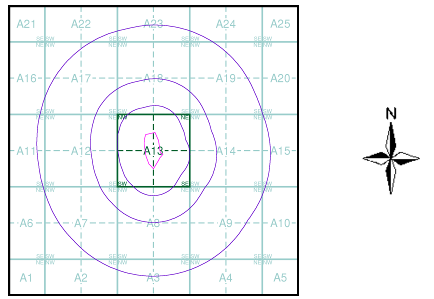
Potential for Running Sand Ground Stability Hazards

High
Low
Moderate
Very Low

Potential for Shrinking or Swelling Clay Ground Stability Hazards

High
Low
Moderate
Very Low

Mining and Ground Stability - Slice A



Order Details

Order Number:	280815658_1_1
Customer Ref:	iGeo-21-111A
National Grid Reference:	487500, 208910
Slice:	A
Site Area (Ha):	3.7
Search Buffer (m):	1000

Site Details

Wendover Cricket Club, Icknield Way, Halton, Wendover, HP22 5PN

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ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	2.960	Urban	0.000
SAAR (mm)	682	Region Number	Region 6

Results	**l/s**
QBAR Rural	12.6
QBAR Urban	12.6
Q100 years	40.2
Q1 year	10.7
Q30 years	28.6
Q100 years	40.2

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 1283 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	127.350	0.350	4.0	446.8	O K
30 min Summer	127.356	0.356	4.1	454.2	O K
60 min Summer	127.370	0.370	4.1	473.8	O K
120 min Summer	127.387	0.387	4.1	497.3	O K
180 min Summer	127.398	0.398	4.1	512.8	O K
240 min Summer	127.407	0.407	4.1	524.8	O K
360 min Summer	127.420	0.420	4.2	544.1	O K
480 min Summer	127.431	0.431	4.2	559.7	O K
600 min Summer	127.440	0.440	4.2	572.6	O K
720 min Summer	127.448	0.448	4.2	583.5	O K
960 min Summer	127.460	0.460	4.2	600.6	O K
1440 min Summer	127.461	0.461	4.2	602.3	O K
2160 min Summer	127.432	0.432	4.2	560.9	O K
2880 min Summer	127.375	0.375	4.1	481.0	O K
4320 min Summer	127.354	0.354	4.1	452.1	O K
5760 min Summer	127.350	0.350	4.0	446.5	O K
7200 min Summer	127.348	0.348	4.0	443.5	O K
8640 min Summer	127.347	0.347	4.0	441.7	O K
10080 min Summer	127.346	0.346	4.0	440.3	O K
15 min Winter	127.352	0.352	4.1	449.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	138.874	0.0	1057
30 min Summer	90.946	0.0	1057
60 min Summer	56.713	0.0	1056
120 min Summer	34.162	0.0	1056
180 min Summer	25.057	0.0	1054
240 min Summer	19.992	0.0	1054
360 min Summer	14.500	0.0	1054
480 min Summer	11.545	0.0	1052
600 min Summer	9.667	0.0	1052
720 min Summer	8.358	0.0	1052
960 min Summer	6.638	0.0	1052
1440 min Summer	4.791	0.0	1094
2160 min Summer	3.452	0.0	1260
2880 min Summer	2.733	0.0	1552
4320 min Summer	1.964	0.0	1072
5760 min Summer	1.552	0.0	1072
7200 min Summer	1.292	0.0	1064
8640 min Summer	1.112	0.0	1064
10080 min Summer	0.980	0.0	1064
15 min Winter	138.874	0.0	1057

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	127.361	0.361	4.1	462.0	O K
60 min Winter	127.378	0.378	4.1	484.8	O K
120 min Winter	127.396	0.396	4.1	510.3	O K
180 min Winter	127.408	0.408	4.1	526.8	O K
240 min Winter	127.417	0.417	4.2	539.5	O K
360 min Winter	127.431	0.431	4.2	559.8	O K
480 min Winter	127.443	0.443	4.2	576.2	O K
600 min Winter	127.452	0.452	4.2	589.9	O K
720 min Winter	127.461	0.461	4.2	601.6	O K
960 min Winter	127.474	0.474	4.3	620.7	O K
1440 min Winter	127.475	0.475	4.3	622.9	O K
2160 min Winter	127.437	0.437	4.2	568.5	O K
2880 min Winter	127.383	0.383	4.1	491.3	O K
4320 min Winter	127.357	0.357	4.1	456.4	O K
5760 min Winter	127.352	0.352	4.1	449.5	O K
7200 min Winter	127.350	0.350	4.0	445.8	O K
8640 min Winter	127.348	0.348	4.0	443.3	O K
10080 min Winter	127.347	0.347	4.0	441.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	90.946	0.0	1057
60 min Winter	56.713	0.0	1056
120 min Winter	34.162	0.0	1054
180 min Winter	25.057	0.0	1054
240 min Winter	19.992	0.0	1054
360 min Winter	14.500	0.0	1052
480 min Winter	11.545	0.0	1052
600 min Winter	9.667	0.0	1052
720 min Winter	8.358	0.0	1052
960 min Winter	6.638	0.0	1050
1440 min Winter	4.791	0.0	1106
2160 min Winter	3.452	0.0	1296
2880 min Winter	2.733	0.0	1260
4320 min Winter	1.964	0.0	1080
5760 min Winter	1.552	0.0	1072
7200 min Winter	1.292	0.0	1064
8640 min Winter	1.112	0.0	1064
10080 min Winter	0.980	0.0	1064

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.406	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.240

Time From:	**(mins) To:**	**Area (ha)**	**Time From:**	**(mins) To:**	**Area (ha)**	**Time From:**	**(mins) To:**	**Area (ha)**
0	4	0.080	4	8	0.080	8	12	0.080

Model Details

Storage is Online Cover Level (m) 128.000

Infiltration Basin Structure

Invert Level (m) 127.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.02100 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	**Area (m²)**	**Depth (m)**	**Area (m²)**
0.000	1178.0	1.000	1778.0

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 934 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	127.049	0.049	3.4	57.9	O K
30 min Summer	127.068	0.068	3.6	81.9	O K
60 min Summer	127.094	0.094	3.6	112.6	O K
120 min Summer	127.122	0.122	3.6	147.1	O K
180 min Summer	127.138	0.138	3.7	167.4	O K
240 min Summer	127.148	0.148	3.7	180.7	O K
360 min Summer	127.162	0.162	3.7	198.1	O K
480 min Summer	127.171	0.171	3.7	208.8	O K
600 min Summer	127.175	0.175	3.7	215.1	O K
720 min Summer	127.178	0.178	3.7	218.2	O K
960 min Summer	127.177	0.177	3.7	216.7	O K
1440 min Summer	127.166	0.166	3.7	203.0	O K
2160 min Summer	127.149	0.149	3.7	182.0	O K
2880 min Summer	127.134	0.134	3.7	162.2	O K
4320 min Summer	127.105	0.105	3.6	127.2	O K
5760 min Summer	127.082	0.082	3.6	98.7	O K
7200 min Summer	127.065	0.065	3.5	77.2	O K
8640 min Summer	127.053	0.053	3.5	62.7	O K
10080 min Summer	127.047	0.047	3.3	56.0	O K
15 min Winter	127.096	0.096	3.6	116.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	138.874	0.0	246
30 min Summer	90.946	0.0	294
60 min Summer	56.713	0.0	386
120 min Summer	34.162	0.0	472
180 min Summer	25.057	0.0	518
240 min Summer	19.992	0.0	556
360 min Summer	14.500	0.0	624
480 min Summer	11.545	0.0	694
600 min Summer	9.667	0.0	764
720 min Summer	8.358	0.0	840
960 min Summer	6.638	0.0	1002
1440 min Summer	4.791	0.0	1246
2160 min Summer	3.452	0.0	1612
2880 min Summer	2.733	0.0	1988
4320 min Summer	1.964	0.0	2728
5760 min Summer	1.552	0.0	3432
7200 min Summer	1.292	0.0	4104
8640 min Summer	1.112	0.0	4736
10080 min Summer	0.980	0.0	5408
15 min Winter	138.874	0.0	368

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	127.141	0.141	3.7	172.1	O K
60 min Winter	127.190	0.190	3.8	233.3	O K
120 min Winter	127.238	0.238	3.9	296.2	O K
180 min Winter	127.265	0.265	3.9	331.6	O K
240 min Winter	127.283	0.283	3.9	354.9	O K
360 min Winter	127.305	0.305	4.0	385.5	O K
480 min Winter	127.320	0.320	4.0	405.3	O K
600 min Winter	127.329	0.329	4.0	418.0	O K
720 min Winter	127.335	0.335	4.0	426.0	O K
960 min Winter	127.340	0.340	4.0	431.9	O K
1440 min Winter	127.329	0.329	4.0	417.7	O K
2160 min Winter	127.302	0.302	4.0	380.6	O K
2880 min Winter	127.275	0.275	3.9	344.1	O K
4320 min Winter	127.221	0.221	3.8	273.7	O K
5760 min Winter	127.172	0.172	3.7	211.2	O K
7200 min Winter	127.130	0.130	3.7	157.7	O K
8640 min Winter	127.095	0.095	3.6	113.9	O K
10080 min Winter	127.068	0.068	3.6	80.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	90.946	0.0	452
60 min Winter	56.713	0.0	494
120 min Winter	34.162	0.0	536
180 min Winter	25.057	0.0	572
240 min Winter	19.992	0.0	606
360 min Winter	14.500	0.0	676
480 min Winter	11.545	0.0	746
600 min Winter	9.667	0.0	818
720 min Winter	8.358	0.0	894
960 min Winter	6.638	0.0	1058
1440 min Winter	4.791	0.0	1420
2160 min Winter	3.452	0.0	1816
2880 min Winter	2.733	0.0	2240
4320 min Winter	1.964	0.0	3072
5760 min Winter	1.552	0.0	3856
7200 min Winter	1.292	0.0	4584
8640 min Winter	1.112	0.0	5248
10080 min Winter	0.980	0.0	5824

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.300
Region	England and Wales	Cv (Winter)	0.500
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.406	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.191

Time (mins) From:	**To:**	**Area (ha)**	**Time (mins) From:**	**To:**	**Area (ha)**	**Time (mins) From:**	**To:**	**Area (ha)**	**Time (mins) From:**	**To:**	**Area (ha)**
0	10	0.000	150	160	0.032	300	310	0.014	450	460	0.009
10	20	0.005	160	170	0.030	310	320	0.014	460	470	0.008
20	30	0.017	170	180	0.028	320	330	0.014	470	480	0.007
30	40	0.033	180	190	0.025	330	340	0.013	480	490	0.006
40	50	0.050	190	200	0.024	340	350	0.013	490	500	0.005
50	60	0.062	200	210	0.022	350	360	0.013	500	510	0.004
60	70	0.073	210	220	0.021	360	370	0.012	510	520	0.003
70	80	0.072	220	230	0.020	370	380	0.012	520	530	0.003
80	90	0.064	230	240	0.020	380	390	0.012	530	540	0.002
90	100	0.056	240	250	0.019	390	400	0.011	540	550	0.002
100	110	0.049	250	260	0.018	400	410	0.011	550	560	0.001
110	120	0.044	260	270	0.017	410	420	0.011	560	570	0.001
120	130	0.040	270	280	0.016	420	430	0.010	570	580	0.001
130	140	0.037	280	290	0.015	430	440	0.010	580	590	0.001
140	150	0.035	290	300	0.015	440	450	0.009			

Model Details

Storage is Online Cover Level (m) 128.000

Infiltration Basin Structure

Invert Level (m) 127.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.02100 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	**Area (m²)**	**Depth (m)**	**Area (m²)**
0.000	1178.0	1.000	1778.0