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Pedmore
Flood Risk Assessment

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EXECUTIVE SUMMARY

This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. It has been produced on behalf of William Davis Ltd in respect of a planning application where it is proposed that the site be developed to accommodate up to 100 dwellings. Vehicular access and egress is proposed to be taken from Bromwich Lane, Pedmore (approximate grid reference: SO911815).

This report demonstrates that the proposed development is not at significant flood risk, subject to the recommended flood mitigation strategies being implemented.

The site is shown to be located within Flood Zone 1, which is land defined as having low probability of flooding from rivers or sea. The nearest Flood Zone extents are located approximately 1.67km north-west of the site associated with River Stour. 1m resolution Light Detection and Ranging (LiDAR) data shows the site to be raised approximately 30-50m above the River Stour.

The majority of the site is shown to be at a very low risk of flooding from pluvial sources. Due to the surrounding topography, the northern boundary of the site is mapped as being at low to medium risk. However, the source of this accumulated runoff is considered to be generated from within the site itself. Therefore, this relatively minor flood risk may be resolved through developing the site and implementing formal surface water drainage infrastructure. More details of the proposed surface water drainage strategy are provided within the accompanying Sustainable Drainage Statement (reference: PBL-BWB-ZZ-XX-RP-CD-0001).

Flood risk posed to the site by canals, reservoirs, and sewers is considered to be low.

The risk of groundwater flooding to the finished development is also considered to be low. However, an intrusive ground investigation within the site identified shallow perched groundwater levels beneath the lower elevations of the site. Therefore, it is recommended that groundwater levels are monitored during the construction phase of development, especially within excavations, and where necessary dewatering should be undertaken by a specialist contractor.

The proposed development will increase the area of impermeable surfaces leading to a potential increase in surface water runoff. To mitigate this, a drainage strategy has been proposed, which will offer attenuated storage to ensure that the runoff rate from the site does not exceed the existing greenfield rate.

In compliance with the requirements of NPPF, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area as a result of suitable management of surface water runoff discharging from the site.

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1. INTRODUCTION

1.1 This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. The FRA has been produced on behalf of William Davis Ltd in respect of a planning application where it is proposed that the site be developed to accommodate up to 100 dwellings.

1.2 This FRA is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals at the planning stage. Summary information is included as **Table 1.1**.

Table 1.1: Site Summary

Site Name	Bromwich Lane
Location	Pedmore
NGR (approx.)	SO911815
Application Site Area (ha)	Approx. 4.20
Development Type	Residential
Flood Zone Classification	Flood Zone 1
NPPF Vulnerability	More Vulnerable
Anticipated Development Lifetime	100+ years
Environment Agency Office	West Midlands
Lead Local Flood Authority	Dudley Metropolitan Borough Council
Local Planning Authority	Dudley Metropolitan Borough Council

Sources of Data

i. Topographical Survey by Survey Solutions, reference 20454cv-01
ii. OS Explorer Series mapping
iii. Risk of Surface Water Flood Risk Maps
iv. The Black Country Strategic Flood Risk Assessment
v. The Dudley Metropolitan Borough Council Preliminary Flood Risk Assessment
vi. The Dudley Borough Development Strategy
vii. Ground Investigations undertaken by GRM Development Solutions reference GRM/P8139/F.1

viii. Severn Trent Water Sewer Records

ix. British Geological Survey Maps

x. 1m LiDAR Contour Data

xi. Sustainable Drainage Statement, reference PBL-BWB-ZZ-XX-RP-CD-0001_SDS

Existing Site

1.3 The greenfield site is located off Bromwich Lane, approximately 1km north of Hagley. The A491 (Hagley Road) is located approximately 110m east of the site. The site is bound by residential development immediately north, east and north-west and greenfield land to the south.

1.4 An unnamed ordinary watercourse is located approximately 530m south-west and approximately 470m south of the site.

1.5 The site's location is illustrated within **Figure 1.1.**

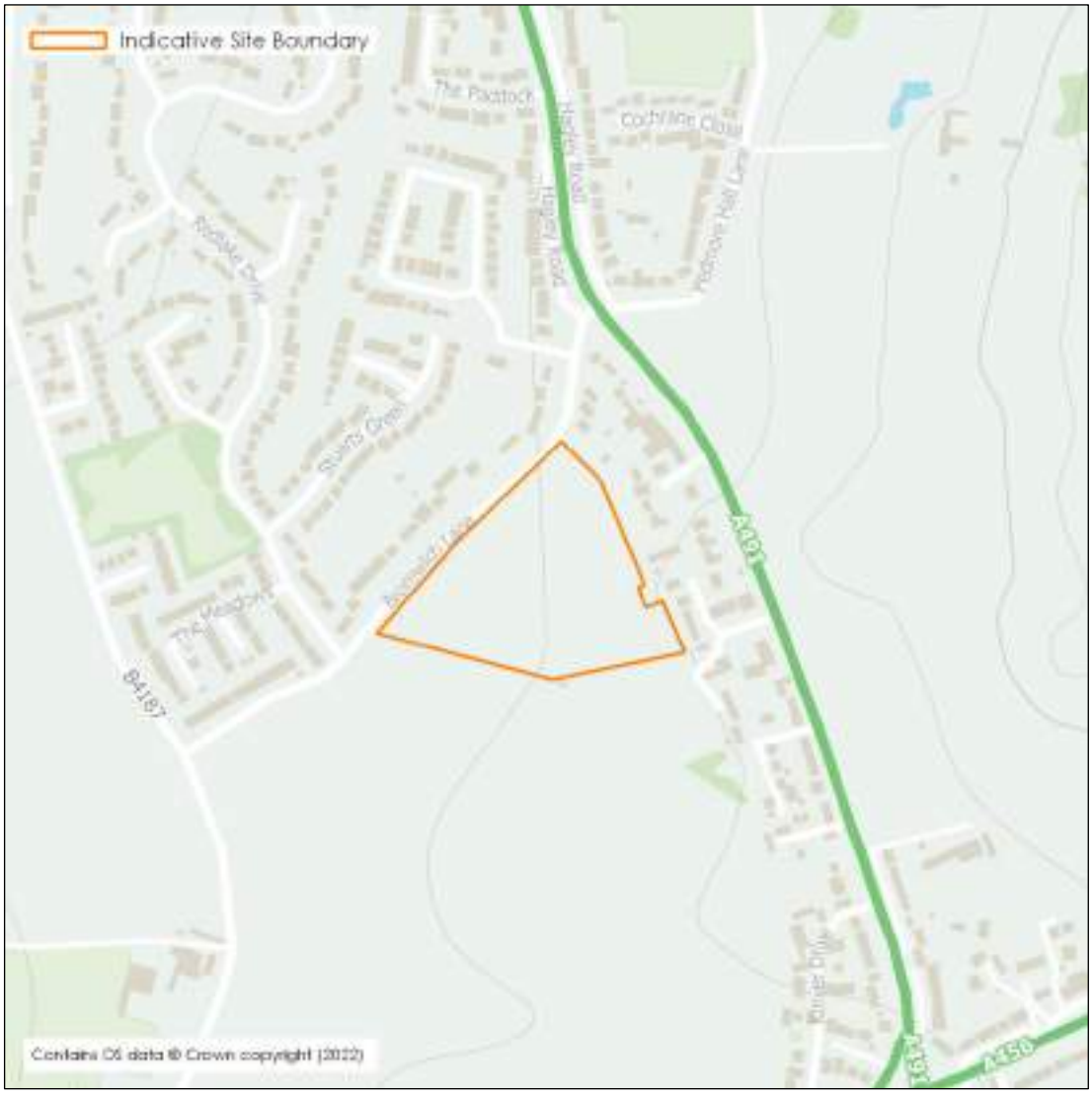

Figure 1.1: Site Location

1.6 A topographical survey of the site has been undertaken and is included as **Appendix 1**. The site is shown to generally fall in a south westerly direction with levels shown to range from approximately 130.7m Above Ordnance Datum (AOD) in the east to approximately 116.5m AOD in the south-west.

Proposed Development

1.7 It is proposed that the site be developed to accommodate up to 100 dwellings. Vehicular access and egress is proposed to be taken from Bromwich Lane to the west. A sketch masterplan is included as **Appendix 2**.

2. FLOOD RISK PLANNING POLICY & GUIDANCE

National Planning Policy Framework

2.1 The NPPF[1] sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. Planning Practice Guidance is also available online[2].

2.2 The Planning Practice Guidance sets out the vulnerability to flooding of different land uses. It encourages development to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off site to the wider catchment area.

2.3 The Planning Practice Guidance also states that alternative sources of flooding, other than fluvial (river flooding), should be considered when preparing a FRA.

2.4 The Planning Practice Guidance includes a series of tables that define Flood Zones (Table 1), the flood risk vulnerability classification of development land uses (Table 2) and 'compatibility' of development within the defined Flood Zones (Table 3). Table 2 and Table 3 are recreated within **Appendix 3** of this report for reference.

2.5 This FRA is written in accordance with the NPPF and the Planning Practice Guidance.

Flood Map for Planning

2.6 With particular reference to planning and development, the Flood Map for Planning identifies Flood Zones in accordance with Table 1 of the Planning Practice Guidance. Further details on the Flood Zone classifications are outlined in **Table 2.1**.

Table 2.1: Flood Zone Classifications

Flood Zone	Description
Flood Zone 1 (Low Probability)	Land having less than a 1 in 1000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability). All land outside of Flood Zone 2 and 3.
Flood Zone 2 (Medium Probability)	Land having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1% AEP); or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1% AEP).
Flood Zone 3a (High Probability)	Land having a 1 in 100 or greater annual probability of river flooding (>1% AEP); or land having a 1 in 200 or greater annual probability of flooding from the sea (>0.5% AEP). This is represented by "Flood Zone 3" on the Flood Map for Planning.
Flood Zone 3b (The Functional Floodplain)	Flood Zone 3b (The Functional Floodplain) is defined as land where water must flow or be stored in times of

[1] Revised National Planning Policy Framework, Ministry of Housing, Communities & Local Government, amended 2021
[2] Planning Practice Guidance: https://www.gov.uk/government/collections/planning-practice-guidance

Flood Zone	Description
	flood. This is not identified or separately distinguished from Zone 3a on the Flood Map for Planning.

2.7 The site is shown to be located within Flood Zone 1, as shown in **Figure 2.1**.

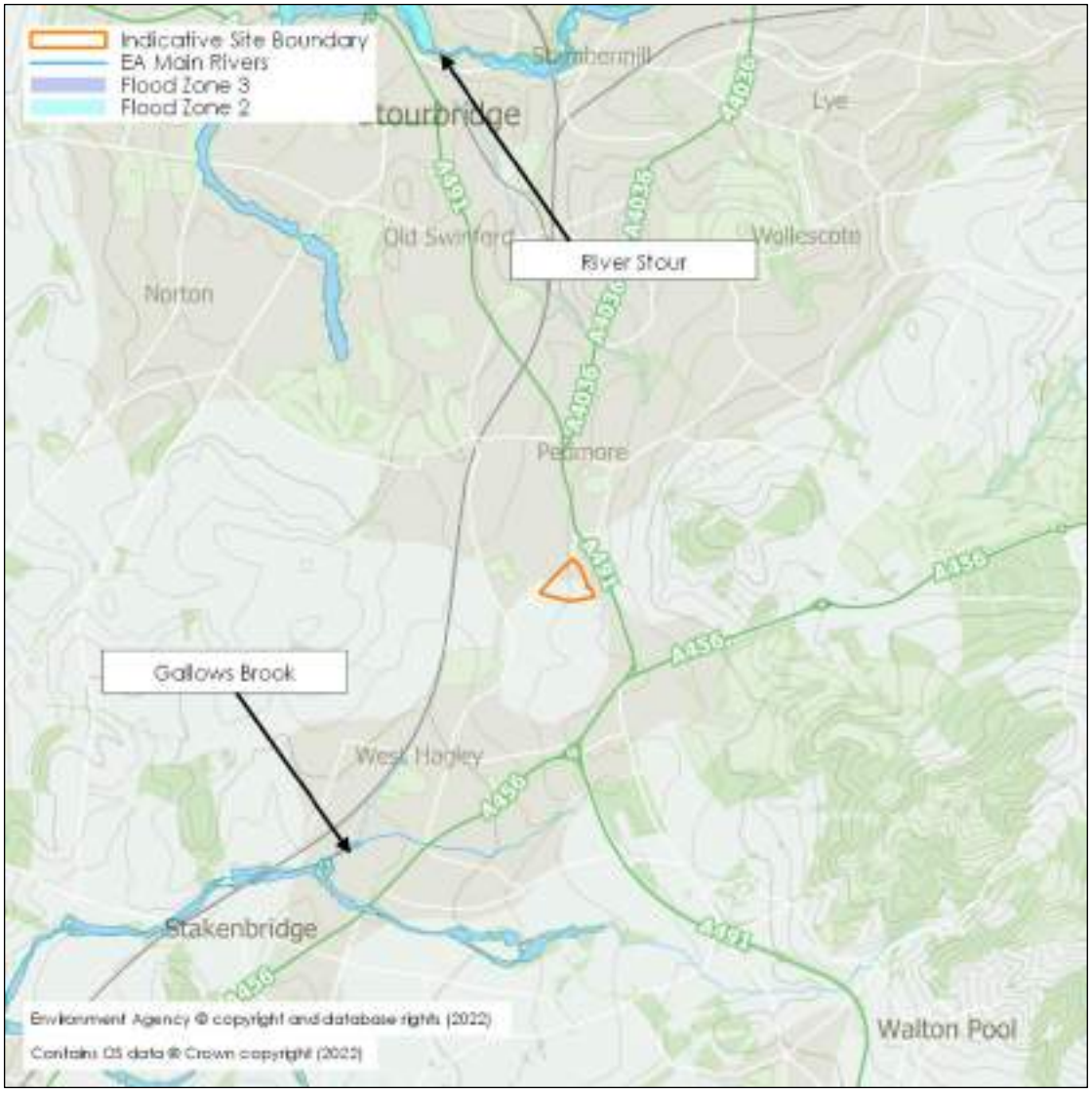

Figure 2.1: Flood Map for Planning

The Design Flood

2.8 The Planning Practice Guidance identifies that new developments should be designed to provide adequate flood risk management, mitigation, and resilience against the 'design flood' for their lifetime.

2.9 This is a flood event of a given annual flood probability, which is generally taken as fluvial (river) and surface water (pluvial) flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), or tidal flooding with a 0.5% annual probability (1 in 200 chance each year), against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Climate Change

Peak River Flow

2.10 Predicted future changes in peak river flows caused by climate change are provided by the Environment Agency (EA)[3], with a range of projections applied to regionalised 'River Basin Districts', which are further subdivided into Management Catchments.

2.11 The site falls within the Severn Middle Worcestershire Management Catchment of the Severn River Basin District. **Table 2.2** identifies the relevant peak river flow climate change allowances from this Management Catchment.

Table 2.2: Peak River Flow Climate Change Allowances for the Severn Middle Worcestershire Management Catchment within the Severn River Basin District

Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2125)
Upper End	25%	38%	67%
Higher Central	16%	21%	40%
Central	12%	15%	30%

2.12 When determining the appropriate allowance for use in a FRA the Flood Zone classification, flood risk vulnerability and the anticipated lifespan of the development should be considered. **Table 2.3** provides a matrix summarising the EA's guidance on determining the appropriate allowance(s).

Table 2.3: Application of Appropriate Peak River Flow Climate Change Allowances

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	Use the central allowance where a location may fall within Flood Zone 2 or 3 in the future.				
2	Use the higher central allowance	Use the central allowance			

[3] Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
3a	Use the higher central allowance	Development should not be permitted	Use the central allowance		
3b	Use the higher central allowance	Development should not be permitted			Use the central allowance
If development is considered appropriate by the local authority when not in accordance with Flood Zone vulnerability categories, then it would be appropriate to use the higher central allowance.					

2.13 The site is located entirely within Flood Zone 1. The Environment Agency guidance states that for a site in Flood Zone 1 and identified to potentially fall within Flood Zones 2 or 3 in the future the Central allowances should be used; however, the distance of the site from surrounding watercourses, and the intervening topography, means that the site is not anticipated to be located within Flood Zones 2 or 3 now or in the future. Therefore, no allowance for climate change has been included within the fluvial flood risk assessment within this report.

Strategic Flood Risk Assessment

2.14 A Strategic Flood Risk Assessment (SFRA) is a study carried out by one or more local planning authorities to assess the risk to an area from flooding from all sources, now and in the future.

2.15 The Black Country Authorities Level SFRA[4] has been reviewed in the production of this FRA. The SFRA provides information specific to the site location in the form of fluvial, surface water and groundwater flood risk mapping, as well as records of historical flooding. Information from the Level 1 SFRA will be referenced within **Section 3** where applicable.

Preliminary Flood Risk Assessment

2.16 A Preliminary Flood Risk Assessment (PFRA) is an assessment of floods that have taken place in the past and floods that could take place in the future. It generally considers flooding from surface water runoff, groundwater and ordinary watercourses, and is prepared by the Lead Local Flood Authorities (LLFA).

2.17 The Dudley Metropolitan Borough Council PFRA[5] considers flooding from surface water runoff, groundwater, ordinary watercourses and canals. However, no historical instances of flooding at the site are referenced. Information from the PFRA will not be referenced further within this report.

[4] Level 1 Strategic Flood Risk Assessment (JBA Consulting, June 2020)
[5] Preliminary Flood Risk Assessment (Dudley Metropolitan Brough Council, June 2011)

2.18 A PFRA Addendum[6] was prepared in 2017 and states that have been no major changes to the assessment of risk since the preliminary assessment was published in 2011.

Local Flood Risk Management Strategy

2.19 A Local Flood Risk Management Strategy (LFRMS) is prepared by a Lead Local Flood Authority to help understand and manage flood risk at a local level.

2.20 The LFRMS aims to ensure that the knowledge of local flood risk issues is communicated effectively so that they can be better managed. The LFRMS also aims to promote sustainable development and environmental protection.

2.21 The Black Country LFRMS[7] has been reviewed and will not be referenced further within this report.

Development Strategy

2.22 The Dudley Borough Development Strategy[8] guides development within the Borough until 2026 by providing allocations and local planning policies to give greater certainty to the development process.

2.23 Policy S4 states 'The Council will require Flood Risk Assessments (FRAs) to be prepared in support of planning applications for;

- all developments within Flood Zone 1 (low risk) for development proposals of 1 hectare or greater and all proposals for new development in Flood Zone 2 (medium risk) or Flood Zone 3 (high risk) as identified in the Environment Agency's flood maps which are updated quarterly and represent the best available information and the Council's surface water flood risk maps and Preliminary Flood Risk Assessment (PFRA) report;

- all developments identified as at risk from other sources of flooding as identified in the updated flood maps included in the Council's Preliminary Flood Risk Assessment produced in 2011 including surface water, sewer and groundwater flooding;

- all developments identified as at risk from flooding in the PFRA report and indicated on the Council's updated Flood Maps for Surface Water which now represent the Council's locally agreed surface water Information as defined in the PFRA including information on flood extents, depths and velocity (speed and direction); and

- all other developments identified as at risk of flooding by the Council as LLFA.

[6] Preliminary Flood Risk Assessment Addendum (Dudley Metropolitan Borough Council, December 2017)
[7] Local Flood Risk Management Strategy (Dudley Metropolitan, Sandwell Metropolitan Borough Council, Walsall Council, City of Wolverhampton Council, February 2016)
[8] The Dudley Borough Development Strategy (Dudley Metropolitan Borough Council, March 2017)

Other Relevant Policy and Guidance

2.24 This FRA has considered the following documents when assessing sources of flood risk and when recommending mitigation and resilience measures.

Flood Risk to People and New Developments

2.25 The Flood Risk to People (FD2321/TR1)[9] document was prepared as a research project considering flood hazard and factors that affect it.

2.26 Flood Risk Assessment Guidance for New Development (FD2320/TR2)[10] provides a framework and guidance for assessing and managing flood risks for new developments and sets flood hazard thresholds.

2.27 Hazard ratings are derived using the following equation in line with the above:

$$Hazard\ Rating = D * (V+0.5) + DF$$

Where:
D = depth
V = velocity
DF = debris factor

2.28 A supplementary note[11] provides clarification of the hazard rating thresholds which should be used for development planning and control use. **Table 2.4** identifies the thresholds of the flood hazard categories.

Table 2.4: Hazard to People[12]

Threshold for Flood Hazard Rating	Degree of Flood Hazard	Description
< 0.75	Low	**Caution** "Flood zone with shallow flowing water or deep standing water"
0.75 - 1.25	Moderate	**Danger for some (i.e.: children, the elderly and the infirm)** "Danger: Flood Zone with deep or fast flowing water"
1.25 - 2.0	Significant	**Danger for most (includes the general public)** "Danger: Flood Zone with deep fast flowing water"
2.0 >	Extreme	**Danger for all (includes the emergency services)** "Extreme Danger: Flood Zone with deep fast flowing water"

[9] Flood Risk to People Methodology (FD2321/TR1), Defra/Environment Agency, 2006
[10] Flood Risk Assessment Guidance for New Development (FD2320/TR2), Defra/Environment Agency, 2005
[11] Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose – Clarification of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1. (http://randd.defra.gov.uk/Document.aspx?Document=FD2321_7400_PR.pdf)
[12] 2008, DEFRA. Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purposes.

3. POTENTIAL SOURCES OF FLOOD RISK

3.1 Flooding can occur from a variety of sources, or combination of sources, which may be natural or artificial. **Table 3.1** below identifies the potential sources of flood risk to the site in its current condition, and the impacts which the development could have in the wider catchment, prior to mitigation. These are discussed in greater detail in the forthcoming section. The mitigation measures proposed to address flood risk issues and ensure the development is appropriate for its location are discussed within **Section 4**.

Table 3.1: Pre-Mitigation Sources of Flood Risk

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Fluvial				X	The site is located in Flood Zone 1 and there no ordinary watercourses within the immediate vicinity of the site.
Canals				X	The nearest canal to the site is the Staffordshire & Worcestershire Canal located 5.35km west of the site. 1m Light Detection and Ranging) LiDAR data shows the site to be elevated 70-90m above this canal.
Groundwater			X		The overall risk to the completed development is considered to be low, but intrusive ground investigations identified localised shallow groundwater levels that could be encountered during the construction phase.
Reservoirs and waterbodies				X	EA reservoir flood risk mapping indicates that the site is far removed from any areas at risk of reservoir failure.
Pluvial runoff			X		The majority of the site is shown to be at very low risk of flooding from pluvial sources.
Sewers			X		No public or private sewers are indicated to be located within the site. LiDAR data has shown that in the event of exceedance by any surrounding sewer flooding, flows are expected to be directed to the north-west away from the site.
Effect of Development			X		Development will not result in impedance of pluvial and fluvial flow routes.

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
on Wider Catchment		X			The development will increase the area of impermeable surfaces leading to a potential increase in runoff, unless mitigated.

Fluvial Flood Risk

3.2 Flooding from watercourses occurs when flows exceed the capacity of the channel, or where a restrictive structure is encountered, which leads to water overtopping the banks into the floodplain. This process can be exacerbated when debris is mobilised by high flows and accumulates at structures.

3.3 The site is shown to be located within Flood Zone 1, as illustrated in **Figure 2.1**, which is land defined as having low probability of flooding from rivers or sea. The nearest Flood Zone extents are located approximately 1.67km north-west of the site associated with River Stour. 1m resolution LiDAR data shows the site to be raised approximately 30-50m above the River Stour.

3.4 The unnamed ordinary watercourse located approximately 530m south-west and approximately 470m south of the site are not represented on the Flood Map for Planning as the catchment area is likely to be too small (<3km^2). Following a review of available contour data, ground levels fall to the south-west of these watercourses away from the site meaning that any flood flows will be routed away from the site.

3.5 The Environment Agency and LLFA do not hold any information of historical fluvial flooding.

3.6 As such, there is not considered to be a risk of fluvial flooding at the site.

Groundwater Flood Risk

3.7 Groundwater flooding occurs when the water table rises above ground elevations, or it rises to depths containing basement level development. It is most likely to happen in low lying areas underlain by permeable geology. This is most common on regional scale chalk aquifers, but there may also be a risk on sandstone and limestone aquifers or on think deposits of sands and gravels underlain by less permeable strata such as that in a river valley.

3.8 British Geological Survey (BGS) mapping shows the sites bedrock to be entirely underlain by the Helsby Sandstone Formation – Sandstone. BGS mapping shows that there is no record of superficial deposits located within the site.

3.9 The EA designates the bedrock geology within the site to be Principal Aquifers. Principal Aquifers provide significant quantities of drinking water, and water for business needs. They may support rivers, lakes and wetlands.

3.10 There are no historical BGS borehole logs located within the site boundary. The nearest borehole log to the site (Borehole log reference: SO98SW509) is located approximately 125m south-east of the site and is underlain by the same bedrock. However, this log did not record a groundwater strike.

3.11 The SFRA identifies that the risk of groundwater flooding is relatively low throughout the Black Country, with the exception of Wolverhampton and also on the Sandwell and Dudley borders – all of which are well removed from the site. Additionally, the PFRA does not include any reports of historical groundwater flooding incidents in the local area.

3.12 A ground investigation was undertaken by GRM Development Solutions in January 2018. The report (reference: GRM/P8139/F.1) states that Topsoil, Made Ground and Helsby Sandstone Formation was encountered during the investigation. Groundwater ingress was only encountered in 7 of the 34 exploratory holes as shown in **Appendix 4**.

3.13 SA02 and TP08 located within the northern corner of the site, encountered slight to moderate ingress at depths of 2.0m and 2.8m below ground level (bgl) respectively. This was reported to most likely represent the depth of the local water table.

3.14 Five exploratory holes in the south west of the site (SA01, TP10, TP12, TP18 and WS08), located in an area of low topography, encountered groundwater in the form of minor seepages up to the moderate ingress at depths of between 0.40m and 1.80m bgl. This was reported to most likely be associated with localised perched water.

3.15 It is reported that the groundwater is mostly likely to be flowing towards the west, following the general fall of the topography.

3.16 Based on the available data and lack of any historical incidents, and given the groundwater was only encountered in isolated areas of the site, and when it was struck it was either found to be localised perched volumes, or to be at a level over 2mBGL, the risk of groundwater exceeding ground levels and causing flooding in the site is considered to be low. However, as also reported in the ground investigation report, there is a risk that groundwater could be encountered during excavations – particularly within the south-western corner. Appropriate mitigation measures to manage this risk of groundwater flooding are proposed within **Section 4**.

Flood Risk from Reservoirs & Large Waterbodies

3.17 Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain water in times of flood. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.

3.18 To help identify this risk, reservoir failure flood risk mapping has been prepared (see **Figure 3.1**), this shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map displays a worst-case scenario and is only intended as a guide.

3.19 There are two flooding scenarios shown on the reservoir flood maps: a 'dry-day' and a 'wet-day'. The dry-day scenario predicts the flooding that would occur if the dam or reservoir failed when rivers are at normal levels. The wet-day scenario predicts how much worse the flooding might be if a river is already experiencing an extreme flood.

Figure 3.1: Reservoir Failure Flood Risk Map

3.20 The site is shown to be far removed from any areas at risk of reservoir failure in both the 'dry-day' and 'wet-day' scenarios. Additionally, there are no large impounded artificial waterbodies within the vicinity of the site.

3.21 Based on the above information, the site is not considered to be at risk of flooding from reservoir and/or large waterbodies.

Pluvial Flood Risk

3.22 Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

3.23 Risk of flooding from surface water (RoFSW) mapping has been prepared by the EA, this shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. An extract from the mapping is included as **Figure 3.2**.

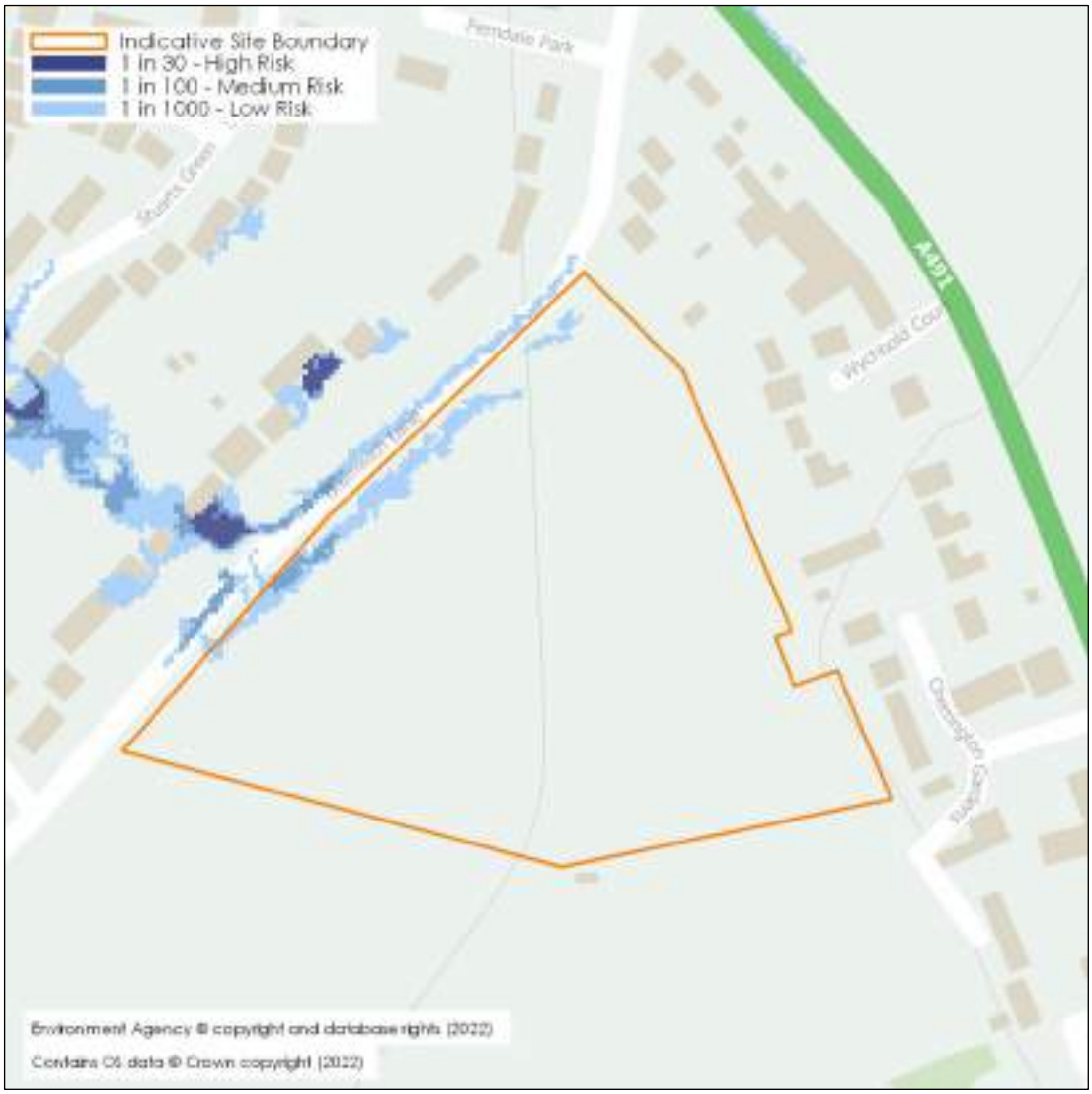

Figure 3.2: Surface Water Extents Mapping

3.24 The majority of the site is shown to be at very low risk of flooding from pluvial sources.

3.25 A low-risk overland flow route along the west site boundary which culminates in a medium risk area of ponding. Within the area of medium flood risk, the EA's flood risk mapping indicates potential flood depths of up to 300mm during the 1 in 100-year (Medium Risk) design event. The flood hazard rating in this location is classified as 'Low – Caution'.

3.26 The surface water flood risk area shown on the EA's flood risk mapping is associated with the existing topography of the site and the uncontrolled runoff of surface water through the greenfield site from east to west before collecting within a topographical depression between the site boundary and Bromwich Lane.

3.27 Overall, the site is considered to be at a low risk of flooding from surface water.

3.28 The low-risk overland flow route may be resolved following implementation of a suitably designed surface water drainage system which will capture and convey surface water through the site, towards an attenuation pond, hence re-directing overland flows away from the topographical depression.

3.29 Additionally, there will be opportunities to contain any residual overland flow routes within a green infrastructure corridor along the north west boundary of the site. However, the inclusion of any green / blue corridors will be subject to inclusion within future development masterplans and will be confirmed as the scheme progresses.

3.30 More information relating to the proposed surface water drainage mitigation measures are discussed within **Section 4**.

Flood Risk from Sewers

3.31 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or as a result of a reduction in capacity due to collapse or blockage, or if the downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.

3.32 The local sewerage undertaker is Severn Trent Water. A copy of their asset records is included as **Appendix 5**. There are no public sewers within the site boundary.

3.33 The records show a 150mm to 225mm foul water public sewer to be located to the west of the site in Bromwich Lane and that this flows in a south westerly then north westerly direction. A 225mm public surface water sewer is shown to be located to the south west of the site in Redlake Drive, directing flows in a north westerly direction.

3.34 Available contour data has shown that in the event of exceedance by sewer flooding, any overland flows would be expected to be directed to the north-west away from the site.

3.35 There is no private drainage infrastructure shown to be within the site on the topographical survey, presented as **Appendix 1**.

3.36 According to the EA, LLFA, and the SFRA there have been no incidences of sewer flooding within the vicinity of the site.

3.37 Overall, the risk of flooding from sewer sources is considered to be low.

Effect of Development on Wider Catchment

Development Land Use/Drainage Considerations

3.38 The proposed development will increase the area of impermeable surfaces leading to a potential increase in surface water runoff. Appropriate mitigation measures to address this risk are outlined in **Section 4**.

4. FLOOD RISK MITIGATION

4.1 **Section 3** has identified the sources of flooding which could potentially pose a risk to the site and the proposed development. This section of the FRA sets out the mitigation measures which are to be incorporated within the proposed development to address and reduce the risk of flooding to within acceptable levels.

Development Levels

4.2 Where possible, it is recommended that finished floor levels are raised 150mm above surrounding ground levels to mitigate any residual risk of flooding from groundwater, surface water and sewer sources.

4.3 Additionally, development should not be located in topographical depressions, and ground levels should be profiled to encourage pluvial runoff and overland flows away from the built development and towards the nearest drainage point.

4.4 It is recommended that no below ground/basement structures are implemented for any dwellings located within areas observed to have shallow resting groundwater levels.

Surface Water Drainage

4.5 To mitigate the development's impact on the current runoff regime it is proposed to incorporate surface water attenuation and storage as part of the development proposals. Further information on the drainage approach is provided within the accompanying Sustainable Drainage Statement (SDS), reference PBL-BWB-ZZ-XX-RP-CD-0001_SDS.

4.6 In brief, the development will discharge surface water to the local public surface water sewer at the calculated Greenfield Mean Annual Flow Rate (QBAR) for all events up 1 in 100-year + 40% climate change allowance. Attenuated surface water storage will be provided in the form of a Sustainable Drainage System (SuDS) attenuation pond with capacity for the 1 in 100-year storm with an allowance for climate change. This will ensure that the additional impermeable surfaces and sewers that will be introduced by the development do not create a flood risk to third parties or pose a flood risk to the development itself.

4.7 The development should be designed with exceedance in mind. The road network and landscape corridors should be used to convey excess overland flows towards the attenuation points.

4.8 Finished floor levels of the development should be set above the maximum water levels within attenuation features, and also above the water levels on potential exceedance flow pathways.

Foul Water Drainage

4.9 It is proposed to drain used water from the development separately to surface water.

4.10 The local surface operator has confirmed capacity for the proposed development. Further information on the drainage approach is provided within the accompanying SDS.

Land Drainage Considerations

4.11 There is a risk that groundwater could be encountered during the construction phase, particularly during deep excavations. It is recommended that water levels are monitored during the construction phase and appropriate dewatering implemented where necessary.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 This FRA has been prepared in accordance with requirements set out in the NPPF and the associated Planning Practice Guidance. The FRA has been produced on behalf of William Davis Ltd in respect of a planning application where it is proposed that the site be developed to accommodate up to 100 dwellings.

5.2 This FRA is intended to support a planning application and as such the level of detail included is commensurate and subject to the nature of the proposals at the planning stage.

5.3 This report demonstrates that the proposed development is not at significant flood risk, subject to the recommended flood mitigation strategies being implemented. The identified risks and mitigation measures are summarised within **Table 5.1**:

Table 5.1: Summary of Flood Risk Assessment

Flood Source	Risk & Proposed Mitigation Measures
Sewers, Pluvial, Groundwater	Finished floor levels of the proposed development should be raised a minimum of 150mm above surrounding ground levels to mitigate any residual risk of flooding. The development should be designed with exceedance in mind. The road network and landscape corridors should be used to convey excess overland flows towards the attenuation points. Finished floor levels of the development should be set above the maximum water levels within attenuation features, and also above the water levels on potential exceedance flow pathways. It is recommended that no basement structures are implemented for any dwellings located within areas observed to have shallow resting groundwater levels. Groundwater water levels should be monitored during the construction phase and appropriate dewatering implemented where necessary.
Impact of the Development	To mitigate the development's impact on the current runoff regime it is proposed to incorporate surface water attenuation and storage as part of the development proposals. For more information on the proposed mitigation strategy refer to the accompany SDS report (PBL-BWB-ZZ-XX-RP-CD-0001).
This summary should be read in conjunction with BWB's full report. It reflects an assessment of the Site based on information received by BWB at the time of production.	

5.4 In compliance with the requirements of NPPF, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area as a result of suitable management of surface water runoff discharging from the site.

APPENDICES

Appendix 1: Topographical Survey


NORTH
Indicative
Private property
Grass
Paved
Footpath
Asphalt
Stones
Vegetation/Trees 10h
Vegetation/Trees 15h
Hedge 2h
Hedge 3h
Hedge 4h
Hedge 5h
Hedge 6h
Hedge 7h
Hedge 8h
Hedge 9h
Hedge 10h
Hedge 11h
Hedge 12h
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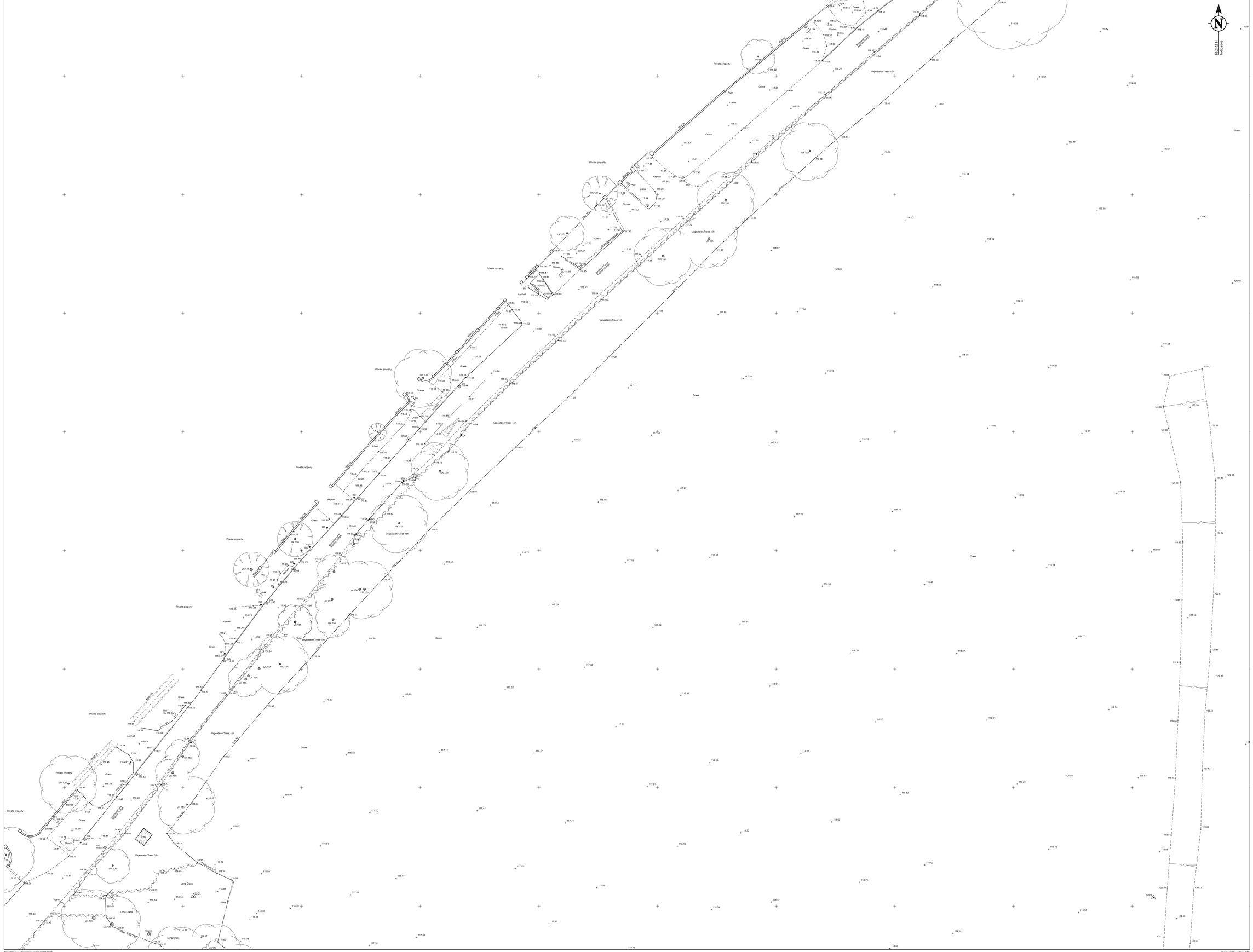
Hedge 21h
Hedge



Original Sheet Size A0H

TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Height	FH	Fire Hydrant	RSJ	Rolled Steel Joist
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CL	Cover Level	MH	Manhole	UB	Universal Beam
C/L	Chain Link Fence	MP	Marker Post	UC	Unknown Cover
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EP	Electric Pole	RE	Rodding Eye	(x.xx)	Floor to Ceiling Height
ER	Earth Rod	RL	Ridge Level		
ET	EP+Transformer	RP	Reflector Post	(x.xx)F/C	Floor to False Ceiling Ht
FB	Flower Bed	RS	Road Sign		
FBD	Floor Board Direction	RSD	Roller Shutter Door	△	Survey Control Station

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REV	DESCRIPTION	DRAWN	APPR	DATE

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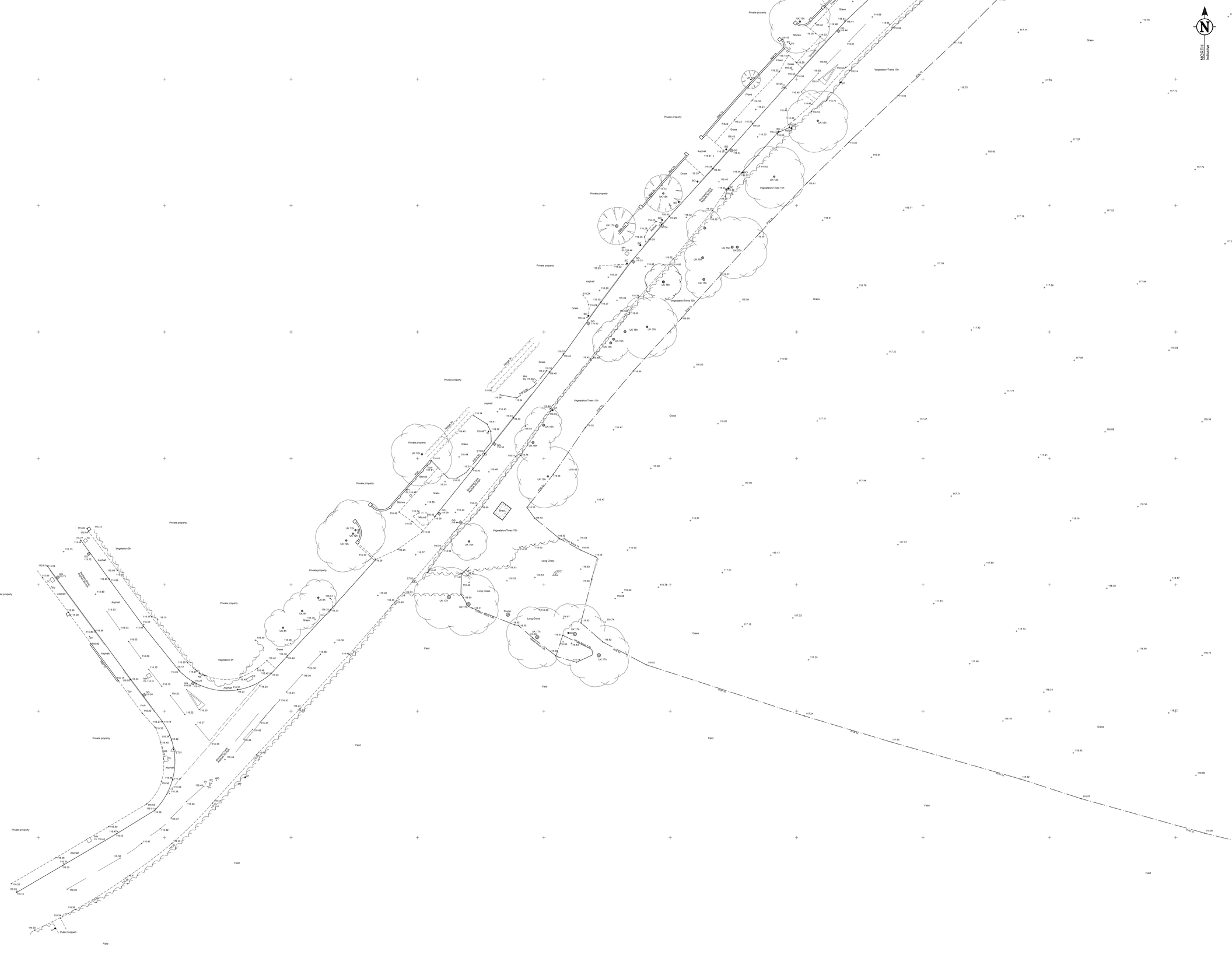
LAND SURVEYING BUILDING SURVEYING UNDERGROUND SURVEYING

PROJECT TITLE
BROMWICH LANE
PEDMORE,DUDLEY

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 2 of 6

CLIENT WILLIAM DAVIS LIMITED				SCALE 1:500
SURVEYOR IM	SURVEY DATE 19/9/17	CHECKED BY PDS	APPROVED BY PDS	DWG STATUS FINAL
DRAWING NUMBER 20454cv-01			REVISION	ISSUE DATE 25/9/17



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DRAWING DETAIL	TOPOGRAPHICAL SURVEY Sheet 3 of 6			
CLIENT	WILLIAM DAVIS LIMITED			SCALE 1:500
SURVEYOR: IM	SURVEY DATE: 19/9/17	CHECKED BY: POS	APPROVED BY: POS	DWG STATUS: FINAL
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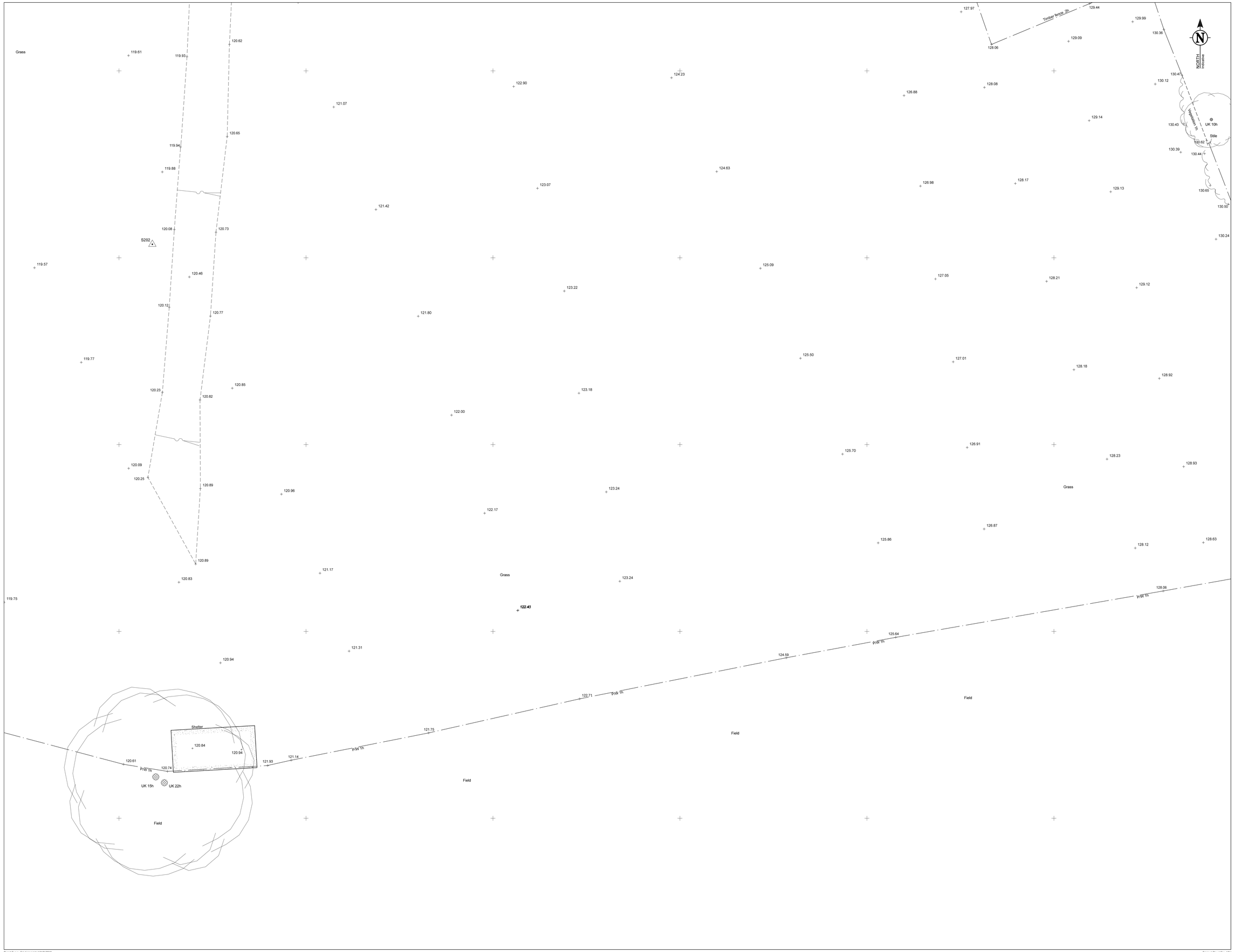

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PROJECT TITLE: BROMWICH LANE PEDMORE DUDLEY				
DRAWING DETAIL: TOPOGRAPHICAL SURVEY Sheet 4 of 6				
CLIENT: WILLIAM DAVIS LIMITED				SCALE: 1:500
SURVEYOR: IM	SURVEY DATE: 19/9/17	CHECKED BY: PDS	APPROVED BY: PDS	DWG STATUS: FINAL
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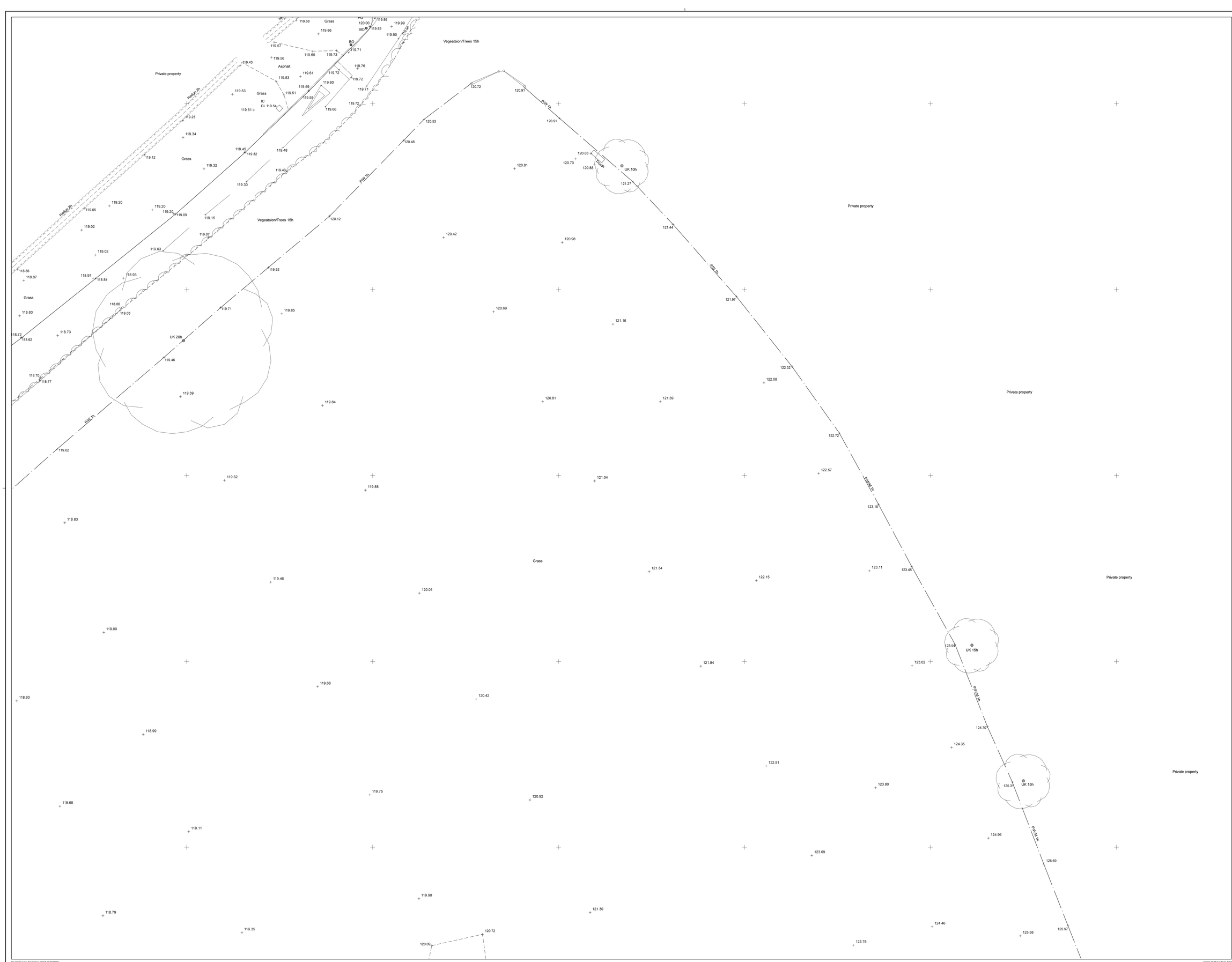

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AH	Arch Head Height	FH	Fire Hydrant	RSJ	Rolled Steel Joist
AR	Assumed Route	FBD	Floor Board Direction	SI	Sign Post
AV	Air Valve	FH	Fire Hydrant	SP	Arch Spring Point Height
BB	Belisha Beacon	FL	Floor Level	SV	Stop Valve
BH	Bore Hole	FP	Flag Pole	SW	Surface Water
BL	Bed Level	FW	Foul Water	SY	Stay
BO	Bollard	GG	Gully Grate	Tel	Telfrite Paving
BP	Brace Post	GV	Gas Valve	TC	Telecom Cover
BS	Bus Stop	HH	Head Height	TH	Tree Ht
BU	Bush	IC	Inspection Cover	THL	Threshold Level
BW	Barbed Wire Fence	IL	Invert Level	TP	Traffic Light
C/Lintel	Centre of Lintel	IN	Iron Nail	TrpH	Triangulation Point
C/B	Close Board Fence	KO	Kerb Outlet	TP	Telegraph Pole
CH	Cill Height	LP	Lamp Post	TV	Cable TV Cover
CL	Cover Level	MH	Manhole	UB	Universal Beam
CiL	Chain Link Fence	MP	Marker Post	UC	Unknown Cover
C-Lev	Ceiling Level	NB	Name Board	UK	Unknown Tree
Col	Column	OHL	Overhead Line (approx)	USB	Under Side Beam
C/P	Chestnut Paling Fence	Pan	Panel Fence	UTL	Unable To Lift
CR	Cable Riser	PB	Post Box	VP	Vent Pipe
DC	Drainage Channel	PM	Parking Meter	WB	Waste Bin
DH	Door Head Height	PO	Post	WH	Weep Hole
DP	Down Pipe	P/R	Post & Rail Fence	WL	Water Level
DR	Drain	P/W	Post & Wire Fence	WM	Water Meter
EL	Eaves Level	P/Wall	Partition Wall	WO	Wash Out
EP	Electric Pole	RE	Rodding Eye	FCH	Floor to Ceiling Height
ER	Earth Rod	RL	Ridge Level		
ET	EP+Transformer	RP	Reflector Post	C/V	A/C Floor to Fallse Ceiling Ht
FB	Flower Bed	RS	Road Sign		
FBD	Floor Board Direction	R/SD	Roller Shutter Door		Survey Control Station

DRAWING NOTE
Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including; sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

Cill heights are measured as floor to the cill and head heights are measured from cill to the top of window.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

Do not scale from this drawing.
The coordinate system established for this survey is related to Ordnance Survey (OS) national grid at a single point using Smartnet, then orientated to grid north with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies any coordinated data used in conjunction with this survey must be derived directly from this control data.

CONTROL CO-ORDINATES

STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION

REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS
Ipswich Coventry Yeovil Norwich Perth Nottingham Brentwood
Tel No: 0845 0405 969 Fax No: 0845 0405 970
www.survey-solutions.co.uk enquiries@survey-solutions.co.uk
LAND SURVEYING BUILDING SURVEYING UNDERGROUND SURVEYING

PROJECT TITLE: BROMWCH LANE PEDMORE.DUDLEY				
DRAWING DETAIL: TOPOGRAPHICAL SURVEY Sheet 6 of 6				
CLIENT: WILLIAM DAVIS LIMITED				SCALE: 1:500
SURVEYOR: IM	SURVEY DATE: 19/9/17	CHECKED BY: PDS	APPROVED BY: PDS	DWG STATUS: FINAL
DRAWING NUMBER: 20454cv-01			REVISION:	ISSUE DATE: 25/9/17

Original Sheet Size A0H

Appendix 2: Layout Plan

Sketch Masterplan

N

SCALE 1:1,500

5 20 40

0m 10 30 50

Appendix 3: NPPF Flood risk Vulnerability and Flood Zone Compatibility

Flood Risk Vulnerability Classifications (recreated from the NPPF Planning Practise Guidance)

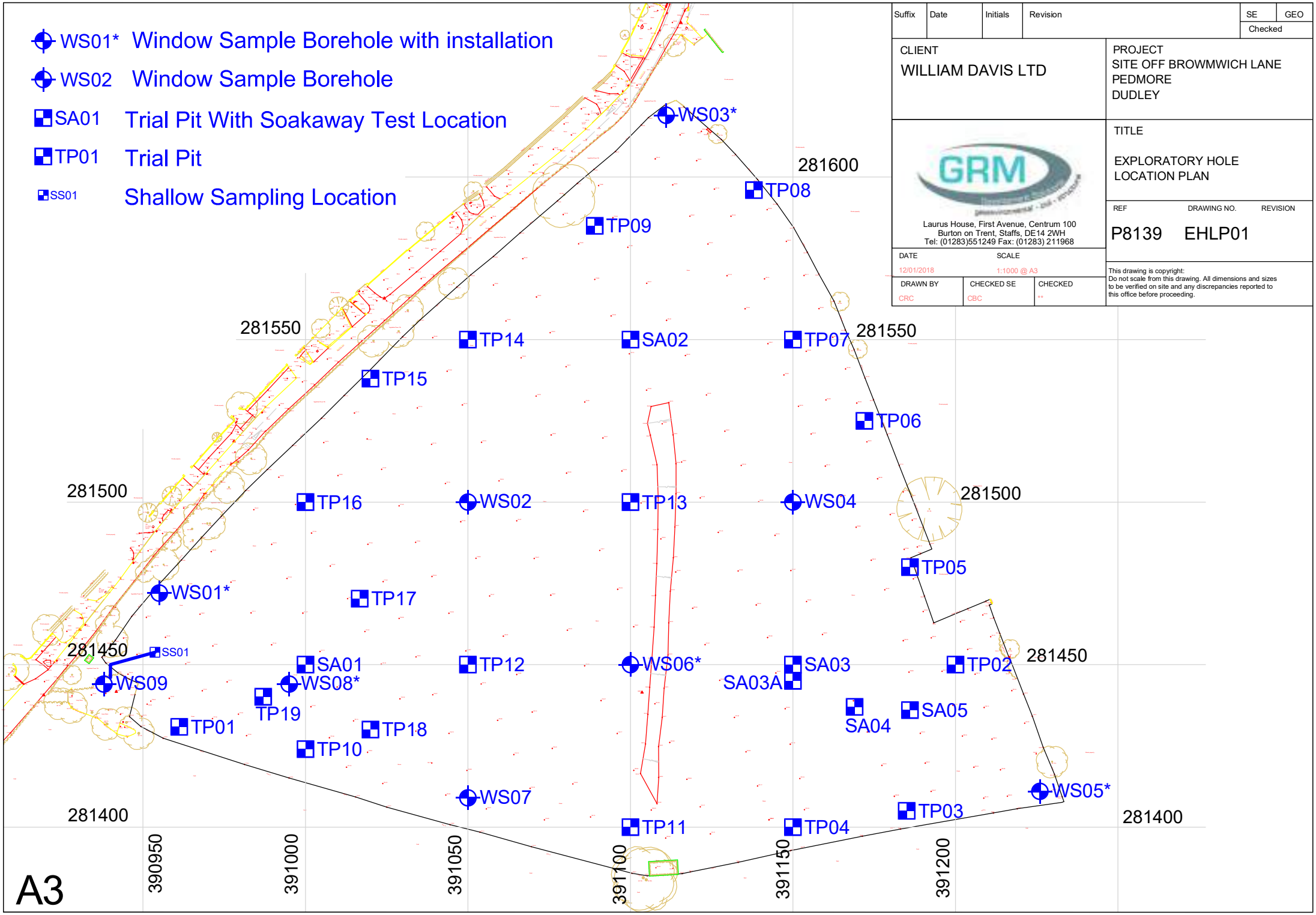
Vulnerability Classification	Description
Essential infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood. • Wind turbines. • Solar farms.
Highly Vulnerable	• Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure'.)
More Vulnerable	• Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	• Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill* and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place. • Car parks.
Water-Compatible Development	• Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Flood Zone Compatibility (recreated from the NPPF Planning Practise Guidance)

Flood Zone	Vulnerability Classification				
	Essential infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 1 (Low Probability)	Development is appropriate	Development is appropriate	Development is appropriate	Development is appropriate	Development is appropriate
Flood Zone 2 (Medium Probability)	Development is appropriate	To be deemed appropriate an exception test is required to demonstrate: • The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk • the sustainability benefits of the development to the community outweigh the flood risk.	Development is appropriate	Development is appropriate	Development is appropriate
Flood Zone 3a (High Probability)	To be deemed appropriate an exception test is required to demonstrate: • The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk the sustainability benefits of the development to the community outweigh the flood risk. Additionally, essential infrastructure should be designed and constructed to remain operational and safe in times of flood.	Development should not be permitted	To be deemed appropriate an exception test is required to demonstrate: • The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk • the sustainability benefits of the development to the community outweigh the flood risk.	Development is appropriate	Development is appropriate

Flood Zone	Vulnerability Classification				
	Essential infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 3b (The Functional Floodplain)	To be deemed appropriate an exception test is required to demonstrate: • The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk • the sustainability benefits of the development to the community outweigh the flood risk. Additionally, development should be designed and constructed to: • remain operational and safe for users in times of flood; • result in no net loss of floodplain storage; • not impede water flows and not increase flood risk elsewhere.	Development should not be permitted	Development should not be permitted	Development should not be permitted	Development is appropriate if designed and constructed to: • remain operational and safe for users in times of flood; • result in no net loss of floodplain storage; • not impede water flows and not increase flood risk elsewhere.

Appendix 4: Ground Investigation Report Extract



Suffix	Date	Initials	Revision	SE	GEO
				Checked	

CLIENT
WILLIAM DAVIS LTD

PROJECT
SITE OFF BROWMWICH LANE
PEDMORE
DUDLEY

Laurus House, First Avenue, Centrum 100
Burton on Trent, Staffs, DE14 2WH
Tel: (01283)551249 Fax: (01283) 211968

TITLE
EXPLORATORY HOLE LOCATION PLAN

REF	DRAWING NO.	REVISION
P8139	EHLP01	

DATE	SCALE
12/01/2018	1:1000 @ A3

DRAWN BY	CHECKED SE	CHECKED
CRC	CBC	**

10.8 BURIED CONCRETE

Based on the mean of the highest 20% of recorded water soluble sulphate and pH levels in the soils below the site and assuming mobile groundwater conditions, in accordance with requirements of BRE Special Digest 1 (2005), 'Concrete in Aggressive Ground', the Design Sulphate Class for buried concrete at the site should be assumed as DS-1 and the ACEC Class as AC-2z.

For unreinforced trench-fill foundations with a width of greater than 450mm, the classifications above equate to a concrete designated as GEN1 in BS8500 and engineer designed FND2Z for reinforced foundations.

The results of the water soluble sulphate and pH testing of are presented in Appendix I.

10.9 SLOPE STABILITY AND RETAINING STRUCTURES

The western half of the site slopes down to the west at shallow gradients, and the eastern half of the site slopes down to the west at moderate gradients of up to approximately one in ten. Therefore, there a low risk of slope instability occurring on the site at present gradients.

Grading of the site, cut and fill operations, removal of trees/vegetation from existing slopes, interference with drainage around existing slopes or the cutting of the toe or surcharging of the crest of existing slopes may cause instability and failure to occur.

The present gradients on site are likely to be adjusted by minor earthworks. Future ground profiles may require earth retaining structures, for which further advice may be required when more information is available.

10.10 SOAKAWAY DRAINAGE

Soakaway tests were carried out, in line with the methodology in BRE365, in the granular and rock quality strata present across the site at five locations (SA01 to SA05). A plan showing the approximate locations of the tests is presented in Appendix D.

Infiltration rates have been calculated for each test pit from the data obtained from site. The calculated infiltration rates are presented below in the order in which they were tested:

		Infiltration Rates		
Location	**Encountered Geology**	**Test 1**	**Test 2**	**Test 3**
SA01	Clay over Sandstone	Negligible and groundwater ingress.		
SA02	Clay over Sandstone	Negligible (water level dropped 6cm in 24 hours).		
SA03	Sand	1.05×10^{-5} m/s	1.20×10^{-5} m/s	5.90×10^{-6} m/s
SA04	Sand	4.50×10^{-5} m/s	3.10×10^{-5} m/s	2.35×10^{-5} m/s
SA05	Sand	2.10×10^{-5} m/s	1.70×10^{-5} m/s	Not possible due to time constraints.
SA03 Test 3 experienced partial sidewall collapse prior to test, which could have silted up the test zone.				

The results show that the granular strata are potentially suitable for the disposal of surface water using a soakaway drainage system. These deposits are more dominant in the south eastern corner and along the central section of the north western boundary as illustrated on the Foundation Zone Plan presented in Appendix M.

The granular strata along the central section of the north western boundary were encountered towards the end of fieldwork and soakaway testing was not feasible in this area due to time constraints. Depending on the assessment of the Drainage Strategy it may be considered beneficial to conduct additional targeted soakaway testing in this area.

If soakaway drainage is considered, the drainage design should ensure that their use does not lead to groundwater flooding or ponding down gradient at the central and western areas of the site. Although not expected to be present in the areas of granular strata, if groundwater is present at relatively shallow depths, then this may affect the use of soakaways.

The cohesive strata across the site are unlikely to be suitable for soakaway drainage and an alternative drainage system should be considered for the disposal of surface water.

The results of the testing should be provided to the project's drainage engineer for inclusion within the site's surface water drainage design after taking into account suitable factors of safety.

If soakaway drainage is to be considered please see Section XV in Appendix A.

It is recommended that the Local Authority and Environment Agency be consulted with regards to the use of soakaway drainage within a Principal Aquifer.

10.11 NEW ACCESS ROADS

Site observations suggest that natural materials will have CBR values of between 2% and 5%, when suitably drained. Proof rolling and the improvement of soft spots may result in increased CBR values and the incorporation of a geotextile grid into sub-base layers may allow for reduced capping thickness.

Once a development layout is produced site observations should be confirmed by in situ or laboratory testing in the footprint of proposed roads in accordance with the adopting Local Authority's preference.

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Trial Pit Log

Trial Pit No
TP01
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
117.00

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
390961 E
281430 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 0.10	D ES					Soft to firm dark brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to coarse angular to well rounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
	0.50	D		0.40	116.60		Firm, friable, reddish brown slightly gravelly slightly sandy silty CLAY. Sand is fine to medium. Gravel is fine to medium well rounded of quartzite. Approximately medium strength. HELSBY SANDSTONE FORMATION
	1.50	D		1.30	115.70		Firm to stiff reddish brown slightly clayey sandy SILT. Sand is fine. Contains sand pockets. Approximately medium to high strength. HELSBY SANDSTONE FORMATION
	1.90	D		1.80	115.20		Extremely weak reddish brown fine to medium grained SANDSTONE. Recovered as sandy fie to coarse gravel. HELSBY SANDSTONE FORMATION
				2.00	115.00		End of Pit at 2.00m

1
2
3
4

Date Excavated: 09/01/2018
Date Backfilled: 09/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.50

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP02
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
128.50

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391200 E
281450 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	D					Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of brick, quartzite and sandstone. Contains frequent rootlets.
	0.30	ES		0.40	128.10		TOPSOIL
	0.60	D					Loose to medium dense reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to coarse rounded of quartzite and angular of sandstone. HELSBY SANDSTONE FORMATION
	1.50	D		1.60	126.90		Extremely weak reddish brown fine to coarse grained SANDSTONE. Contains fine to medium rounded quartzite pebbles. HELSBY SANDSTONE FORMATION
	2.00	D		2.20	126.30		End of Pit at 2.20m

1
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Date Excavated: 09/01/2018
Date Backfilled: 09/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.30

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP03
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
125.70

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391185 E
281405 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 0.20	D ES		0.30	125.40		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
	0.60	D					Loose to medium dense reddish brown slightly clayey slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse rounded of quartzite and angular of sandstone. HELSBY SANDSTONE FORMATION
	1.60	D					
				2.10	123.60		
	2.20	D					Extremely weak reddish brown coarse grained conglomeratic sandstone. Contains fine to medium rounded quartzite pebbles, HELSBY SANDSTONE FORMATION
				2.30	123.40		End of Pit at 2.30m

1
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Date Excavated: 09/01/2018
Date Backfilled: 09/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.50

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP04
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
123.00

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391150 E
281400 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 0.20	D ES		0.30	122.70		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
	0.90	D					Loose to medium dense light brown slightly gravelly silty SAND. Sand is fine. Gravel is fine to medium rounded of quartzite. HELSBY SANDSTONE FORMATION
	1.90	D		1.70	121.30		Medium dense reddish brown slightly silty slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular of sandstone and rounded of quartzite. HELSBY SANDSTONE FORMATION
	2.20	D		2.10 2.30	120.90 120.70		Extremely weak reddish brown medium to coarse grained SANDSTONE. Contains fine to medium rounded quartzite pebbles. HELSBY SANDSTONE FORMATION End of Pit at 2.30m

1
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Date Excavated: 09/01/2018
Date Backfilled: 09/01/2018
Shoring: None
Stability: Slightly unstable from 1.2m begl.
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60 × 2.90

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP05
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
127.80

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391186 E
281480 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 0.20	D ES		0.40	127.40		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of brick, quartzite and sandstone. Contains frequent rootlets. TOPSOIL
	0.70	D					Medium dense reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to coarse rounded of quartzite and angular of sandstone. HELSBY SANDSTONE FORMATION
	1.70	D		1.80	126.00		
	1.90	D		2.00	125.80		Extremely weak light grey and reddish brown medium to coarse grained SANDSTONE. HELSBY SANDSTONE FORMATION End of Pit at 2.00m

1
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Date Excavated: 09/01/2018
Date Backfilled: 09/01/2018
Shoring: None
Stability: Slightly unstable between 0.4m begl and 2.0m begl.
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.70

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP06
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
126.40

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391172 E
281525 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 0.20	D ES		0.30	126.10		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of brick, quartzite and sandstone. Contains frequent rootlets. TOPSOIL
	0.50	D					Medium dense reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to coarse rounded of quartzite and angular of sandstone. HELSBY SANDSTONE FORMATION
				1.20	125.20		Extremely weak light grey and reddish brown medium to coarse grained SANDSTONE. HELSBY SANDSTONE FORMATION
	1.40	D					
				1.60	124.80		End of Pit at 1.60m

1
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3
4

Date Excavated: 09/01/2018
Date Backfilled: 09/01/2018
Shoring: None
Stability: Slightly unstable from 0.5m begl.
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.90

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP07
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
123.00

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391150 E
281550 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 0.20	D ES					Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of brick, quartzite and sandstone. Contains frequent rootlets. TOPSOIL
				0.40	122.60		
	0.60	D					Loose to medium dense, damp, reddish brown silty SAND. Sand is fine to medium. HELSBY SANDSTONE FORMATION
	0.90 0.90 0.90 1.00	D	HVP=45 HVP=54 HVP=71	0.90	122.10		Firm, medium strength, reddish brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to medium angular of sandstone and mudstone. HELSBY SANDSTONE FORMATION
	1.70	D					
				1.90	121.10		
	2.00	D					Medium dense reddish brown mottled light grey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse angular of sandstone, HELSBY SANDSTONE FORMATION
				2.40	120.60		
	2.50	D		2.50	120.50		Extremely weak to weak reddish brown fine to medium grained SANDSTONE. . HELSBY SANDSTONE FORMATION End of Pit at 2.55m

1
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3
4

Date Excavated: 09/01/2018
Date Backfilled: 09/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.60

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP08
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
122.00

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391138 E
281596 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 0.20	D ES					Soft to firm dark brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to coarse angular to well rounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
				0.40	121.60		
	0.60	D					Stiff, locally firm, friable, reddish brown slightly sandy silty CLAY. Sand is fine. Approximately high strength, locally medium strength. HELSBY SANDSTONE FORMATION
				1.20	120.80		
	1.30	D					Medium dense reddish brown silty fine SAND. HELSBY SANDSTONE FORMATION
	2.30	D					
▼				2.60	119.40		Medium dense reddish brown mottled light grey and black slightly sandy clayey GRAVEL. Sand is fine to coarse. Gravel is fine to coarse angular of mudstone and sandstone. Contain frequent pockets of very soft gravelly clay. HELSBY SANDSTONE FORMATION *... disturbed sample from 2.8m begl is of clay.*
	3.20	D					*... disturbed sample from 3.2m begl is of gravel.*
				3.80	118.20		End of Pit at 3.80m

1 2 3 4

Date Excavated: 09/01/2018
Date Backfilled: 09/01/2018
Shoring: None
Stability: Unstable from 2.6m begl.
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
Moderate groundwater ingress noted at 2.6m begl.

Trial Pit Dimensions (m):
0.60 × 3.00

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks: Bucket scraping in base of pit, assumed rockhead at base.

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP09
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
119.50

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391089 E
281585 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 0.20	D ES		0.30	119.20		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
	0.50	D					Stiff, friable, reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine rounded of quartzite. Approximately high strength, HELSBY SANDSTONE FORMATION
				1.40	118.10		Loose to medium dense reddish brown slightly clayey silty fine SAND. HELSBY SANDSTONE FORMATION
	1.50	D					
				1.90	117.60		Medium dense reddish brown mottled grey. micaceous sandy GRAVEL. Sand is fine. Gravel is fine to medium angular of micaceous sandstone. HELSBY SANDSTONE FORMATION
	2.00	D		2.10 2.15	117.40 117.35		Extremely weak to weak reddish brown fine to medium grained SANDSTONE. . HELSBY SANDSTONE FORMATION End of Pit at 2.15m

1 2 3 4

Date Excavated: 09/01/2018
Date Backfilled: 09/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.80

Reason for termination of Trial Pit:
Terminated on rockhead.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP10
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
117.80

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391000 E
281424 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 0.10	D ES					Soft to firm dark brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to coarse angular to well rounded of quartzite and sandstone. Contains frequent rootlets.
				0.30	117.50		TOPSOIL
	0.50	D					Loose to medium dense reddish brown slightly clayey slightly gravelly silty SAND. Sand is fine to medium. Gravel is fine to coarse rounded of quartzite and angular of sandstone. Locally sandy silt. HELSBY SANDSTONE FORMATION
▼							
	1.50	D					
				1.60	116.20		Stiff reddish brown mottled light grey weakly thinly laminated slightly sandy CLAY. Sand is fine to medium. Approximately high strength. HELSBY SANDSTONE FORMATION
	1.80	D					
				2.20	115.60		End of Pit at 2.20m

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Date Excavated: 10/01/2018
Date Backfilled: 10/01/2018
Shoring: None
Stability: Slightly unstable from 1.2m begl.
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
Slight groundwater ingress noted at 1.2m begl.

Trial Pit Dimensions (m):
0.60 × 2.50

Reason for termination of Trial Pit:
Refusal on rock, no rock recovery.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP11
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
120.00

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391100 E
281400 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 0.20	D ES		0.30	119.70		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
	0.50	D					Medium dense reddish brown slightly clayey SAND and GRAVEL. Sand is fine to medium. Gravel is fine to coarse rounded of quartzite. HELSBY SANDSTONE FORMATION
							... one quartzite cobble encountered at 1.2m begl.
				1.50	118.50		
	1.60	D					Medium dense reddish brown slightly clayey slightly gravelly SAND. Sand is medium. Gravel is is fine to coarse rounded of quartzite and angular sandstone. HELSBY SANDSTONE FORMATION
				1.80	118.20		
	1.85	D		1.90	118.10		Extremely weak reddish brown medium grained SANDSTONE. Recovered as gravelly sand. HELSBY SANDSTONE FORMATION End of Pit at 1.90m

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Date Excavated: 10/01/2018
Date Backfilled: 10/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
3.00

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP12
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
188.70

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391050 E
281450 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 0.10	D ES					Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
	0.50	D		0.40	188.30		Firm, locally soft, slightly gravelly sandy CLAY. Sand is fine. Gravel is fine. Gravel is fine to coarse rounded of quartzite. Approximately medium strength, locally low strength. HELSBY SANDSTONE FORMATION
							... becomes stiff, friable, and locally mottled light grey at 1.2m begl.
	1.40	D					
				1.50	187.20		Extremely weak to weak thinly laminated reddish brown micaceous fine to medium grained SANDSTONE. HELSBY SANDSTONE FORMATION
▼	1.70	D					
				1.80	186.90		End of Pit at 1.80m

1
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3
4

Date Excavated: 10/01/2018
Date Backfilled: 10/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
Slight groundwater ingress noted at 0.4m begl and 1.8m begl.

Trial Pit Dimensions (m):
0.60
2.80

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP13
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
119.50

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391100 E
281500 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 0.10	D ES					Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of ceramic, quartzite and sandstone. Contains frequent rootlets.
				0.40	119.10		TOPSOIL
	0.50	D					Firm to stiff, friable, reddish brown slightly gravelly sandy silty CLAY. Sand is fine. Gravel is fine to coarse angular of sandstone. Approximately medium to high strength. HELSBY SANDSTONE FORMATION
	1.50	D					*... becomes mottled light grey from 1.4m begl.*
	2.15	D		2.10	117.40		Extremely weak reddish brown thinly laminated micaceous fine to medium grained SANDSTONE. HELSBY SANDSTONE FORMATION
				2.20	117.30		End of Pit at 2.20m

1
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4

Date Excavated: 10/01/2018
Date Backfilled: 10/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.90

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP14
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
118.30

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391050 E
281550 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 0.10	D ES					Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of ceramic, quartzite and sandstone. Contains frequent rootlets. TOPSOIL
				0.40	117.90		Medium dense reddish brown slightly clayey slightly gravelly fine to medium SAND. Gravel is fine to coarse rounded of quartzite and angular of sandstone. HELSBY SANDSTONE FORMATION
	0.60	D					
	1.50	D					*... becomes gravelly (sandstone) and occasional pockets of reddish brown clay from 1.4m begl.*
	1.85 - 1.90	D		1.85 1.90	116.45 116.40		Extremely weak reddish brown thinly laminated (ripple laminated) fine to medium grained SANDSTONE. HELSBY SANDSTONE FORMATION End of Pit at 1.90m

1
2
3
4

Date Excavated: 10/01/2018
Date Backfilled: 10/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.80

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP15
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
117.50

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391020 E
281538 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 0.10	D ES					Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets.
				0.30	117.20		TOPSOIL
	0.40	D					Medium dense reddish brown slightly gravelly clayey SAND. Sand is fine to medium. Gravel is fine to coarse rounded to subangular of quartzite. HELSBY SANDSTONE FORMATION
							... becomes gravelly from 1.2m begl, gravel is of angular of sandstone.
	1.40	D					
	1.70 - 1.80	D		1.70	115.80		Extremely weak reddish brown thinly laminated micaceous fine to medium grained SANDSTONE. HELSBY SANDSTONE FORMATION
				1.80	115.70		End of Pit at 1.80m

1
2
3
4

Date Excavated: 10/01/2018
Date Backfilled: 10/01/2018
Shoring: None
Stability: Slightly unstable between ground level and 0.5m begl.
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.90

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP16
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
116.75

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391000 E
281500 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 0.10	D ES		0.20	116.55		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
	0.50	D					Medium dense reddish brown slightly clayey gravelly SAND. Sand is fine to medium. Gravel is fine to coarse rounded of quartzite. HELSBY SANDSTONE FORMATION
	1.00	D		0.90	115.85		Medium dense reddish brown gravelly SAND. Sand is fine to medium. Gravel is fine to coarse angular of sandstone. HELSBY SANDSTONE FORMATION
	1.80 - 1.90	D		1.80 1.90	114.95 114.85		Extremely weak reddish brown thinly laminated micaceous fine to medium grained SANDSTONE. HELSBY SANDSTONE FORMATION End of Pit at 1.90m

1
2
3
4

Date Excavated: 10/01/2018
Date Backfilled: 10/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.80

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP17
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
117.75

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391016 E
281470 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
				0.30	117.45		Medium dense reddish brown slightly clayey slightly cobbly gravelly SAND. Sand is fine to medium. Gravel is fine to coarse rounded of quartzite. Cobbles are rounded of quartzite. HELSBY SANDSTONE FORMATION
				1.20	116.55		Firm to stiff, friable, reddish brown sandy silty CLAY. Sand is fine. Contains frequent pockets of sand. Approximately medium to high strength. HELSBY SANDSTONE FORMATION
				1.70	116.05		Medium dense reddish brown slightly silty gravelly SAND. Sand is fine to medium. Gravel is fine to coarse angular of sandstone. HELSBY SANDSTONE FORMATION
				2.00	115.75		Extremely weak reddish brown thinly laminated fine to medium grained SANDSTONE. HELSBY SANDSTONE FORMATION
				2.10	115.65		End of Pit at 2.10m

1
2
3
4

Date Excavated: 10/01/2018
Date Backfilled: 10/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.90

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP18
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
118.25

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391020 E
281430 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets.
				0.40	117.85		TOPSOIL
							Medium dense, damp, reddish brown slightly gravelly silty SAND. Sand is fine. Gravel is fine to coarse rounded of quartzite and angular of sandstone. HELSBY SANDSTONE FORMATION
▼				1.50	116.75		Stiff, friable, reddish brown slightly gravelly slightly cobbly sandy CLAY. Sand is fine to medium. Gravel is fine to coarse angular of sandstone. Cobbles are angular of sandstone. Contains sand pockets. Approximately high strength. HELSBY SANDSTONE FORMATION
				2.40	115.85		Medium dense reddish brown slightly clayey fine to medium SAND. Gravel is fine to coarse angular of sandstone. HELSBY SANDSTONE FORMATION
				2.80	115.45		Extremely weak reddish brown thinly laminated fine to medium grained SANDSTONE. HELSBY SANDSTONE FORMATION
				2.85	115.40		End of Pit at 2.85m

1
2
3
4

Date Excavated: 10/01/2018
Date Backfilled: 10/01/2018
Shoring: None
Stability: Slightly unstable from 1.5m begl.
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
Moderate groundwater ingress noted at 1.5m begl.

Trial Pit Dimensions (m):
0.60
2.70

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
TP19
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
117.50

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
390987 E
281440 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.40	117.10		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of brick, quartzite and sandstone. Contains frequent rootlets. TOPSOIL
				1.40	116.10		Firm to stiff reddish brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to coarse rounded of quartzite. Approximately medium to high strength. HELSBY SANDSTONE FORMATION
				2.50	115.00		Medium dense reddish brown slightly clayey gravelly SAND. Sand is fine to medium. Gravel is fine to coarse angular of sandstone. HELSBY SANDSTONE FORMATION
							End of Pit at 2.50m

1
2
3
4

Date Excavated: 10/01/2018
Date Backfilled: 10/01/2018
Shoring: None
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
3.20

Reason for termination of Trial Pit:
Terminated on rockhead.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
SA01
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
117.60

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391000 E
281450 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 0.20	D ES					Soft to firm dark brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to coarse angular to well rounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
				0.40	117.20		
▼	0.50	D					Very soft reddish brown slightly gravelly sandy SILT. Sand is fine to medium. Gravel is fine to coarse rounded of quartzite. Approximately very low strength. HELSBY SANDSTONE FORMATION
				1.10	116.50		
	1.20	D					Stiff to very stiff, friable, reddish brown locally mottled light grey slightly sandy CLAY. Sand is fine. Approximately high to very high strength. HELSBY SANDSTONE FORMATION
							... becomes gravelly. Gravel is fine to coarse angular of mudstone and sandstone.
	2.10	D					
				2.30	115.30		
	2.35	D					Extremely weak reddish brown fine to medium grained SANDSTONE. HELSBY SANDSTONE FORMATION
				2.40	115.20		End of Pit at 2.40m

1
2
3
4

Date Excavated: 09/01/2018
Date Backfilled: 09/01/2018
Shoring: None
Stability: Slightly unstable between 0.6m begl and 1.1m begl.
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
Moderate groundwater ingress noted at 0.6m begl.

Trial Pit Dimensions (m):
0.60 × 2.70

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks: Infiltration testing not carried out due to groundwater ingress and side wall collapse.

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
SA02
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
119.75

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391100 E
281550 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 0.10	D ES					Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
				0.40	119.35		Firm to stiff reddish brown slightly sandy slightly gravelly SILT/CLAY. Sand is fine to medium. Gravel is fine to medium rounded of quartzite. Approximately medium to high strength. HELSBY SANDSTONE FORMATION
	0.60	D					
	1.70	D					
▼							*... gravel band of fine to medium angular mudstone and sandstone.*
	2.05	D		2.00 2.10	117.75 117.65		Extremely weak reddish brown fine to medium grained SANDSTONE. HELSBY SANDSTONE FORMATION End of Pit at 2.10m

1
2
3
4

Date Excavated: 09/01/2018
Date Backfilled: 10/09/2018
Shoring: Soakaway crates
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
Slight groundwater ingress noted at 2.0m begl.

Trial Pit Dimensions (m):
0.60
2.90

Reason for termination of Trial Pit:
Terminated in rock quality strata.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
SA03
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
123.25

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391150 E
281450 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 0.20	D ES		0.40	122.85		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of brick, quartzite and sandstone. Contains frequent rootlets. TOPSOIL
	0.50	D					Loose to medium dense reddish brown slightly silty slightly gravelly SAND. Sand is fine to medium. Gravel is fine to coarse rounded of quartzite and angular of sandstone. HELSBY SANDSTONE FORMATION
	1.50	D		1.60	121.65		End of Pit at 1.60m

1
2
3
4

Date Excavated: 09/01/2018
Date Backfilled: 09/01/2018
Shoring: None
Stability: Unstable, major sidewall collapse.
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.80

Reason for termination of Trial Pit:
Target depth attained.

General Remarks: Infiltration testing not carried out due to side wall collapse.

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
SA03A
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
123.25

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391150 E
281445 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.40	122.85		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
				1.60	121.65		Loose to medium dense reddish brown slightly silty slightly gravelly SAND. Sand is fine to medium. Gravel is fine to coarse rounded of quartzite and angular of sandstone. HELSBY SANDSTONE FORMATION
							End of Pit at 1.60m

1
2
3
4

Date Excavated: 09/01/2018
Date Backfilled: 10/09/2018
Shoring: Soakaway crates
Stability: Unstable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.40

Reason for termination of Trial Pit:
Target depth attained.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
SA04
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
125.10

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391169 E
281437 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.40	124.70		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
				1.10	124.00		Loose to medium dense reddish brown slightly clayey slightly gravelly medium to coarse SAND. Gravel is fine to coarse rounded of quartzite and angular sandstone. HELSBY SANDSTONE FORMATION
							End of Pit at 1.10m

1
2
3
4

Date Excavated: 10/01/2018
Date Backfilled: 10/09/2018
Shoring: Soakaway crates
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60
2.20

Reason for termination of Trial Pit:
Target depth attained.

General Remarks:

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Trial Pit Log

Trial Pit No
SA05
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD)
127.00

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
391186 E
281436 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20	126.80		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
				1.50	125.50		Loose to medium dense reddish brown slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular of sandstone. HELSBY SANDSTONE FORMATION End of Pit at 1.50m

1
2
3
4

Date Excavated: 10/01/2018
Date Backfilled: 10/09/2018
Shoring: Soakaway crates
Stability: Stable
Plant Used: JCB 3CX
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.60 × 2.30

Reason for termination of Trial Pit:
Target depth attained.

General Remarks: Bucket scraping in base of pit, assumed rockhead at base.

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

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Windowless Sample Borehole

Borehole No WS01
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD) 116.50

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates 390955 E 281472 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
									Firm, friable, reddish brown slightly gravelly slightly sandy silty CLAY. Sand is fine to medium. Gravel is fine to medium well rounded of quartzite.
		0.50	D			0.40	116.10		TOPSOIL
		0.90 - 1.00	D			0.70	115.80		Firm, friable, reddish brown slightly gravelly sandy CLAY. Sand is fine. Gravel is fine to coarse sub-angular of quartzite. Approximately medium strength. HELSBY SANDSTONE FORMATION
		1.00	C	N=29 (4,4/5,6,7,11)					Medium dense reddish brown slightly clayey fine to medium SAND. HELSBY SANDSTONE FORMATION
		1.50 - 1.60	D						
		1.95 - 2.00	D	50 (25 for 50mm/50 for 60mm)		1.95	114.55		Extremely weak reddish brown thinly laminated medium grained SANDSTONE. HELSBY SANDSTONE FORMATION
		2.00	C			2.00	114.50		End of Borehole at 2.00m

Crew: Dynamic Sampling - L. Tyler and K. Hardy **Logger:** CRC **Weather:** Overcast

Equipment: Tracked Window Sample Rig

Reason for termination of borehole: Refusal in rock.

Groundwater Remarks:
No Groundwater Encountered.

General Remarks:

Hole Started:	12/01/2018	Hole Complete:	12/01/2018	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS02
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD) 117.90

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates 391050 E 281500 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
									Firm, friable, reddish brown slightly gravelly slightly sandy silty CLAY. Sand is fine to medium. Gravel is fine to medium well rounded of quartzite.
						0.40	117.50		TOPSOIL
									Soft reddish brown slightly gravelly sandy CLAY. Sand is fine. Gravel is fine to coarse sub-angular of quartzite. Approximately low strength. HELSBY SANDSTONE FORMATION
		1.00 - 1.20	D	N=10 (1,2/2,2,3,3)					
		1.00	C						
						1.20	116.70		Medium dense reddish brown fine SAND. Contains pockets of clay. HELSBY SANDSTONE FORMATION
		1.50 - 1.60	D						
		1.85 - 2.00	D			1.85	116.05		Extremely weak reddish brown thinly laminated medium grained SANDSTONE. Recovered as a sand and gravel. HELSBY SANDSTONE FORMATION
		2.00	C	50 (25 for 135mm/50 for 45mm)		2.00	115.90		End of Borehole at 2.00m

Crew: Dynamic Sampling - L. Tyler and K. Hardy

Logger: CRC

Weather: Overcast

Equipment: Tracked Window Sample Rig

Reason for termination of borehole: Refusal in rock.

Groundwater Remarks:
No Groundwater Encountered.

General Remarks:

Hole Started:	12/01/2018	Hole Complete:	12/01/2018	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS03
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD) 120.90

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates 391111 E 281619 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.40	120.50		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
		0.70 - 0.80	D						Medium dense reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to coarse sub-rounded to sub-angular of quartzite and sandstone. HELSBY SANDSTONE FORMATION
		1.00	C	N=11 (2,1/2,2,3,4)					
						1.30	119.60		Firm to stiff, high strength, reddish brown sandy CLAY. Sand is fine to medium. HELSBY SANDSTONE FORMATION
		1.40 - 1.50	D						
		1.90 - 2.00	D			1.90	119.00		Extremely weak reddish brown thinly laminated medium grained SANDSTONE. HELSBY SANDSTONE FORMATION
		2.00	C	50 (25 for 70mm/50 for 65mm)		2.00	118.90		End of Borehole at 2.00m

Crew: Dynamic Sampling - L. Tyler and K. Hardy **Logger:** CRC **Weather:** Overcast

Equipment: Tracked Window Sample Rig

Reason for termination of borehole: Refusal in rock.

Groundwater Remarks:
No Groundwater Encountered.

General Remarks:

Hole Started:	12/01/2018	Hole Complete:	12/01/2018	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS04
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD) 123.50

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates 391150 E 281500 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.40	123.10		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
		0.60 - 0.70	D						Medium dense reddish brown slightly clayey slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to medium angular to well rounded of quartzite and sandstone. HELSBY SANDSTONE FORMATION
		1.00	C	N=14 (2,1/2,2,4,6)					
		1.40 - 1.50	D						
		1.60 - 1.80	D			1.60	121.90		Extremely weak reddish brown thinly laminated medium grained SANDSTONE. HELSBY SANDSTONE FORMATION
		1.80	C	50 (25 for 20mm/50 for 40mm)		1.80	121.70		End of Borehole at 1.80m

Crew: Dynamic Sampling - L. Tyler and K. Hardy

Logger: CRC

Weather: Overcast

Equipment: Tracked Window Sample Rig

Reason for termination of borehole: Refusal in rock.

Groundwater Remarks:
No Groundwater Encountered.

General Remarks:

Hole Started:	12/01/2018	Hole Complete:	12/01/2018	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS05
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD) 130.00

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates 391226 E 281411 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.50 - 0.60	D			0.40	129.60		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL Medium dense reddish brown to brown slightly clayey slightly gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse sub-rounded to angular of sandstone and quartzite. HELSBY SANDSTONE FORMATION
		1.00	C	N=21 (2,4/4,5,6,6)					
		1.80 - 2.00	D						
		2.00	C	50 (25 for 77mm/50 for 65mm)		2.00	128.00		End of Borehole at 2.00m

Crew: Dynamic Sampling - L. Tyler and K. Hardy

Logger: CRC

Weather: Overcast

Equipment: Tracked Window Sample Rig

Reason for termination of borehole: Refusal on rock, no rock recovery.

Groundwater Remarks:
No Groundwater Encountered.

General Remarks:

Hole Started:	12/01/2018	Hole Complete:	12/01/2018	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS06
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD) 119.60

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates 391100 E 281450 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.50 - 0.60	D			0.40	119.20		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite, carbonaceous material and sandstone. Contains frequent rootlets. TOPSOIL Medium dense reddish brown slightly gravelly silty fine to coarse SAND. Gravel is fine to coarse well rounded to angular of sandstone and quartzite. Contains silt/clay pockets. HELSBY SANDSTONE FORMATION
		1.00	C	N=18 (2,2/3,4,6,5)					
		1.50 - 1.60	D						
		1.90	C	50 (25 for 70mm/50 for 77mm)		1.90	117.70		End of Borehole at 1.90m

Crew: Dynamic Sampling - L. Tyler and K. Hardy

Logger: CRC

Weather: Overcast

Equipment: Tracked Window Sample Rig

Reason for termination of borehole: Refusal on rock, no rock recovery.

Groundwater Remarks:
No Groundwater Encountered.

General Remarks:

Hole Started:	12/01/2018	**Hole Complete:**	12/01/2018	**Version:**	FINAL	**Scale:**	1:25

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Windowless Sample Borehole

Borehole No WS07
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD) 119.00

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates 391050 E 281409 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.40	118.60		Firm, friable, reddish brown slightly gravelly slightly sandy silty CLAY. Sand is fine to medium. Gravel is fine to medium well rounded of quartzite. TOPSOIL
		0.50 - 0.60	D						Firm reddish brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to coarse sub-angular to well rounded of quartzite. Approximately medium strength. HELSBY SANDSTONE FORMATION
		1.00	C	N=14 (2,1/2,2,4,6)					
						1.20	117.80		Medium dense reddish brown slightly clayey gravelly SAND. Sand is fine to medium. Gravel is fine to medium angular of sandstone. HELSBY SANDSTONE FORMATION
		1.30 - 1.40	D						
						1.60	117.40		Extremely weak reddish brown thinly laminated micaceous medium grained SANDSTONE. HELSBY SANDSTONE FORMATION
		1.70 - 1.80	D						
		1.80	C	50 (25 for 77mm/50 for 55mm)		1.80	117.20		End of Borehole at 1.80m

Crew: Dynamic Sampling - L. Tyler and K. Hardy

Logger: CRC

Weather: Overcast

Equipment: Tracked Window Sample Rig

Reason for termination of borehole: Refusal in rock.

Groundwater Remarks:
No Groundwater Encountered.

General Remarks:

Hole Started:	12/01/2018	Hole Complete:	12/01/2018	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS08
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD) 117.50

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates 390995 E 281444 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
						0.30	117.20		Loose to medium dense dark brown to dark reddish brown slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of quartzite and sandstone. Contains frequent rootlets. TOPSOIL
		0.50 - 0.60	D						
		1.00	C	N=15 (1,2/3,3,4,5)		1.00	116.50		Very soft reddish brown slightly gravelly very sandy CLAY. Sand is fine to medium. Gravel is fine to coarse well rounded of quartzite angular of sandstone. HELSBY SANDSTONE FORMATION
		1.50 - 1.60	D						Firm to stiff, high strength, reddish brown mottled greenish grey slightly sandy CLAY. Sand is fine to medium. HELSBY SANDSTONE FORMATION
		1.90 - 2.00	D			1.90	115.60		
		2.00	C	50 (25 for 145mm/50 for 60mm)		2.00	115.50		Extremely weak very thinly laminated reddish brown mottled greenish grey fine to medium grained micaceous SANDSTONE. HELSBY SANDSTONE FORMATION
									End of Borehole at 2.00m

1 2 3 4

Crew: Dynamic Sampling - L. Tyler and K. Hardy **Logger:** CRC **Weather:** Overcast

Equipment: Tracked Window Sample Rig

Reason for termination of borehole: Refusal in rock.

Groundwater Remarks:
Slight seepage noted at 0.4m begl.

General Remarks:

Hole Started:	12/01/2018	Hole Complete:	12/01/2018	Version:	FINAL	Scale:	1:25

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Windowless Sample Borehole

Borehole No WS09
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

Ground Level (mAOD) 116.50

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates 390938 E 281444 N

Installation/ Backfill	Water Strike	Samples/Tests Depth	Type	Result	Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description
		0.03 - 0.10	D			0.10	116.40		Medium dense dark brown slightly clayey slightly sandy GRAVEL. Sand is fine to medium. Gravel is fine angular of igneous rock, sandstone and chert. Contains abundant organic material. MADE GROUND
		0.10 - 0.50	D			0.50	116.00		Soft to firm dark brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to medium of brick and chert. Approximately low to medium strength. MADE GROUND
		0.60 - 0.70	D						Firm, medium strength, friable, reddish brown slightly gravelly sandy silty CLAY. Sand is fine to medium. Gravel is fine to medium well rounded of quartzite. Contains frequent sand pockets. HELSBY SANDSTONE FORMATION
		1.20	C	N=7 (1,2/1,2,2,2)					
		1.50 - 1.60	D						
		1.95 - 2.00	D	50 (25 for 145mm/50 for 180mm)		1.95	114.55		Extremely weak reddish brown micaceous fine grained SANDSTONE. HELSBY SANDSTONE FORMATION
		2.00	C			2.00	114.50		End of Borehole at 2.00m

Crew: Dynamic Sampling - L. Tyler and K. Hardy

Logger: CRC

Weather: Overcast

Equipment: Tracked Window Sample Rig

Reason for termination of borehole: Refusal in rock.

Groundwater Remarks:
No Groundwater Encountered.

General Remarks:

Hole Started:	12/01/2018	**Hole Complete:**	12/01/2018	**Version:**	FINAL	**Scale:**	1:25

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Trial Pit Log

Trial Pit No
SS01
Sheet 1 of 1

Site Name: Land of Bromwich Lane, Pedmore

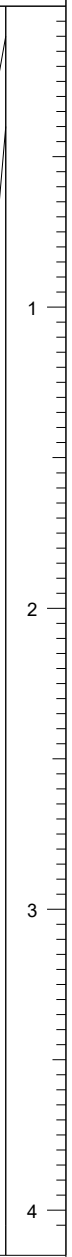
Ground Level (mAOD)
116.60

Client: William Davis Ltd

GRM Project Ref: P8139

Coordinates
390940 E
281446 N

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.05 0.05	D ES		0.10	116.50		Black mottled grey slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse angular of igneous rock, chert, sandstone, plastic, brick and rope. MADE GROUND
	0.30 0.30	D ES		0.40	116.20		Firm reddish brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium rounded to angular of quartzite and brick. Approximately medium strength. Sandstone and Igneous rock were also observed. However, these may have fallen in from overlying strata. MADE GROUND
							End of Pit at 0.40m



Date Excavated: 12/01/2018
Date Backfilled: 12/01/2018
Shoring: None
Stability: Slightly unstable
Plant Used: None (hand dug)
Logged by: CRC

Groundwater Observations:
No Groundwater Encountered.

Trial Pit Dimensions (m):
0.30 × 0.30

Reason for termination of Trial Pit:
Target depth attained.

General Remarks: Hand dug pit.

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

Appendix 5: Sewer Records

Public Foul Gravity/Local Storm Drain
Public Combined Gravity/Local Storm Drain
Public Surface Water Gravity/Lateral Drain
Pressure Foul
Pressure Combined
Pressure Surface Water
Pumping Station
Flow Direction
Chamber
Inspection Chamber
Vortex
Hydrobrake
Soakaway
Pressure Valve Chamber
Pressure Surface Water Chamber
Pressure Combined Chamber
Pressure Foul Chamber
Pressure Surface Water Manhole
Pressure Foul Manhole
Pressure Combined Manhole
Pressure Surface Water Manhole
Pressure Surface Water Outfall
Pressure Foul Outfall
Pressure Combined Outfall

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on:
0800 783 4444 (24 hours)

a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991(a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.

b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.

c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.

d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.

e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).

f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.

2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).

3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.

4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.

5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.

6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.

7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.

8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.

9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.

10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.

11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.

12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.

13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus.

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.

16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014

18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.

19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
	C		0	0
	C		0	0
	C		0	0
	C		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
	F		0	0
0501	F	116.92	114.36	2.56
0601	F	119.56	117.79	1.77
0901	F	120.23	118	2.23
1601	F	121.59	119.36	2.23
1602	F	121.26	0	0
1603	F	120.88	118.47	2.41
1704	F	122.56	119.8	2.76
1706	F	121.97	119.29	2.68
1707	F	122.86	121.54	1.32
1708	F		0	0
1904	F	119.94	117.92	2.02
2502	F	133.53	0	0
2602	F	126.73	124.78	1.95
2801	F		0	0
3002	F		0	0
3003	F		0	0
3004	F		0	0
3005	F		0	0
3006	F		0	0
3007	F		0	0
3008	F		0	0
3009	F		0	0
3010	F		0	0
3011	F		0	0
3012	F		0	0
3013	F		0	0
3014	F		0	0
3015	F		0	0
3016	F		0	0
3017	F		0	0
3018	F		0	0
3019	F		0	0
3020	F		0	0
3021	F		0	0
3022	F		0	0
3023	F		0	0
3024	F		0	0
3026	F	132.25	0	0
3027	F	132.28	0	0
3029	F	132.03	0	0
3030	F	131.43	0	0
3031	F	127.63	0	0
3032	F	128.05	0	0
3100	F		0	0
3101	F		0	0
3102	F		0	0
3103	F		0	0
3104	F		0	0
3105	F		0	0
3106	F		0	0
3107	F		0	0
3108	F		0	0
3109	F		0	0
3110	F		0	0
3111	F		0	0
3112	F		0	0
3113	F		0	0
3114	F		0	0
3200	F		0	0
3201	F	133.07	129.33	3.74
3210	F		0	0
3300	F		0	0
3301	F	133.43	131.48	1.95
3302	F		0	0
3401	F	132.67	0	0
3402	F	136.71	134.54	2.17
4001	F	128.62	126	2.62
4003	F		0	0
4004	F		0	0
4006	F		0	0
4008	F		0	0
4011	F		0	0
4012	F		0	0
4015	F		0	0
4016	F		0	0
4101	F	132.74	128.79	3.95
4102	F	131.08	128.25	2.83
4905	F	106.89	105.18	1.71
5601	F	0	108.44	0
5700	F		0	0
5701	F	106.69	105.16	1.53
5801	F	104.32	102.57	1.75
5805	F	104.76	103.18	1.58
5901	F	103.06	101.33	1.73
6100	F		0	0
6453	F	112	111.1	0.9
6456	F	112.15	0	0
6457	F	112.25	111.04	1.21
6553	F		0	0
6555	F	112.32	110.65	1.67
6556	F	112.5	0	0
6601	F	110.12	108.41	1.71
6602	F	111.18	108.44	2.74
6603	F	110.88	109	1.88
6655	F		0	0
6656	F		0	0
6702	F		0	0
6704	F	108.85	107.05	1.8
6705	F	108.56	106.61	1.95
6802	F	108.77	106.4	2.37
6804	F	108.95	106.65	2.3
6806	F	109.25	106.96	2.29
6807	F	108.28	106.14	2.14
7001	F	139.64	136.58	3.06
7002	F	140.9	138.24	2.66
7003	F	136.45	134.66	1.79
7005	F	138.74	136.59	2.15
7101	F	140.4	139.04	1.36
7102	F	138.72	137.3	1.42
7201	F		0	0
7405	F	112.81	111.66	1.15
7406	F	112.5	111.33	1.17
7407	F	113.06	111.6	1.46
7408	F	113.37	111.84	1.53
7409	F	113.35	111.93	1.42
7410	F	113.85	112.22	1.63
7501	F	113.2	0	0
7502	F	0	0	0
7601	F	111.21	109.44	1.77
7602	F	109.97	108.03	1.94
7604	F	111.17	0	0
7606	F	112.41	110.45	1.96
7607	F	110.52	108.67	1.85
7803	F	109.52	107.03	2.49
7804	F	111.59	109.07	2.52
7902	F	107.54	105.66	1.88
8453	F	114.2	112.71	1.49
8502	F	114.21	111.57	2.64
8503	F	114.01	112.9	1.11
8504	F	113.47	112.26	1.21
8505	F	113.06	111.7	1.36
8506	F	112.85	111.09	1.76
8602	F	111.89	109.92	1.97
8603	F	112.26	110.44	1.82
8605	F	111.76	109.9	1.86
8701	F	112.11	109.87	2.24
8703	F	112.31	110.21	2.1
8705	F	114.5	111.17	3.33
8706	F		0	0
8707	F		0	0
8802	F	112.62	110.97	1.65
8803	F	113.19	111.72	1.47
8901	F	111.37	109.1	2.27
8904	F	111.94	109.43	2.51
9401	F	116.37	114.72	1.65
9402	F	116.43	113.69	2.74
9601	F	114.27	112.17	2.1
9603	F	115.87	112.97	2.9
9606	F	117.24	115.62	1.62
9802	F		0	0
9803	F	116.43	115.09	1.34
9902	F	116.16	115.21	0.95
9903	F	115.94	0	0
9904	F	116.64	0	0
9908	F		0	0
0751	S	119.03	117.16	1.87
0752	S	119.75	118.7	1.05
0753	S	121.11	119.53	1.58
0852	S	119.19	117.62	1.57
0853	S	118.9	117.99	0.91
0854	S	120.61	119.18	1.43
0855	S	121.12	118.89	2.23
0856	S	121.06	118.95	2.11
0857	S	119	117.26	1.74
0952	S	118.13	117.3	0.83
1751	S	121.32	120.22	1.1
1752	S	123.1	121.65	1.45
1755	S	121.79	120.04	1.75
1851	S	120.65	119.06	1.59
1952	S	119.31	117.46	1.85
1953	S	121.17	118.9	2.27
2400	S	0	0	0
2401	S	0	0	0
2551	S		0	0
2552	S	0	0	0
2651	S		0	0
2951	S	126.71	125.23	1.48
2952	S	124.32	122.62	1.7
3025	S	132.29	0	0
3028	S	132.13	0	0
3115	S	133.57	0	0
3403	S	0	0	0
3404	S	0	0	0
3551	S		0	0
3552	S	0	0	0
4005	S		0	0
4007	S		0	0
4013	S		0	0
4014	S		0	0
4902	S	107.7	106.13	1.57
4903	S	107.71	105.13	2.59
5752	S	107.73	0	0
5754	S	107.5	106.21	1.29
5852	S	104.31	103.02	1.29
5854	S	105.11	103.93	1.18
5952	S	103.34	101.64	1.7
5953	S		0	0
6351	S	112.91	111.71	1.2
6451	S	111.73	110.63	1.1
6452	S	111.6	110.52	1.08
6454	S	111.9	111.71	0.19
6455	S	112.03	110.88	1.15
6551	S	110.78	109.38	1.4
6554	S	112.32	111.1	1.22
6654	S	110.83	108.8	2.03
6751	S	109.1	108.26	0.84
6753	S	108.85	108.08	0.77
6756	S	107.88	0	0
6757	S	108.04	106.88	1.16
6851	S	108.98	107.8	1.18
6853	S	108.98	107.39	1.59
6855	S	108.35	0	0
6951	S	108.33	106.7	1.63
7351	S	115.53	112.77	2.76
7401	S	112.5	111.08	1.42
7402	S	113.15	111.99	1.16
7403	S	114.18	113	1.18
7404	S	113.65	112.47	1.18
7411	S	112.65	111.14	1.51
7652	S	111.29	110.04	1.25
7653	S	111.17	109.77	1.4
7655	S	112.42	110.94	1.48
7656	S	110.57	109.22	1.35
7659	S	109.98	108.87	1.11
7851	S	109.43	107.12	2.31
7852	S	109.5	107.02	2.48
7855	S	111.6	109.11	2.49
7951	S	107.56	106.01	1.55
8351	S	115.1	113.76	1.34
8451	S	114.89	113.09	1.8
8452	S	116.09	114.36	1.73
8551	S	114.18	112.42	1.76
8557	S	112.83	111.41	1.42
8651	S	111.88	110.48	1.4
8654	S		0	0
8752	S	112.17	110.85	1.32
8754	S	112.73	111.2	1.53
8851	S	112.58	111.26	1.32
8854	S	113.14	111.86	1.28
8952	S	111.33	109.59	1.74
8953	S	111.92	110.11	1.81
9652	S	114.21	112.74	1.47
9654	S	115.84	113.28	2.56
9655	S	116.79	115.08	1.71
9751	S	116.38	114.6	1.78
9851	S	116.07	114.34	1.73
9951	S	116.61	113.67	2.94
9955	S	115	113.54	1.46

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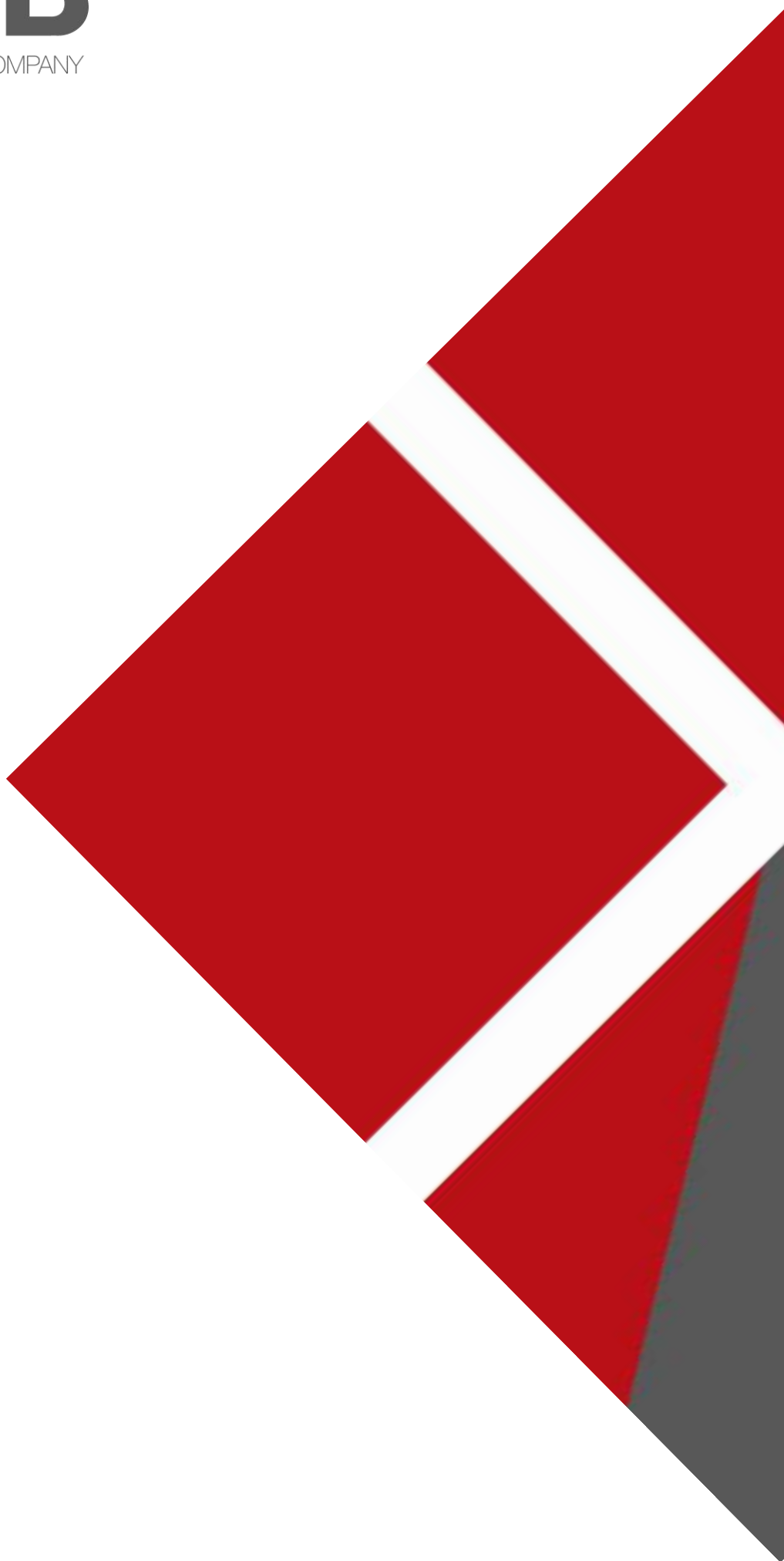

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