ARMSTRONG STOKES & CLAYTON LIMITED
Civil & Structural Engineering Consultants

Peveril Homes Ltd

Land West of Burton Road, West Tutbury, Staffordshire

Hydrogeological & Hydrological Impact Assessment

October 2012

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APPENDICES

1.0 INTRODUCTION

1.1 This Hydrogeological & Hydrological Impact Assessment has been produced on behalf of Peveril Homes Ltd by Armstrong Stokes & Clayton in support of the proposed mixed use development of land located to the west of Burton Road, West Tutbury, Staffordshire.

1.2 This Assessment considers the potential impacts of the proposed development uses on the existing hydrological regime. It considers potential changes in surface water and groundwater flow/level, water quality and any resultant impact on groundwater users.

1.3 This Assessment closely references, and should be read in conjunction with, the following.

- Phase 2 Ground Investigation Report (GeoDyne - November 2011)
- Flood Risk Assessment (ASC - April 2011)

2.0 BASELINE CONDITIONS

Site description & Existing Usage

2.1 The application site has a gross area of approx. 15.893ha and is located to the south east of West Tutbury, Staffordshire. The site boundary is indicated on the OS based site location plan included within Appendix A.

2.2 The site is greenfield consisting of open grazing land divided up by various post and rail fence/hedge field boundaries. There are no significant features identified within the site boundary.

2.3 The site is bound to the north by an area of dense vegetation/scrub and residential property beyond, to the west by existing residential property and Green Lane. It is bound to the east by the Burton Road (A511) and to the south by further open grazing land.

2.4 A small pond is located within the dense undergrowth, immediately adjacent to the northern boundary. The purpose of this pond is unknown.

Topography

2.5 A topographical survey, Dwg No. 13583_OGL, has been carried out by Greenhatch Group and is included within Appendix B.

2.6 The contoured topographical survey confirms that the site falls predominantly from the south west to the north east by approx. 10m. The lowest spot level shown is 79.04m AOD where the site bounds the A511 Burton Road roundabout. The highest spot level shown is 89.49m AOD towards the south western corner of the site. The south western corner itself falls away to the west towards Green Lane, the lowest level within the site boundary being approx. 87.70m AOD.

Local Hydrology

2.7 The site falls within the catchment of the River Dove located approx. 1km to the north of the site. The Mill Fleam, a man-made watercourse originally built to serve the old Tutbury cotton mill, runs between the site and the River Dove to the north of the town.

2.8 The Ground Investigation Report does not contain any information relating to the quality of the River Dove or Mill Fleam. The 2009 historic river quality data for the River Dove available on the Environment Agency's website from monitoring points upstream and downstream of the site, confirms biology and chemistry grades of A (very good).

2.9 The Ground Investigation Report does not contain any information in respect of discharge consents within the area. Based on the site's location relative to the River Dove and Mill Fleam, there is unlikely to be any licensed discharges within 500m of the site.

2.10 The Environment Agency on line flood mapping confirms that the site lies within Flood Zone 1. Flood risk from all sources has been considered within the Flood Risk Assessment dated April 2011, prepared in respect of the proposed development.

Existing Drainage

2.11 The public sewer records confirm that the nearest public foul/combined sewers to the site are located within Green Lane and the nearest public surface water sewer is located within Cromwell Close. Further combined sewers are located within Ironwalls Lane and Burton Road, to the north of the site. 150mm and 225mm diameter highway drains are also located within Burton Road.

2.12 The existing site is Greenfield and therefore does not benefit from any positive foul or surface water drainage systems.

Geology

2.13 The Ground Investigation Report confirms that the British Geological Survey mapping shows the site to be underlain by solid geology comprising strata of the Mercia Mudstone Group.

2.14 At the western extent of the site, the Mercia Mudstone is indicated to the overlain by superficial Glacial Till deposits comprising a mixture of clay, sand gravel and silt.

2.15 No Made Ground deposits were identified within potential influencing distance (i.e. 250m).

Hydrogeology

2.16 From the current Environment Agency on line mapping, the site is not located within a groundwater Source Protection Zone (SPZ) or a Groundwater Vulnerability Zone.

2.17 The site and surrounding area is indicating the Environment Agency mapping as being underlain by bedrock classified as being a Secondary B Aquifer, which is described as *'predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers'.*

2.18 The Ground Investigation Report does not contain any information in respect of licensed groundwater abstractions within the area. Based on current groundwater SPZ mapping available on line, it would appear that the closest groundwater abstraction point is located in Hatton, approximately 1.5km to the north of the site.

2.19 The ground investigation works included 38 No. trial pits up to a depth of 4m. Groundwater was not encountered in any of these trial pits.

2.20 Based on the unfavourable ground conditions encountered within the trial pits, percolation testing has not been carried out on site. The Ground Investigation Report states '*The presence of typically cohesive natural strata across the site is likely to preclude the use of soakaways'*.

Contamination

2.21 The Ground Investigation Report states that *'the results of the chemical analysis have indicated that the topsoil and natural strata at the site may be regarded as being chemically uncontaminated with respect to the determinands tested for'.*

2.22 With no elevated levels of contaminants identified, there is no significant risk to the underlying Secondary B Aquifer.

2.23 As groundwater was not encountered within the trial pits, no groundwater samples were available for testing.

3.0 POTENTIAL IMPACTS & MITIGATION

Temporary (Demolition/Construction)

3.1 During the demolition and construction phases there will be an increase in the risk of the mobilisation of any existing pollutants present on the site, identified or unidentified, potentially contaminating groundwater and/or receiving waters. There will also, of course, be the risk of spillages/leaks which could potentially lead to contamination of groundwater.

3.2 With no existing contaminants or pollutants identified, the Ground Investigation Report confirms that no specific remediation works are considered necessary.

3.3 All potential risks must be specifically assessed as part of the health and safety evaluation for the works to be performed in accordance with prevailing legislation. Site practices must conform to the specific legislative requirements and follow appropriate guidance (e.g. HSE, 1991; CIRIA, 1996).

3.4 All construction activities will be undertaken in accordance with best practice construction techniques and regulations in addition to the relevant Environment Agency Pollution Prevention Guidelines (PPG), in particular.

- PPG1: ‘General Guide to the Prevention of Water Resources’
- PPG6: ‘Working at Construction and Demolition Sites’
- PPG8: ‘Safe Storage and Disposal of Oils’

3.5 Temporary impermeable areas will be kept to an absolute minimum. In accordance with CIRIA C532 ‘Control of Water Pollution from Construction Sites’, positive surface water run-off from the construction site will be managed by the appropriate use of temporary bunding and lined settlements ponds, allowing for the isolation and on site treatment of sediment laden run-off before it is discharged to ground.

3.6 Appropriately sited storage areas will be provided for any fuels, oils and chemicals. The storage areas should have impervious bases, be adequately bunded and be secure.

3.7 All deliveries of fuels, oils and other hazardous materials will be supervised by appropriate personnel to ensure that storage tanks/areas do not become overfilled and to guard against any accidental spillages. An appropriate spill management plan will be provided, detailing the materials and procedures that will be used to deal with any such event.

3.8 Appropriate facilities will be provided for the wash-down of vehicles and plant. Associated run-off will not be disposed of to ground or watercourses.

Permanent (Operational)

General

3.9 It is proposed to provide a mixed use development consisting of 224 residential units together with approx. 1800m2 of office accommodation (B1 class).

3.10 The risk of any significant leaks or spillages associated with the proposed development uses will therefore be very low, of a minor nature and generally controllable at source.

3.11 The proposed development layout is shown on Dwg. No. P119A/300/B/P, included within Appendix C.

Foul Drainage

3.12 With respect to the residential element of the development, based on 224 units, the peak foul drainage discharge generated will be approx. 10.4 l/s. Assuming an occupancy rate of 1 person/15m2, the maximum occupancy of the proposed B1 office accommodation will be 120 persons. Based on a maximum discharge of 100 l/person/day then the peak foul discharge will be approx. 1.0 l/s. The overall peak discharge for the development is therefore estimated to be 11.4 l/s.

3.13 The proposed development will be served by a new on site gravity foul drainage system and pumping station. The new main on site foul sewers and pumping station will be constructed to adoptable standards and offered to Severn Trent Water for adoption under Section 104 of the Water Industry Act 1991.

3.14 Subject to the approval of Severn Trent Water, it is proposed to connect the new pumping station rising main to the public 225mm diameter combined sewer located at the junction of Ironwalls Lane with Burton Road. The new on site foul pumping station will be located at the junction of the new development northern access road with Burton Road.

3.15 The preliminary foul drainage layout is indicated on Dwg. No. P119A/300/B/P and P119A/301/B/P, included within Appendix C.

Surface Water

3.16 As previously stated, with no specific information relating to soil infiltration rates available, the Ground Investigation Report states '*The presence of typically cohesive natural strata across the site is likely to preclude the use of traditional soakaways'*.

3.17 On the basis that the surface water drainage strategy will not be able to rely on proprietary infiltration SUDS techniques, on site attenuation will therefore be essential in restricting surface water run-off from the proposed development. It is proposed to accommodate the necessary attenuation within three on site balancing ponds, interlinked by a network of swales.

3.18 The attenuation system will serve the vast majority of the development and it is proposed to restrict the residual positive surface water discharge from this attenuation system to a minimum of 10 l/s, as described within the FRA. With the nearest watercourse to the site of any note being the Mill Fleam, located approx. 700m to the north, alternative outfall points closer to the site have therefore been investigated.

3.19 Subject to the approval of Severn Trent Water and Staffordshire County Council, it is proposed to connect the restricted surface water discharge to the existing highway drainage system within Burton Road. The highway drain, to its outfall, will then be promoted for adoption with STWL in accordance with a section 102 agreement of the Water Industry Act 1991.

3.20 Utilising this outfall surface water flows from the site can drain via gravity.

3.21 Due to topographical constraints, it may be necessary to supplement the on-site balancing pond system with a limited amount of below ground attenuation within the proposed new access roads off Burton Road and the open space area adjacent to the main pond.

3.22 The use of permeable paving for private driveways/parking areas is to be considered as part of the detailed design process to help reduce the extent of attenuation required and to assist where localised topographical constraints are identified.

3.23 The new main on site surface water sewers will be constructed to adoptable standards and offered to Severn Trent Water for adoption under Section 104 of the Water Industry Act 1991. New highway drainage will be offered to the Highway Authority for adoption under Section 38 of the Highways Act 1980.

3.24 The proposed swales and balancing ponds will be adopted by a suitable adopting authority to ensure on going regular maintenance.

3.25 The most likely areas of the proposed development that would be subject to any leak or spillage of a hazardous material will be the adoptable highways and private car parks. Run-off from these areas within the residential element of the scheme will be drained via trapped gullies supported with appropriate planting within the ponds and swale areas that will provide some water quality enhancement. The B1 office development will also include bypass petrol/oil separators. The proposals will be in accordance with the relevant Environment Agency PPGs.

3.26 The preliminary surface water drainage layout is indicated on Dwg. No. P119A/300/B/P and P119A/318/P, included within Appendix C.

4.0 SUMMARY & CONCLUSIONS

General

4.1 The Ground Investigation Report states that no specific remediation works are required.

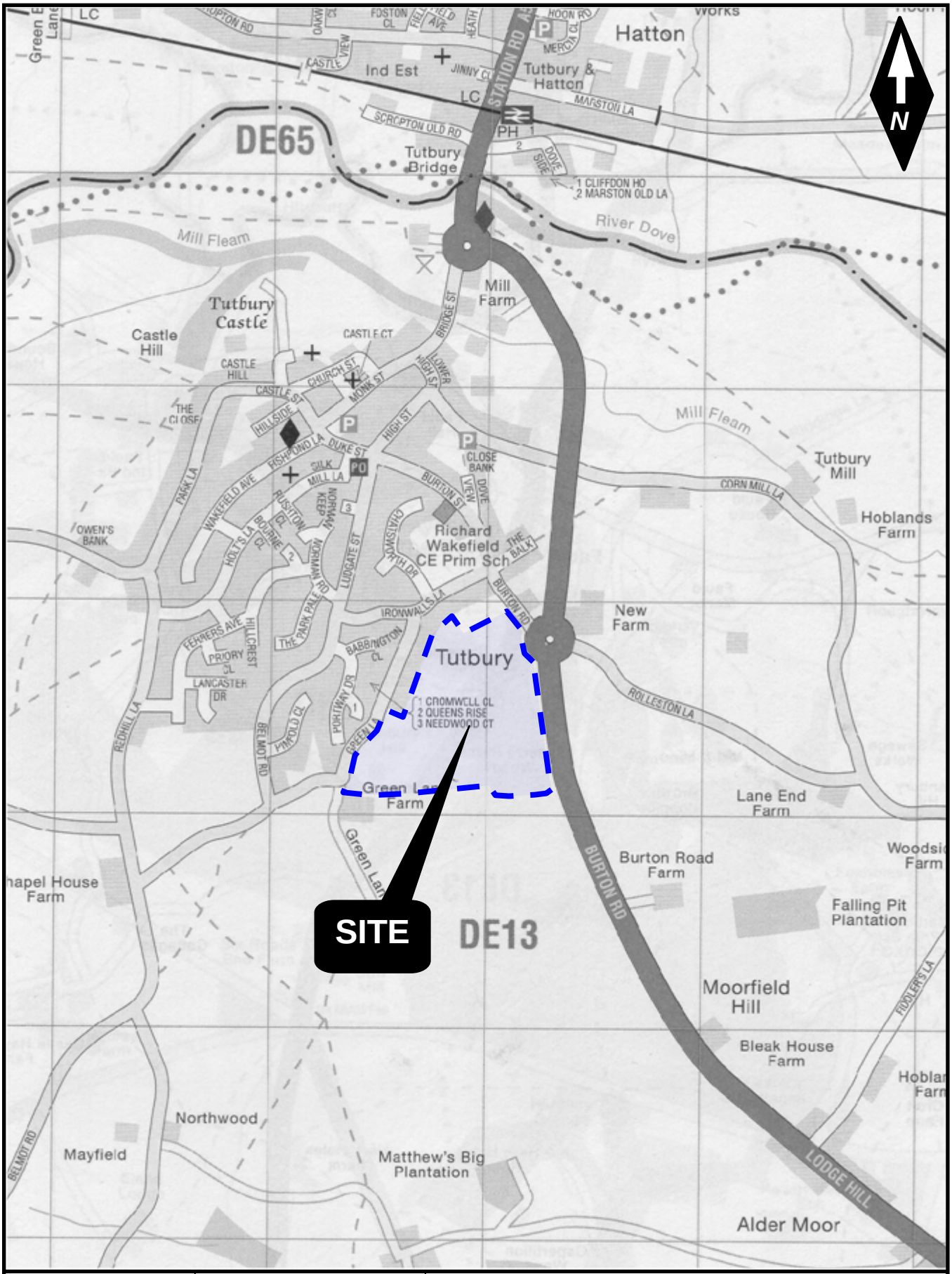
4.2 With the adoption of the design and working practices outlined within this assessment, it is concluded that the residual risks to local hydrology and hydrogeology are low.

4.3 The overall impact on other groundwater and surface water users is therefore considered to be negligible.

4.4 The proposed foul and surface water drainage systems should ensure that the risks of pollution and groundwater contamination are kept to a minimum. The continued efficiency of the drainage systems will, however, be dependant upon the implementation of an appropriate and regular maintenance regime.

APPENDICES

APPENDIX A



SCALE: **Do Not Scale**	CLIENT: **Peveril Homes Ltd**	JOB TITLE: **Land at Tutbury**		
DATE: **24/04/09**				
DRAWN: **AG**	TITLE: **SITE LOCATION PLAN**		JOB NUMBER: **P119**	FIGURE: **1**

APPENDIX B

N

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
L1	421615.406	328140.504	83.805
L2	421333.509	328136.235	88.928
L3	421666.121	328150.310	80.663
L4	421619.534	328400.479	80.319
L5	421559.929	328492.547	79.869
L6	421398.445	328328.206	88.789
L7	421399.803	328220.051	88.620
L19	421188.728	328186.769	87.189
L20	421220.571	328211.540	87.745
L21	421256.047	328291.671	88.405

Note:

Some services may have been omitted due to parked vehicles. The Ordnance Survey tile is to be used as a guide only.

OS Buildings *Surveyed Buildings*

This survey has been orientated to the Ordnance Survey (O.S) National Grid (OSGB36) via a Global Position System (GPS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN02 & OSGM02 transformation models.
The survey has been correlated to this point and a further one or more OSGB36 points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid.

Legend:

Buildings / walls
Kerb line
Edge of surface
Canopy / Overhang
Line Marking
Centre Line
Barrier
Hedge
Security Fence
Panel Fence
Open Fence
Overhead Powerline
Chamber
Woodland
Station and Name
Station Level
Benchmark
Borehole
Trial Hole
Tree / Bush / Sapling
Area of Underground
Gate
Inspection chamber
Cover level
Invert level
Pipe size (diameter)
Gully
Back Gully
Manhole

IB	Illuminated Bollard
CPS	Concrete Paving Slabs
Elec	Electric
BT	British Telecom
Fh	Fire Hydrant
St	Stop tap
Sv	Stop valve
Wo	Wash Out
Wm	Water Meter
Mkr	Service Marker
Re	Rodding eye
Av	Air Valve
C+m+p	Cable Marker
Lp	Lamp Post
Sp	Sign Post
Ep	Electricity Post
Tp	Telegraph Post
TL	Traffic light
Bs	Bus Stop
Fl	Floodlight
Fp	Flagpole
Pb	Post box
Lb	Litter Bin
Bo	Bollard
TCB	Telephone call box
Fa	Flagstaff
WL	Water level
Ht	Height
IFL	Internal floor level
THL	Threshold level
Re	Rodding Eye
Dk	Drop kerb
Gas	Gas
Er	Earth rod

Rev	Date	Description	Drawn	Q. Ref.

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CLIENT

Peveril Homes

PROJECT

Tutbury

TITLE

Topographical Survey

SCALE	DATE	DRAWN	QUALITY REF
1: 500	Aug/Sep 09	LP	FO346

Level datum	O.S (GPS)
Grid orientation	O.S (GPS)
Job number	13583

Drawing No. 13583_OGL — Rev. 0

Comments
This plan should only be used for its original purpose. GreenHatch Ltd accepts no responsibility for this plan if supplied to any party other than the original client.

All dimensions should be checked on site prior to design and construction.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

DO NOT SCALE

APPENDIX C