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flood risk assessment

68 & 70 Keymer Road, Hassocks

Flood Risk Assessment

Project No.	1592
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Date	05th March 2024
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1 Introduction

Introduction & Background

1.1 Awcock Ward Partnership has been commissioned by Planning Issues Ltd to prepare a Flood Risk Assessment (FRA) in support of a full planning application for the redevelopment of 68 & 70 Keymer Road, Hassocks, West Sussex BN6 8QP.

1.2 The proposed redevelopment of this brownfield site will comprise a single block of 41 retirement apartments with associated access, parking, and amenity space, following the demolition of two detached properties.

1.3 The proposed redevelopment site is bounded by Keymer Road to the north, and residential dwellings to the east, south, and west. The site is adjacent to an ordinary watercourse along its southern boundary. It lies approximately 200 m east of the town centre and 550 m east of Hassocks Station, operated by Southern Railway and Thameslink.

1.4 The location of the site in relation to its surroundings can be seen within Figure 1.1.

Figure 1.1 – Site Location Plan

1.5 This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF); and DEFRA's 'Non-Statutory Technical Standards for sustainable drainage systems' (2011) and the West Sussex County Council (WSCC) Lead Local Flood Authority (LLFA) 'Policy for the Management of Surface Water'.

1.6 This document sets out the existing baseline conditions in Section 2, the development proposal in Section 3. The proposed surface water management plan and foul water strategy that will serve the development is discussed in Sections 4 and 5 respectively, with Section 6 providing the Ownership and Maintenance information before concluding in Section 7.

2 Existing Baseline Conditions

Existing Site

2.1 The existing brownfield site comprises of two detached residential properties.

2.2 H&H Surveys Ltd undertook a topographic survey of the site in July 2023. The survey indicates that the site generally slopes down at a 1 in 30 gradient

towards the southwestern corner, with elevations ranging from 48.9 mAOD to 43.9 mAOD.

2.3 The back edge of the highway at the northern boundary varies in level from 48.9 mAOD in the east to 47.4 mAOD in the west. Levels at the access to Keymer Road rise from 46.75 mAOD within the site, to 47.56 mAOD at the edge of carriageway.

2.4 A watercourse runs along the southern boundary, with the top level of the bank falling from 45.7 mAOD in the east to 44.7 mAOD in the west. The stream bed levels also fall from east to west, typically from 43.55 mAOD to 43.01 mAOD.

2.5 A copy of the topographic survey for the site can be seen as Appendix A.

Existing Flood Risk

2.6 We have carried out a desktop assessment of potential flood risks to the site using the Environment Agency's (EA) Flood Information Service.

Fluvial sources (River flooding)

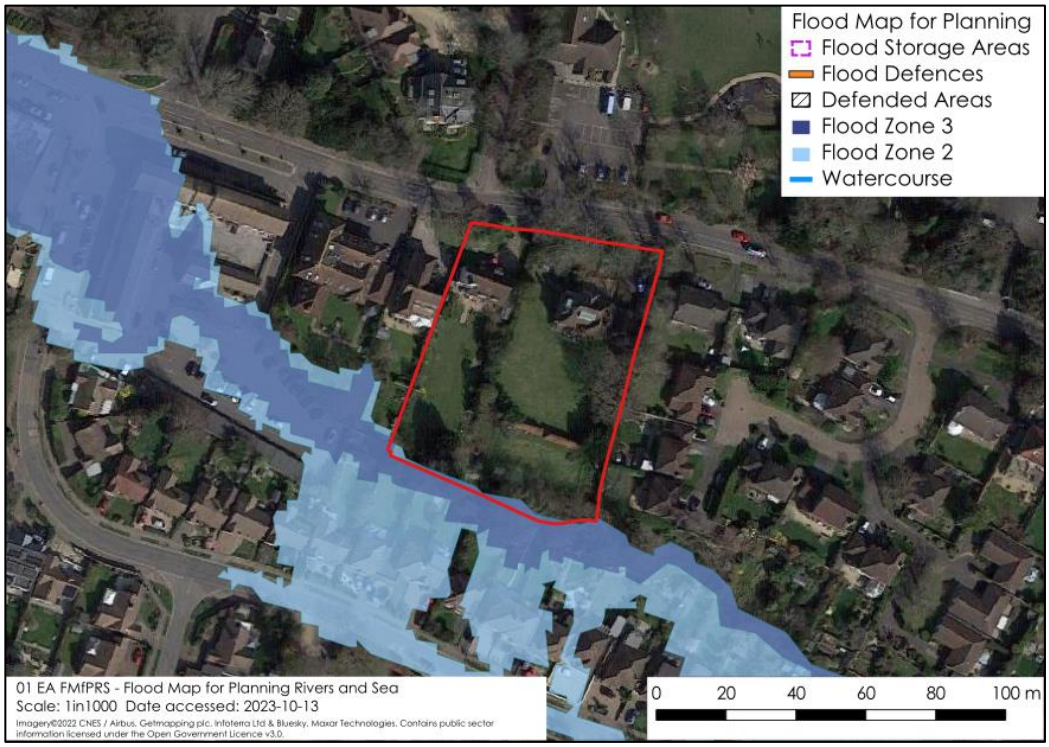
2.7 An extract of the 'Flood Map for Planning' has been reproduced as Figure 2.1 and shows the majority of the site as being within 'Flood Zone 1', as land assessed as having less than 1 in 1,000 annual exceedance probability (AEP) of flooding from fluvial sources (<0.1%).

2.8 Flood Zone 2 and 3 are mapped and are localised to the watercourse along the southern edge of the site. The AEP for fluvial flooding in this area is between 0.1% and 1% for Flood Zone 2, and greater than 1% for Flood Zone 3.

2.9 Flood levels for Flood Zone 2 range from 45.5 to 45.1 mAOD from east to west. LiDAR DTM mapping from DEFRA Data Service has been used to identify the levels along the edge of Flood Zone 2 within the site boundary.

2.10 In this analysis, Flood Zone 2 serves as a representative for the areas likely to experience flooding with a 1% annual probability, accounting for additional impacts from climate change.

Figure 2.1 – EA Flood Map for Planning



2.11 Modification of existing ground levels within the extent of any flooding from watercourses or surface water flooding would require consideration of flood volume compensation and any effects on watercourse capacity.

Pluvial sources (surface water flooding)

2.12 The EA's 'Flooding from Surface Water' map has been reproduced as Figures 2.2A and 2.2B and show the depth of surface water flooding in the 1 in 100 and 1 in 1000 AEP events respectively.

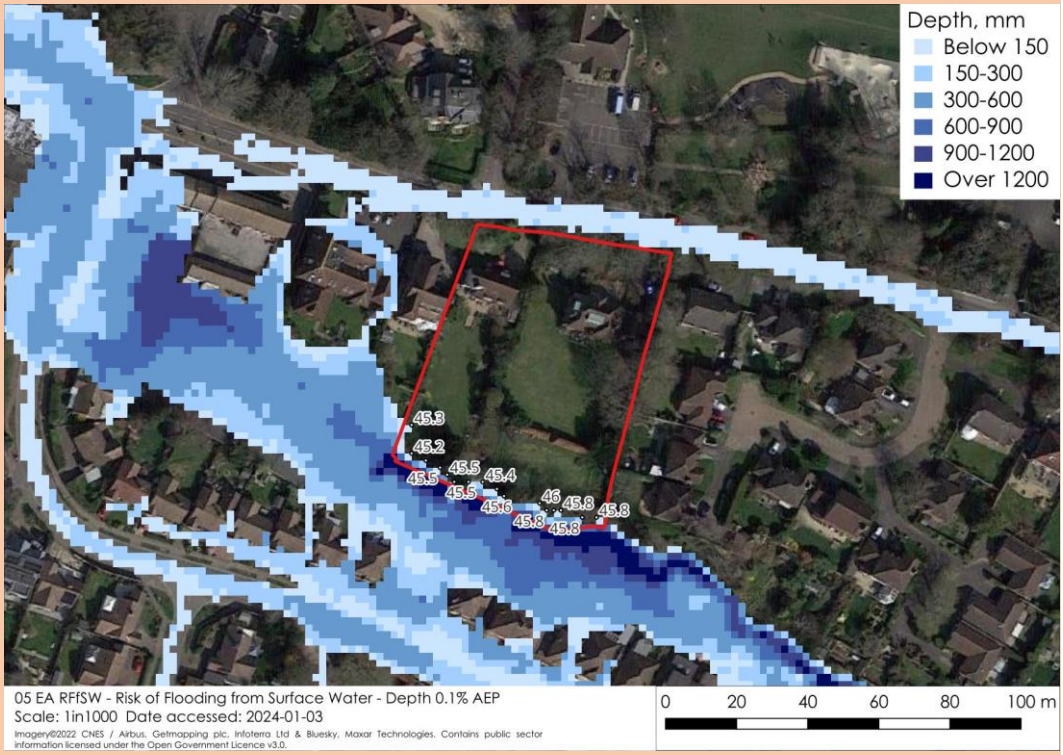
2.13 Most of the site is at 'very low risk', with an AEP for surface water flooding of less than 0.1%.

2.14 Considering potential climate change impacts for the 1 in 100 AEP event, a 1 in 1000-year flood analysis predicts levels ranging from 46.0 to 45.2 mAOD along the boundary. These levels are obtained from LiDAR DTM mapping along the maximum extents shown in Figure 2.2B.

2.15 Surface water flooding risk is also present in the highway along the northern boundary. In a 1 in 100-year event, this takes the form of isolated linear pooling. In a 1 in 1,000-year event, it is more connected to wider surface water flow routes in the local area but does not exceed 0.15 m in depth and should remain passable by vehicular traffic.

Figure 2.2A – EA Flooding from Surface Water (Depths) 1in100

Figure 2.2B – EA Flooding from Surface Water (Depths) 1in1000



Flooding from Reservoirs

2.16 The EA Flooding from Reservoirs mapping indicates the site is not at risk of flooding as a result of reservoir failure either alone or in combination with fluvial flooding.

Groundwater Flooding

2.17 The site does not lie within a groundwater flood risk or flood warning area, and it is therefore considered that groundwater flooding is unlikely to present a risk to this site or any future development proposals.

Ground Conditions

2.18 A preliminary Ground Investigation was undertaken by Crossfield Consulting in February 2023 and concluded that *"In view of the recorded ground conditions with practically impermeable clays and a relatively shallow water table associated with the stream, soakaway drainage is effectively precluded at this site. It is necessary to identify an alternative drainage solution for the proposed development."*

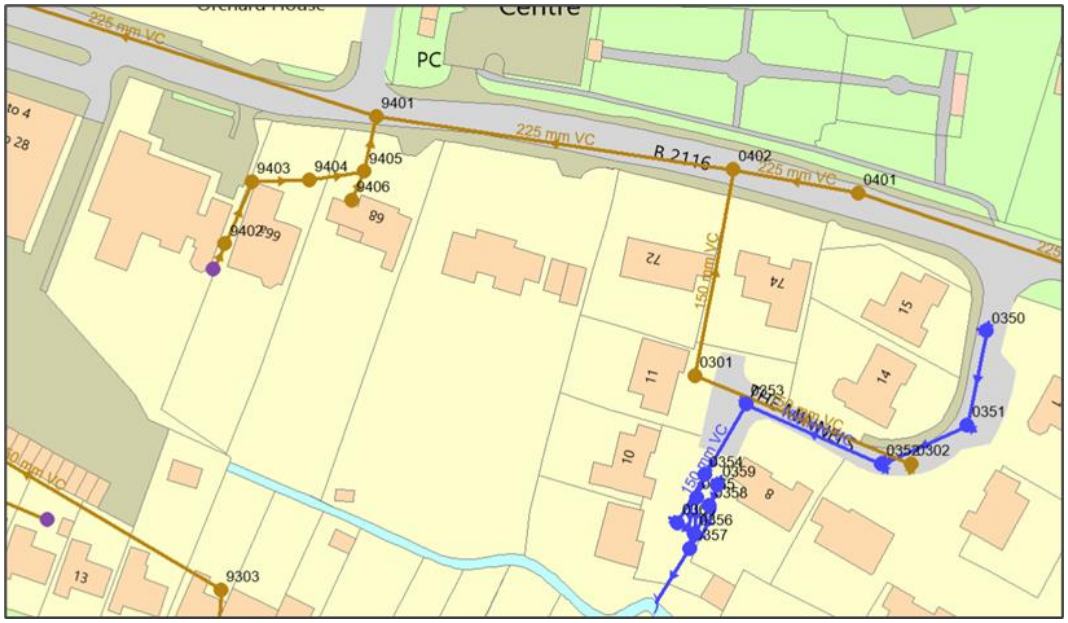
2.19 The Ground Investigation precludes the use of soakaways due to ground conditions on site. Extracts from the Ground investigation are included in Appendix B.

Existing Site Drainage

2.20 The Southern Water (SW) sewer records identify an adopted 225 mm diameter foul water sewer within Keymer Road, to the north of the site. They do not indicate any adopted surface water sewers local to the site.

2.21 An extract from Southern Water's asset records can be seen as Figure 2.3 and are included in Appendix C.

Figure 2.3 – Southern Water Asset Records



2.22 The Southern Water asset records and CCTV survey identify an adopted foul sewer located within the north boundary serving No. 68 within the site, and No. 66 west of the site.

2.23 The sewer from No. 66 will need to be retained and therefore any new built development should remain outside a 3 m easement either side of the adopted sewer.

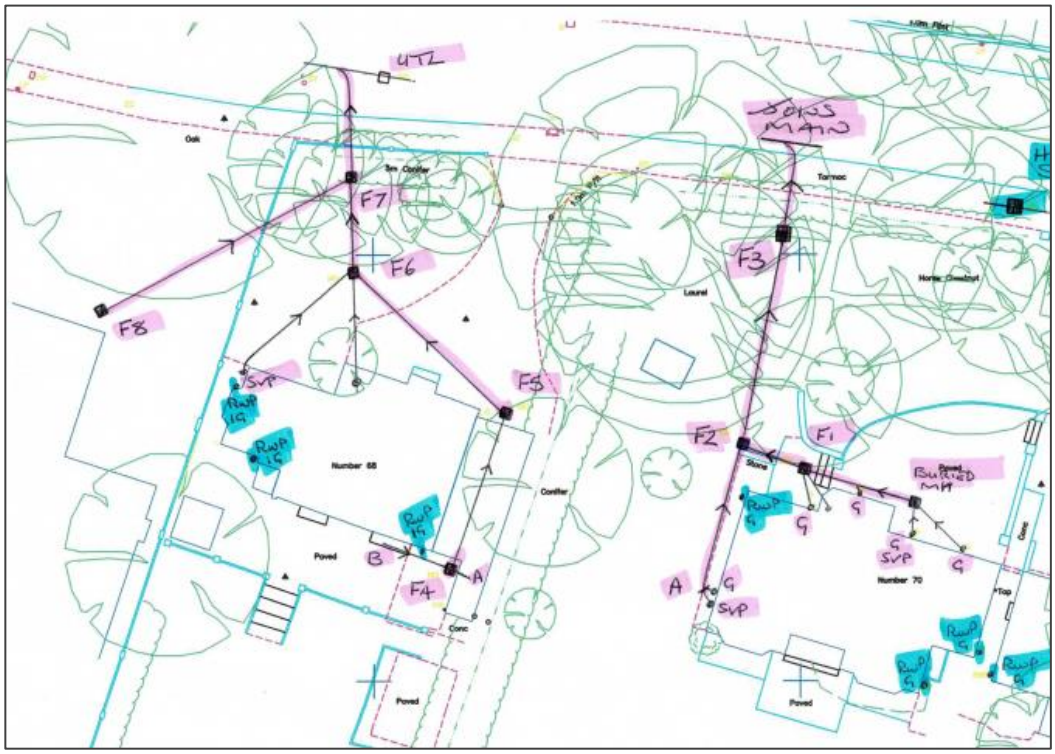
2.24 A CCTV drainage survey was undertaken by Utility Surveys Ltd and identifies an existing on-site private drainage network.

2.25 The survey confirms that foul flows from the existing properties discharges to the adopted foul sewer within Keymer Road. Similarly, the foul system also receives connections from a number of gullies.

2.26 There are some residual gullies, on the southern edge of the properties, which were untraced and assumed to drain to historical soakaways, or otherwise piped to the bounding watercourse.

2.27 A copy of the CCTV report is included in Appendix D, with an extract included as Figure 2.4.

Figure 2.4 – Existing Foul Sewer Connection



2.28 Level information from the CCTV survey indicates that the eastern off-site foul connection is shallow, with F2 0.7m deep (IL 46.82 mAOD) and F3 1.65m deep (46.5 mAOD). These inverts are likely to be too shallow/high to receive gravity connections from any new development.

2.29 Southern Water records indicate that the adopted manhole within Keymer Road, immediately outside the existing access for No. 68, has an invert of ~44.1 mAOD. This is more likely to accept a new gravity connection from any new development.

Existing surface water runoff

2.30 The existing site is considered to be partially brownfield, comprising residential roofs and associated driveways. The residual area is comprised of private domestic gardens.

2.31 Runoff generated by the impermeable catchment enters existing site drainage or, flows overland towards the southern watercourse.

2.32 The existing brownfield rates have been estimated based on the Modified Rational Method (HR Wallingford, 1990) and are included in Table 2.2, with a copy of the calculation sheet included as Appendix E.

Table 2.2 – Brownfield Rates (0.069 ha driveways and roofs)

Return Period	Brownfield Rate (l/s)
2 year	8.4
30 year	23.0
100 year	30.6

2.33 The WSCC Policy for the Management of Surface Water states that *"Redevelopment on brownfield land has the potential to rectify or reduce flood risk. In all cases, including on brownfield sites, runoff should where possible be restricted to the greenfield 1 in 1 year runoff rate during all events up to and including the 1 in 100-year rainfall event with climate change."*

2.34 The policy goes on to say that *"If it is deemed that this is not achievable, evidence must be provided, and developers should still seek to achieve … a 50% betterment of existing runoff rates on brownfield sites (provided this does not result in a runoff rate less than greenfield)."*

2.35 Based on the above policy, we would initially look to limit peak flows to the equivalent greenfield rates. Provision of long-term storage (LTS) is not likely to be practicable due to inherently small control diameters with increased risk of blockage.

2.36 The equivalent greenfield runoff rates for the site area have been calculated using FEH, with the results summarised within Table 2.3 and the calculation sheet included within Appendix F of this report.

Table 2.3 – Equivalent Greenfield Runoff Rates (0.457 ha)

Return Period	Greenfield Rate (l/s)
2 year	3.0
30 years	8.1
100 years	10.7
Qbar	**3.4**

2.37 To ensure the development will be safe throughout its lifetime and that it provides a reduced flood risk overall, the drainage strategy will include appropriate mitigation measures, so that the Qbar greenfield runoff rate is not exceeded throughout the developments lifetime, with allowances for climate change, providing a betterment of at least 88% over existing brownfield rates.

3 Development Proposal

3.1 The brownfield redevelopment proposes a single block of 41 retirement apartments together with associated access, parking, and amenity space.

3.2 The lowest ground finished floor level of 46.50 mAOD remains well above the maximum fluvial water flood level of 45.5 mAOD and pluvial water flood level of 46.00 mAOD to the southeast of the site, and therefore the proposed development will not be impacted by existing off-site surface water flooding.

3.3 No changes to ground levels are proposed within the extents of the existing surface water flooding and therefore the development will not impact the existing flood extents.

3.4 A copy of the proposed site layout has been included within Appendix G of this report.

4 Surface Water Management Plan

4.1 To ensure the development is safe throughout its lifetime, the surface water management plan (SWMP) accounts for runoff in up to the 1 in 100-year return period.

4.2 The strategy also safeguards against the upper end allowances for climate change (45%) indicated for the 1% AEP storm event in the 2070 epoch for the *Adur and Ouse Rainfall Catchment* providing betterment over existing conditions, where the rate and volume of runoff would otherwise continue to increase due to climate change.

4.3 An Intrusive Ground Investigation concluded that infiltration is not viable due to the underlying impermeable clay and shallow water table. It has been confirmed that the applicant's land title include riparian rights permitting a discharge to the watercourse at the southern edge of site. In line with the approved drainage hierarchy an attenuated discharge to surface water is proposed. This should be located in the southwest corner of the site, outside of any existing Root Protection Area's (RPA).

4.4 Runoff generated by the proposed building, access road and external hard paving will be collected and drained towards a new cellular attenuation tank beneath the parking court in the southwest of the site.

4.5 All chambers immediately upstream of the tank will include silt traps, whilst the tank itself will include vented covers or a high-level vent pipe to mitigate air-locks.

4.6 Causeway Flow has been used to determine the storage requirements for the development. The output of this exercise has been summarised within Table 4.1, with copies of the modelling outputs included within Appendix H.

Table 4.1 – Attenuation Storage Volumes Requirements

Attenuation Feature	Attenuation Volume
Cellular Attenuation Tank	110.7 m^3
TOTAL	**110.7 m^3**

4.7 Runoff from the tank will pass through a new flow control chamber prior to discharging to the watercourse.

4.8 The flow control will ensure that peak flows do not exceed the sites Qbar greenfield rate up to the 100yr storm event.

4.9 The controlled outfall will be released to the existing watercourse at the southern edge of site. The outfall should be located outside of any RPA's and more than 2 m away from existing headwalls.

4.10 The proposed development will achieve significant betterment compared to existing site conditions, with peak rates of discharge being limited to equivalent greenfield rates. When compared to existing brownfield discharge rates the proposed SWMP provides at least 88% reduction in peak flows in the 100yr storm event whilst also offsetting the impacts of a 45% increase in peak rainfall intensity due to climate change.

4.11 The rise in levels from the Keymer Road into the site access road should be retained to ensure that the development is protected from off-site exceedance flows.

4.12 A copy of the preliminary drainage layout can be found on drawing 1592-01-PDL-1001 included within Appendix I.

Long-Term Storage

4.13 The WSCC Policy for the Management of Surface Water states, "*[Where] discharge rates [are] to be limited to a range of greenfield rates, based on the 1 in 1, 1 in 30 and 1 in 100-year storm events … the use of this method to restrict discharge rates requires the inclusion of on-line long-term storage, sized to take account of the increased post development volumes, discharging at no greater than 2 l/s/ha. … If it is deemed that this is not achievable, evidence must be provided, and developers should still seek to achieve no increase in runoff from greenfield sites...*"

4.14 The site area measures 0.457ha and therefore any increase in volume during the 100 year 6 hours storm would need to be limited to just 0.9 l/s.

4.15 The Long Term Storage (LTS) requirement has been calculated in line with CIRIA C753 Equation 24.10 and due to the high 'Soil Proportion Runoff' value (SPR) and low Percentage Impermeable (PIMP) the calculation confirms that LTS is not required because during the Q100 6hr storm the volume is runoff is not being increased.

4.16 A copy of our LTS calculation sheet can be found within Appendix H.

Urban Creep

4.17 The proposed development comprises a single building of apartments. In the same way the respective property deeds will secure age restricted living, they will also prevent residents from implementing any works that would increase the drainage catchment (patio or property extensions).

4.18 All proposed buildings and grounds are operated and maintained by Churchill Estates Management and any unregulated extensions to patios or properties would be liable to remedial action.

4.19 Given the above, the drainage calculations do not make any separate allowance for urban creep.

Exceedance Measures

4.20 During exceedance events, beyond the 100-year critical storm, surface water runoff will overflow from the aforementioned systems.

4.21 External levels around the building will remain below the corresponding FFL in order that overland flows can be directed away from buildings and towards areas of open space where any residual aboveground storage can be used before following the topography of the site.

4.22 As part of any future detailed design, effort should be made to fall away from the building, even if only for a short distance, with a lateral fall to direct flows either to the access road and car park on the west, or to the green space on the east.

4.23 Beyond the capacity of the site, exceedance flows would continue towards the watercourse. This reflects existing arrangements, but the residual rate and volume of exceedance runoff would be reduced compared to the existing site, due to the implementation of stormwater attenuation.

5 Foul Water Strategy

5.1 In terms of wastewater connections, the developer is entitled to make a connection to the nearest practical point on the network where the existing sewer is at least the same diameter as the new sewer required to provide capacity for the development.

5.2 Under the provisions of the Water Industry Act 1992 (as amended), the developer will need to pay the sewerage undertaker the published sewer connection charges and infrastructure charge per dwelling, and the sewerage undertaker is responsible for any network reinforcement.

5.3 The existing on-site private foul networks can be abandoned, whilst the existing adopted foul sewer which serves No. 66 will be retained.

5.4 The existing retained adopted sewer is too shallow to receive a gravity connection from the site and therefore foul flows will instead drain through a new private gravity network to the existing adopted foul network in Keymer Road, which is 2.24m deep.

5.5 A pre-planning enquiry was submitted to SW and their response has confirmed there is available capacity to receive foul flows from the site.

5.6 The proposed foul drainage arrangements can be seen on the preliminary drainage layout drawing 1592-01-PDL-1001 within Appendix I, with a copy of the Southern Water enquiry response included within Appendix C.

6 Ownership & Maintenance

6.1 All new on-site piped drainage will remain private and will be designed in accordance with Building Regulations Part H and will become the responsibility of the appointed management company, 'Churchill Estates Management'.

6.2 The existing adopted sewer serving the adjacent property will be retained under the responsibility of Southern Water.

6.3 The proposed attenuation will be retained under private ownership and will be operated and maintained by 'Churchill Estates Management' in accordance with CIRIA C753 and any manufacturer specific guidance.

6.4 At the detailed design stage, a 'Drainage Maintenance Plan' will be prepared. The Plan will set out maintenance tasks, responsibilities, and frequencies for the entire drainage network.

7 Conclusion

7.1 The proposed development has been assessed in line with the National Planning Policy Framework, to allow the planning application to be progressed and to show that the development can be undertaken in an acceptable manner from a flood risk perspective.

7.2 The proposed development is located within Flood Zone 1 and is not susceptible to flooding from surface water, groundwater, infrastructure, or artificial sources including consideration for climate change.

7.3 To ensure the development is safe throughout its lifetime, the surface water strategy accounts for runoff in up to the 1 in 100-year return period.

7.4 The strategy also safeguards against climate change (45%), providing betterment over existing conditions, where the rate and volume of runoff would continue to increase due to climate change.

7.5 Infiltration drainage is not viable; therefore, surface water runoff will be attenuated on-site and discharged at the Qbar greenfield rate to the watercourse located on the southern boundary, providing 88% betterment compared to the existing brownfield arrangements.

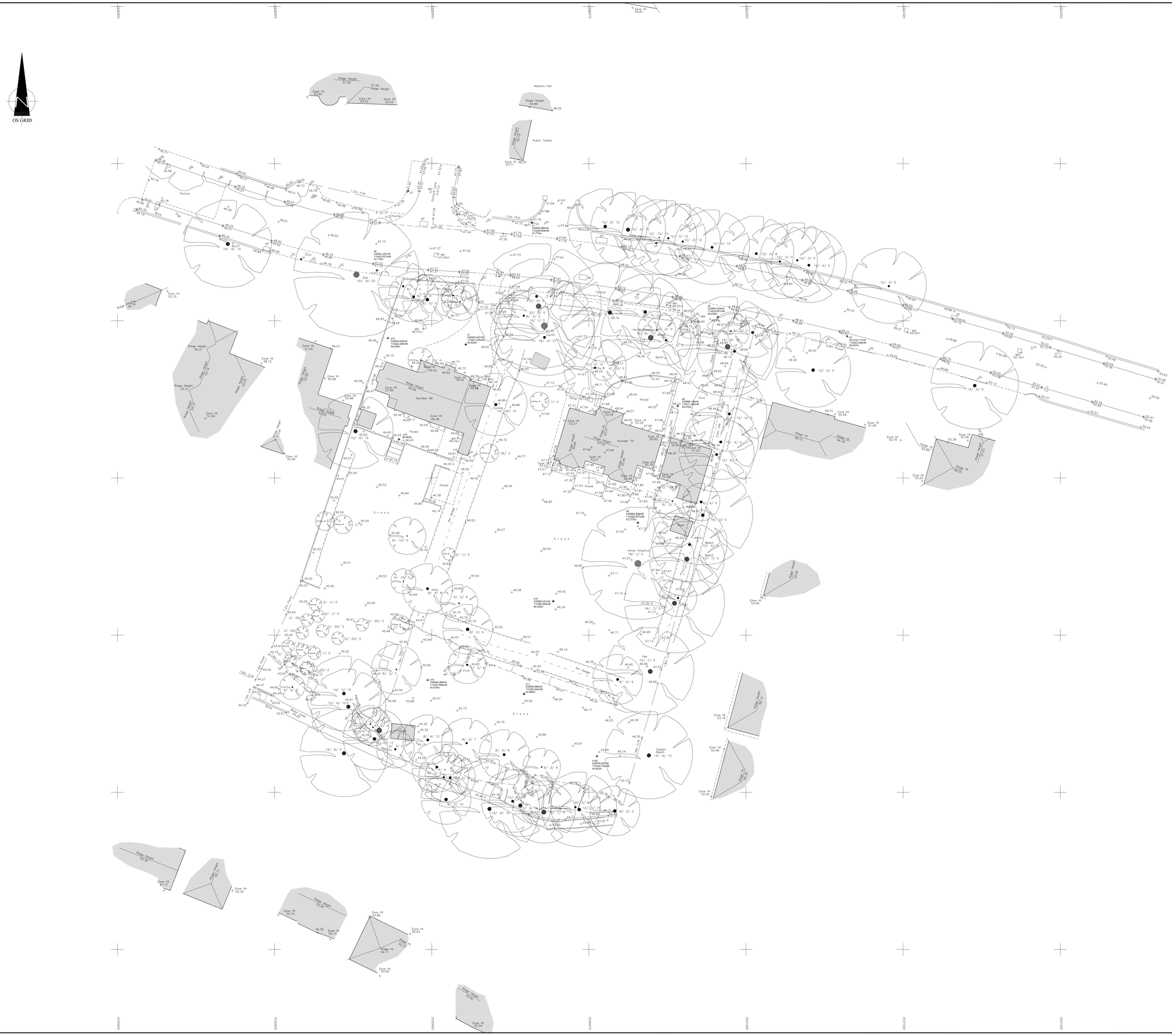
7.6 Beyond the 100-year critical storm, exceedance runoff will be directed away from buildings and towards any residual areas of open space, where any aboveground storage can be used. Beyond the capacity of the site exceedance flows would flow to the watercourse. This reflects existing arrangements, but the residual rate and volume of exceedance runoff would be significantly reduced compared to the existing site.

7.7 Foul flows generated by the proposed development will be served by a new private gravity network with a connection to the adopted Southern Water foul sewer network within Keymer Road., as agreed with Southern Water.

7.8 All new on-site drainage will remain private and will be designed in accordance with Building Regulations Part H and CIRIA C753 and will become the responsibility of the appointed management company (Churchill Estates Management).

7.9 As the development will be safe from flooding throughout its lifetime and will actively reduce the flood risk to properties within the downstream catchment, it is recommended that the Local Planning Authority confirm they have no objections to the proposed development.

Appendix A Topographic Survey



LINETYPE MENU

- Bank
- Building
- Kerb
- Foliage
- Hedge
- Pipe
- Verge
- Wall
- Track
- Fence
- Telephone
- Electric
- Water line
- Tree Spread/Trunk Dia/Height
- Manhole
- SWS (Estimated Size / From Surface) — SWS
- FWS (Estimated Size / From Surface) — FWS
- Grid Cross

LEGEND

AV	Air Valve	RS	Road Sign
BL	Bollard	SC	Stop Cock
ER	Earth Rod	Str	Strainer
DP	Downpipe	SV	Stop Valve
BT	British Telecom Cover	TL	Threshold Level
CATV	Cable Television Cover	TP	Telephone Pole
CL	Cover Level	WM	Water Meter
EP	Electric Power Pole	WO	Wash Out
EV	Eave Level	UTL	Unable To Lift
FH	Fire Hydrant	Fence Descriptions	
FL	Floor Level	B/W	Barbed Wire
FP	Fence Post	C/B	Close Board
G	Gully	C/I	Corrugated Iron
GP	Gate Post	C/L	Chain Link
GV	Gas Valve	C/P	Chestnut Paling
IC	Inspection Chamber	C/W	Chicken Wire
IL	Invert Level	I/R	Iron Railings
KO	Kerb Outlet	P/R	Post & Rail
LC	Basement Light	P/W	Post & Wire
LP	Lamp Post		Rock Face
M	Meter		Glass Roofed
MH	Manhole Cover		Buildings & Walls
MK	Marker		Double Gates
MS	Milestone		Single Gate
RG	Ridge Level		

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Topographic Surveys	As Built Drainage Surveys
Elevation Surveys	Co-ordination Of Site Layouts
Floor Plan Surveys	Rectified Photo Elevations
Volumetric Surveys	C.A.D Plotting Bureau

Project Name:
Numbers 68 & 70 Keymer Road
Hassocks BN6 8QP

Drawing Title:
Topographic Survey

Client:
Churchill Retirement Living

Agent:

Date:	Scale:
July 2023	A0 @ 1:200

Drawn	Surveyor	Dwg No	Revision
KJH	GH	SU 01	

Site Datum: Ordnance Survey	OSBM Ref: OSGM OS15 SU 01
Grid Orientation: Ordnance Survey	Sheet ID: CHURCHILL-Hassocks-Keymer

Disclaimer
D & H Surveys will Guarantee that this Survey Data & Station Coords are Correct to the Indicated Scale ONLY

Appendix B Ground Investigation (Extracts)

and potable abstractions listed within 1 km of the site. The site does not lie within a Source Protection Zone.

The Groundsure report (based on UK Health Security Agency and British Geological survey data, updated December 2022) indicates that the site is not within an area where radon precautions are required in new buildings.

5. GROUND CONDITIONS AND GEOLOGICAL MODEL

5.1 Ground Investigation

Details of the rationale and scope of the Crossfield Consulting ground investigation and laboratory testing, together with exploratory hole logs, in situ and laboratory test results, are presented in Appendix I. The investigation has identified the presence of the following, below the site.

5.2 Buried Foundations and Services

No buried foundations or other such structures were encountered during the ground investigation. Such obstructions, associated with the current buildings, should be anticipated. Underground services are also present, as associated with the existing buildings.

5.3 Strata Encountered

Topsoil
Topsoil was recorded during the previous ground investigations to a maximum depth of 0.40 m. The topsoil typically comprised of a slightly sandy gravelly clay with one occasion being a sandy clay.

Folkestone Formation
Beneath the topsoil, a weathered Folkestone Formation have been encountered, typically orangish brown comprising firm to stiff becoming stiff consistency, sandy gravelly clay and recorded to depths of between 0.20 m to 2.30 m. Beneath the highly weathered Folkestone Formation lie a less weathered, strata generally of dark grey stiff becoming very stiff consistency, silty clay and recorded to depths of between 1.38 m to base of holes at 5 m.

Recorded in one exploratory hole (DS 4) have been a fine to coarse lens/thin horizon of medium dense sand at a depth between 1.30 m to 1.38 m. Within DS 5 exploratory hole an extremely weak sandstone has been encountered at a depth of 4.89 m.

5.4 Groundwater

Groundwater as a slight seepage was encountered during the ground investigation within one exploratory hole (DS 5) at 4.9m depth within a sandstone band. Traces of groundwater were observed elsewhere at shallower depth, as appears to be associated with perched waters. The general 'water table' and upper boundary of saturated strata are expected at approximately 43.3 mOD, namely the stream water level. It is noted that groundwater/saturated strata may be located at higher levels near to Keymer Road and upslope from the stream.

The ground conditions are based observations made at the time of the fieldwork. It should be noted that groundwater levels may vary due to seasonal and other effects.

Shallow excavations may remain stable in the short term where excavations do not encounter groundwater. However, instability may occur in excavations left open for extended periods of time. Support should be provided, or the sides battered back, in any excavations requiring man entry in compliance with the relevant risk assessment.

Groundwater is, based on current data, expected to be present at depths commensurate with the adjoining stream. However, perched water may locally be encountered. If perched water does enter excavations, pumping from screened sumps may be required.

11. ASSESSMENT OF SOAKAWAY DRAINAGE

Groundwater is expected to be present at depths commensurate with the adjoining stream. Strata above this level generally comprise of clays, classified in CIRIA C750 (2016) as very low permeability to practically impermeable. On this basis, it is indicated that soakaways will not provide a suitable drainage solution, such that an alternative SuDS drainage system is necessary.

12. ROAD PAVEMENTS

Based on the nature of the shallow soils beneath the site a preliminary design equilibrium CBR of 3% may be considered for the design of road pavements. The materials at shallow depth may be regarded as frost-susceptible.

13. ASSESSMENT OF MATERIALS FOR WASTE DISPOSAL

There is no requirement to remove soils from site and, therefore, development levels should be set such that soils can be retained and reused on site where possible. Providing development levels are set to accommodate soil arisings (for example, from foundation excavations), such materials would not be classified as waste if retained and re-used on site. However, if materials are excess to requirements, they should be taken to an appropriately permitted waste facility.

If material is identified for removal to a waste facility, it will be necessary to provide a description of the material and laboratory test data to the receiving facility. This information is included in Appendix III. It should be noted that additional testing, either for classification purposes or for waste acceptance criteria (WAC) testing to confirm acceptability of the waste may be required (as noted below).

The available analytical laboratory test data has been used to provide preliminary waste disposal advice. It should be noted that these test results may not specifically relate to materials that are, or will be, scheduled for removal from site. However, the results are appropriate for preliminary guidance and costing purposes.

A preliminary assessment of potential waste classification for materials on site has been undertaken in accordance with the Environment Agency's document Guidance on the Classification and Assessment of Waste WM3 (2021). The assessment indicates that the following preliminary waste classification advice would be appropriate.

- Topsoil is likely to be classified as 'non-hazardous' waste if taken to a landfill due to the organic content of such materials. Alternatively, these materials could be taken to a recycling facility.

- Natural strata (inorganic soils/excluding topsoil), providing they have not been impacted by potential contaminants associated with the site usages, would be classified as 'inert' waste without any requirement for laboratory testing.

Waste requires pre-treatment prior to disposal at landfill and this may take the form of physical or chemical treatment to reduce hazards and/or waste volumes. The segregation and screening of waste soils into separate, and appropriately classified, waste streams would satisfy the pre-treatment criteria by ensuring that volumes of each waste category are minimised. Segregation of waste streams is also important to prevent materials being classified within a worse-case category and, therefore, incurring higher disposal costs. Mixing of different waste streams to dilute hazardous properties is not permitted.

It should be noted that the above assessment is provided in accordance with current waste disposal and environmental permitting legislation and guidance documents. However, individual landfills and other waste disposal facilities may have variances in their permit that differs from standard guidance. Waste facilities may also make decisions with respect to accepting waste on a commercial basis. Therefore, landfills or other waste facilities should be approached to confirm that they will accept waste materials prior to finalising waste disposal proposals.

14. RECOMMENDED SUPERVISION AND MONITORING

In compliance with the requirements in BS EN 1997-1:2004 and BE EN 1997-2:2007, construction and workmanship of the engineering solutions recommended in this report shall be supervised. In particular, issues listed in Section 9.4 General Construction Advice shall be considered in the implementation of the works and design of any necessary temporary works set out in Section 10.

In relation to the foundation solution(s) and ground floor slab recommendations in Section 9, the following supervision and monitoring is recommended.

- Inspections of formation strata in excavations for strip/pad footings

15. SUMMARY

A residential development is proposed at south of Keymer Road, Keymer, Hassocks. The site is currently occupied by two houses and their private gardens. The proposed development comprises a block of apartments up to two-and-a-half storeys in height, together with car parking and managed landscaping areas. Residents of the development will be of retirement age.

Ground conditions comprise a limited thickness of Topsoil. Present beneath the Topsoil are high-strength Folkestone Formation. Groundwater is expected to be at levels commensurate with the adjoining stream.

It is noted that the only development recorded on site comprise the present houses and gardens. On the basis of the ground investigation data, it is indicated that there are no valid contaminant linkages in relation to the proposed development. Therefore, it is considered that remediation works should not be necessary for the proposed development.

Based on the recorded ground conditions, strip/trench fill foundations, placed within the high strength Folkestone Formation, are considered to be suitable for the proposed development. It is recommended that an allowance should be made for suspended ground floor slabs with an underfloor void for the proposed buildings together with associated foundations precautions for shrinkable clay soils near to trees.

In view of the shallow clays, the use of soakaways is considered unsuitable for the proposed development.

REFERENCES

Technical References

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Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Keymer Road, Hassocks	**Hole Ref.**	**DS 1**
Date:	04/08/2023	**Sheet**	1 of 1
		Job No.	CCL03662
Contractor	LTS	**Ground Level.**	48.21 m OD
Equipment	Premier Compact 110	**Co-ordinates**	
Method	0.0 m to 5.0 m dynamic sampling	**Logged by:**	MW
Boring Diameter	100 mm	**Checked by:**	JDH

Logged on site during drilling operations

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Backfill	Level O.D.
0.20	JGg				Brown slightly sandy slightly gravelly organic CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular fine to medium of flint. (TOPSOIL) (TOPSOIL)	0.40		47.81
0.70	J				Firm becoming firm to stiff consistency orangish brown mottled light grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular fine to medium of flint. (FOLKESTONE FORMATION)			
1.00-1.45	SPT(C)			N=9				
1.30	J				… 1.20m Becoming silty.			
1.70	J				… 1.50 m Becomes firm to stiff and stiff consistency			
2.00-2.45	SPT(C)			N=17	… 1.90 m Becomes stiff	2.20		46.01
2.50	J				Stiff becoming very stiff consistency dark grey mottled brown slightly gravelly silty CLAY. Gravel Is angular fine to medium of flint. (FOLKESTONE FORMATION)			
3.00-3.45	SPT(C)			N=22	… 3.10 m Becomes dark grey and no gravel present.			
3.60	J							
4.00-4.425	SPT(C)			N=50 275mm		4.00		44.21
					End of exploratory hole			

Core Recovery

Depth	Recovery
0.00-1.20	n/a
1.20-2.00	100%
2.00-3.00	100%
3.00-4.00	100%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations

Additional Tests

Test type	Test Depth	Test Value

Remarks

Hand dug pit to 1.20 m.

Further progress below 4 m precluded by very dense strata.

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Keymer Road, Hassocks	**Hole Ref.**	**DS 2**
Date:	04/08/2023	**Sheet**	1 of 1
		Job No.	CCL03662
Contractor	LTS	**Ground Level.**	46.80 m OD
Equipment	Premier Compact 110	**Co-ordinates**	
Method	0.0 m to 5.0 m dynamic sampling	**Logged by:**	MW
Boring Diameter	100 mm	**Checked by:**	JDW

Logged on site during drilling operations

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
0.25	JGg				Brown slightly sandy organic CLAY with frequent rootlets. Sand is fine to medium. (TOPSOIL) ... 0.15 m a root with a 2 cm diameter.	0.30			46.50
0.70	J				Firm becoming firm to stiff consistency brown slightly sandy slightly gravelly CLAY with rare rootlets. Sand is fine to medium. Gravel is angular fine to medium of flint. (FOLKESTONE FORMATION)				
1.00-1.45	SPT(C)			N=12					
1.90	J					1.80			45.00
2.00-2.45	SPT(C)			N=8*	Firm and firm to stiff consistency orangish brown light grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular fine to medium of flint. (FOLKESTONE FORMATION) ... 2.00 m Becomes silty.	2.30			44.50
2.50	J				Firm becoming very stiff dark grey slightly sandy silty CLAY. Sand is fine to (FOLKESTONE FORMATION)				
3.00-3.45	SPT(C)			N=25					
4.00-4.45	SPT(C)			N=26					
4.90	J								
5.00-5.45	SPT(C)			N=42	End of exploratory hole	5.00			41.80

Core Recovery

Depth	Recovery
0.00-1.00	100%
1.00-2.00	60%
2.00-3.00	100%
3.00-4.00	100%
4.00-5.00	80%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations
2.00	2.00	-	Trace/damp strata

Additional Tests

Test type	Test Depth	Test Value

Remarks

* Probable anomalous test value due to boring disturbance

Damp strata 2.0 - 2.3 m

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Keymer Road, Hassocks	**Hole Ref.**	**DS 3**
Date:	04/08/2023	**Sheet**	1 of 1
		Job No.	CCL03662
Contractor	LTS	**Ground Level.**	45.50 m OD
Equipment	Premier Compact 110	**Co-ordinates**	
Method	0.0 m to 5.0 m dynamic sampling	**Logged by:**	MW
Boring Diameter	100 mm	**Checked by:**	JH

Logged on site during drilling operations

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Backfill	Level O.D.
0.10	JGg				Dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular fine to medium of flint. (TOPSOIL)	0.20		45.30
0.60	J				Stiff consistency brown slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to medium. Gravel is angular fine to medium of flint.	0.90		44.60
1.00-1.45	SPT(C)			N=13	Firm to stiff and stiff consistency orangish brown slightly sandy slightly	1.10		44.40
1.05	J				gravelly CLAY. Sand is fine to coarse. Gravel is angular fine to medium of flint.			
1.30	J				Firm to stiff consistency light brown mottled grey sandy silty CLAY. Sand is (FOLKESTONE FORMATION)			
2.00-2.45	SPT(C)			N=20		2.06		43.44
2.40	J				Stiff consistency dark grey silty CLAY. (FOLKESTONE FORMATION)	2.50		43.00
					Light brown mottled gey silty SAND. Sand is fine to medium. (FOLKESTONE FORMATION)	2.68		42.82
3.00-3.45	SPT(C)			N=28	Stiff to very stiff consistency dark grey CLAY with pockets/thin hori; (FOLKESTONE FORMATION)			
4.00-4.45	SPT(C)			N=27				
4.60	J							
5.00-5.45	SPT(C)			N=32	End of exploratory hole	5.00		40.50

Core Recovery

Depth	Recovery
0.00-1.00	100%
1.00-2.00	95%
2.00-3.00	100%
3.00-4.00	100%
4.00-5.00	100%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations
1.10	1.10	-	1.1 to 2.0 trace/damp strata

Additional Tests

Test type	Test Depth	Test Value

Remarks

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Keymer Road, Hassocks	**Hole Ref.**	**DS 4**
Date:	04/08/2023	**Sheet**	1 of 1
		Job No.	CCL03662
Contractor	LTS	**Ground Level.**	47.00 m OD
Equipment	Premier Compact 110	**Co-ordinates**	
Method	0.0 m to 5.0 m dynamic sampling	**Logged by:**	MW
Boring Diameter	100 mm	**Checked by:**	JDH

Logged on site during drilling operations

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Backfill	Level O.D.
0.30	JGg				Dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular fine to medium of flint. (TOPSOIL)	0.35		46.65
0.50	J				Stiff consistency orangish brown mottled light grey slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular fine to coarse of flint. (FOLKESTONE FORMATION)			
1.00-1.45	SPT(C)			N=13				
1.00	J							
1.20	J					1.30		45.70
1.35	J				Medium dense orangish brown fine to coarse SAND. (FOLKESTONE FORMATION)	1.38		45.62
1.80	J				Stiff to very stiff consistency dark grey mottled brown silty CLAY. (FOLKESTONE FORMATION)			
2.00-2.33	SPT(C)			N=50 180mm		2.00		45.00
					End of exploratory hole			

Core Recovery

Depth	Recovery
0.00-1.00	100%
1.00-2.00	95%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations
1.30	1.30	-	Trace/damp strata

Additional Tests

Test type	Test Depth	Test Value

Remarks

Further progress below 2.0 m precluded by very dense/high strength strata

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Dynamic Sample Record Sheet

Project:	Keymer Road, Hassocks	**Hole Ref.**	**DS 5**
Date:	04/08/2023	**Sheet**	1 of 1
		Job No.	CCL03662
Contractor	LTS	**Equipment**	Premier Compact 110
Method	0.0 m to 5.0 m dynamic sampling	**Ground Level.**	46.05 m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	MW — Logged on site during drilling operations
		Checked by:	

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
0.3	JGg				Light brown slightly sandy slightly gravelly organic CLAY with frequent rootlets. Sand is fine to medium. Gravel is angular fine to medium of sandstone and siltstone. (TOPSOIL)	0.40			45.65
0.8	JGg				Stiff consistency becoming firm orangish brown mottled light grey slightly sandy slightly gravelly CLAY with rare rootlets. Sand is fine to coarse. Gravel is angular fine to medium of flint. (FOLKESTONE FORMATION)				
1.00-1.45	SPT(C)			N=7					
1.5	J				… 1.40 m to 1.65 m Becomes firm to stiff consistency				
					… 1.65 m Becomes stiff consistency				
2.00-2.45	SPT(C)			N=18		2.30			43.75
2.5	J				Stiff becoming very stiff consistency dark grey silty CLAY. (FOLKESTONE FORMATION)				
3.00-3.45	SPT(C)			N=20					
3.5	J								
4.00-4.45	SPT(C)			N=24					
4.50	J					4.89			41.16
4.90-5.05	SPT(C)			N=50 85mm	Extremely weak light grey SANDSTONE. Recovered as fine to medium gravelly sand (FOLKESTONE FORMATION)				
					End of exploratory hole	4.90			41.15

Core Recovery

Depth	Recovery
0.00-1.00	100%
1.00-2.00	90%
2.00-3.00	100%
3.00-4.00	95%
4.00-4.90	100%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations
4.90 m	4.90 m	4.90 m	

Additional Tests

Test type	Test Depth	Test Value

Remarks

Further progress below 4.9 m precluded by strength of rock strata

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Legend:

- ⊗ Dynamic sample borehole
- * Installation location
- ▲ Dynamic probe borehole

EXPLORATORY HOLE LOCATION PLAN

Scale 1:500

Reproduced from Drawing No. SU 01 by D&J Surveys Ltd dated July 2023

Appendix C Southern Water Records and Correspondence

from Southern Water

Ben Green
Awcock Ward Partnership
Ada House
Pynes Hill
Exeter
Devon
EX2 5TU

Your ref

Our ref
DSA000028655

Date
23 November 2023

Contact
Tel 0330 303 0119

Dear Mr Green,

Level 1 Capacity Check Enquiry: 68 & 70 Keymer Road, Hassocks, West Sussex, BN6 8AB.

We have completed the capacity check for the above development site and the results are as follows:

Foul Water

There is currently adequate capacity in the local sewerage network to accommodate a foul flow of **0.37 l/s** for the above development at manhole reference TQ3115**0402**. Please note that no surface water flows (existing or proposed) can be accommodated within the existing foul sewerage system unless agreed by the Lead Local Flood Authority in consultation with Southern Water, after the hierarchy Part H3 of Building Regulations has been complied with.

Connecting to our network

It should be noted that this information is only a hydraulic assessment of the existing sewerage network and does not grant approval for a connection to the public sewerage system. A formal Sewer Connection (S106) application is required to be completed and approved by Southern Water Services. To make an application visit: developerservices.southernwater.co.uk

Please note the information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter.

Should it be necessary to contact us please quote our above reference number in all communications relating to this application by email at southernwaterplanning@southernwater.co.uk

Yours sincerely,

Future Growth Planning Team
Developer Services

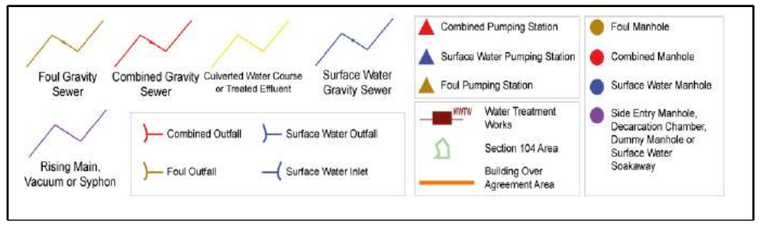
southernwater.co.uk/developing-building/planning-your-development

(c) Crown copyright and database rights 2023 Ordnance Survey 100031673 | Date: 14/08/23 | Scale: 1:1250 | Map Centre: 531003,115350 | Data updated: 05/05/23 | Our Ref: 1249790 - 2 | Wastewater Plan A3

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2023 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.



john.duncan@nrswa.net

Hassocks

WATER for LIFE from Southern Water

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0201	F	47.49	45.35	
0202	F	47.89	45.86	
0203	F	48.47	46.77	
0301	F	49.40	45.81	
0302	F	50.56	47.56	
0401	F	50.11	45.73	
0402	F	49.63	45.45	
1202	F	0.00	0.00	
1203	F	0.00	0.00	
1204	F	0.00	0.00	
1205	F	0.00	0.00	
1206	F	0.00	0.00	
1301	F	52.38	48.29	
1302	F	0.00	0.00	
1303	F	0.00	0.00	
1304	F	0.00	0.00	
2302	F	0.00	0.00	
2401	F	0.00	0.00	
2402	F	0.00	0.00	
2403	F	0.00	0.00	
2404	F	0.00	0.00	
2405	F	0.00	0.00	
8201	F	49.10	47.77	
8301	F	44.67	41.73	
8302	F	44.60	42.72	
8303	F	44.62	42.97	
8304	F	46.16	44.53	
8305	F	46.12	44.80	
8306	F	0.00	0.00	
8307	F	0.00	0.00	
8308	F	0.00	0.00	
8309	F	0.00	0.00	
8401	F	43.84	41.04	
8403	F	43.41	0.00	
8404	F	43.30	41.19	
9201	F	46.42	44.62	
9202	F	46.94	45.12	
9301	F	45.83	44.03	
9302	F	45.55	43.93	
9303	F	45.37	43.74	
9401	F	47.33	44.10	
9402	F	0.00	0.00	
9403	F	0.00	0.00	
9404	F	0.00	0.00	
9405	F	0.00	0.00	
9406	F	0.00	0.00	
0350	S	51.21	49.69	
0351	S	50.96	49.41	
0352	S	50.38	48.75	
0353	S	49.41	47.84	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0354	S	48.47	44.87	
0355	S	48.02	0.00	
0356	S	47.62	44.62	
0357	S	47.51	44.77	
0358	S	47.95	0.00	
0359	S	48.43	44.88	
0360	S	47.62	45.95	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Appendix D CCTV Survey

CCTV SURVEYS

HIGH PRESSURE JETTING

MAN ENTRY SURVEYS

RELINING & REPAIRS

PILING SURVEYS

CHIMNEY SURVEYS

DrainSafe
Approved Drainage Contractors

National Association N.A.D.C. Drainage Contractors

UTILITY SURVEYS LTD.

5 SUFFOLK ROAD
MALDON
ESSEX
CM9 6AX
Telephone: 07971 910370

CCTV REPORT

CLIENT	CHURCHILL RETIREMENT LIVING
LOCATION	68 & 70 KEYMER ROAD HASSOCKS WEST SUSSEX BN6 8QP
DATE	15/08/2023
REF	071522

CONTENTS

REGISTER OF APPENDICES

GENERAL INFORMATION

Utility Surveys Ltd have been appointed by Churchill Retirement Living to undertake a Sewer Condition Survey at the location identified. This survey commenced on 15 August 2023.

CONTACT INFORMATION

SITE ADDRESS: **68 & 70 KEYMER ROAD** **HASSOCKS** **WEST SUSSEX** **BN6 8QP**	**SITE CONTACT: N/A** **CONTACT NO:** **EMAIL:**
CLIENT DETAILS: **CHURCHILL RETIREMENT LIVING** **CHURCHILL HOUSE** **6 CHERTSEY ROAD** **BYFLEET** **SURREY KT14 7AG**	**CONTACT: MATTHEW GLACKIN** **CONTACT NO: 01932 338951** **EMAIL:**

UTILITY SURVEYS LTD CONTACT DETAILS

OFFICE	**SIMON GARDINER** **07971 910370** **simon@utilitysurveysltd.co.uk**
RIG MANAGER	**SIMON GARDINER**

SITE DESCRIPTION

Site Description

DEVELOPMENT SITE

Site Boundaries

CLEARLY DEFINED ON SUPPLIED DRAWINGS

SURVEY BRIEF

Sewer Condition Inspection Survey

The Purpose of the Sewer Condition Inspection Survey was to establish the location and extent of foul and/ or surface water drainage systems and to document their condition prior to any further works.

- A full condition survey can only be produced if precleansing / jetting is carried out in conjunction with the CCTV survey.

- If precleansing is not carried out at the time of the survey further faults and conditional defects may be present but not recorded in this report.

In addition Utility Surveys Ltd have;

- Attempted to investigate all agreed areas, although if not all could be fully accessed (see Daily Record Sheet).

- Produced a report to establish the location and extent of foul and surface water drainage systems and to document their condition prior to any further works.

- Provided the basic information from which a remediation or management plan can be instigated.

- Highlighted the requirement for urgent action to repair or remediation works to the surveyed drainage system.

- Incorporated in the results any additional manholes/ drainage found, which may have been buried, obscured or not identified in the original scope of works.

Agreed Restrictions and Exclusions

This report is based upon a Sewer Condition Inspection Survey of an unfamiliar site.

During the course of the survey all reasonable efforts were made to identify and access all Manholes and foul/ surface drainage/ outfall, throughout the site.

Some installations/ areas may not have been inspected due to access and or safety reasons (e.g. Wet Wells, Large Unventilated Tanks, Traffic Management Situations). Unless an accepted safe system of work has been devised.

Access may not have been gained to several areas of the site due to conditions outside the control of the client or contractor, any such areas have been documented within this report (see Daily Record Sheet).

Any diagrams/ CAD drawings in the report are not to be scaled and are illustrative only to indicate approximate locations.

Manhole covers will not be lifted if:

a) There is a danger of damaging surrounding flooring or finishes.

b) They are covered, i.e. under fitted carpets, flooring, tiling or paving etc.

c) Under fittings, fixtures, fencing, equipment etc.

Buried manholes will be located, if possible, position marked. If instructed, excavated in soft ground only up to a depth of 350mm with temporary reinstatement.

No allowance has been made for any precleansing unless stated in the quotation.

Full and free access to all areas affected is to be arranged by the instructing party.

SURVEY TECHNIQUES

The areas set out within the survey brief underwent inspection for a Sewer Condition Inspection Survey each area within the agreed scope of works was surveyed for location extent and condition of foul and/ or surface water drainage systems and CCTV footage gathered for confirmation. Every reasonable effort was made to investigate all aspects of the drainage system. Additional photographs were taken where relevant to the inspection.

There were no deviations from the agreed scope of works.

This Sewer Condition Inspection Survey was carried out in accordance with the Utility Surveys Ltd documented 'in-house' procedure 820 'Code of Working Practice' based on National Sewerage Association guidance.
The Sewer Condition Inspection Survey Report states information recorded at the time of survey only, based on visual and CCTV assessment in accordance with sewer classification codings issued by WRC, incorporating the following inspection criteria:

CONDITION of pipe work
LOCATION of pipe work
EXTENT of the pipe work

A defect grade description has been provided for the identification of defective pipe work.

Changes to any of the above criteria shall necessitate the need for reassessment

These gradings and the reports can be used to form the basis of a planned preventative maintenance programme. This can be the subject of further discussions with our technical support team.

Drainage Report

Prepared For

CHURCHILL RETIREMENT LIVING
6 CHERTSEY ROAD
BYFLEET
SURREY
KT14 7AG

Site

HASSOCKS
68 & 70 KEYMER ROAD
HASSOCKS
WEST SUSSEX
BN6 8QP

UTILITY SURVEYS LIMITED
Surveyor: Simon Gardiner
simon@utilitysurveysltd.co.uk

Total Defects for Project

1	0	29	1	0

Total DRB Grades for Project

0	11	1

071522 Keymer Road Hassocks - CCTV Survey Report : 15/08/23

Name :	UTILITY SURVEYS LIMITED
Contact :	SIMON GARDINER
Location :	5 SUFFOLK ROAD
Town :	MALDON
Region :	ESSEX
Postcode :	CM9 6AX
Email :	simon@utilitysurveysltd.co.uk
Contact Number :	
Surveyor :	Simon Gardiner
Valid Certification No :	L1103

Client Information

Name :	CHURCHILL RETIREMENT LIVING
Contact :	MATTHEW GLACKIN
Location :	6 CHERTSEY ROAD
Town :	BYFLEET
Region :	SURREY
Postcode :	KT14 7AG
Tel :	01932 338951
Mobile :	
Email :	
Fax :	

Site Information

Name :	HASSOCKS
Contact :	
Location :	68 & 70 KEYMER ROAD
Town :	HASSOCKS
Region :	WEST SUSSEX
Postcode :	BN6 8QP
Tel :	
Mobile :	
Email :	
Fax :	

Total Defects for Project

1 | 0 | 29 | 1 | 0

Total DRB Grades for Project

0 | 11 | 1

Report interpretation.

Overview:

Each section of the drainage system is allocated a score indicating areas that require attention. These areas are detailed in the Overview section on the following page and also at the bottom right of the first few pages. We use colour coding as an indicator of severity. Additional information concerning rehabilitation options/recomendations is included in the Overview page, which can also be used as an, "at a glance" indication of system condition. More in depth information for each section, Including images can be found later in the report. Grade indicators are as follows:

Grade A: Drain is serviceable no recommendations required

Grade B: There is an issue that might require remedial works

Grade C: There is a defect that requires remedial works, the drain is not serviceable.

Observations:

Each section of drainage reported on (manhole to manhole for example), contains detailed information about that drain and any observations made concerning condition are detailed below the header section. The observations are colour coded and given a severity score, with more significant defects being given a higher score, using a scale from 1 to 5 as detailed below:

Severity 1 to 2: These defects may require remedial monitoring

Severity 3: These defects probably require some form of remedial works

Severity 4 to 5: Defects that will require remedial repair or replacement

General:

The information provided is relevant at the time of survey. The coding system in this report is based on the Manual of Sewer Condition Classification, 5th edition (MSCC5) domestic codes (BS EN 13508-1:2003). This is the official standard for the water industry.

The severity system is based on significant experience in general practice and the 1 -5 grades represent the severity of individual defects: 5 representing a more serious defect.

Please feel free to contact us for further explanation or pricing for remedial works required.

Total Defects for Project

Total DRB Grades for Project

Overview

Section: 1 **From: F1** **To: SPUR A**	Grade B	**DRB Grade: B** **Pipe Size: 100** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**
Section: 2 **From: F1** **To: F2**	Grade B	**DRB Grade: B** **Pipe Size: 100** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**
Section: 3 **From: F2** **To: SPUR A**	Grade B	**DRB Grade: B** **Pipe Size: 100** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**
Section: 4 **From: f2** **To: f3**	Grade B	**DRB Grade: B** **Pipe Size: 100** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**
Section: 5 **From: F3** **To: MAIN**	Grade B	**DRB Grade: B** **Pipe Size: 150** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**
Section: 6 **From: F4** **To: SPUR A**	Grade B	**DRB Grade: B** **Pipe Size: 100** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**
Section: 7 **From: F4** **To: SPUR B**	Grade B	**DRB Grade: B** **Pipe Size: 100** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**
Section: 8 **From: F4** **To: F5**	Grade B	**DRB Grade: B** **Pipe Size: 100** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**

Total Defects for Project

1 0 29 1 0

Total DRB Grades for Project

0 11 1

Section: 9 **From: F5** **To: F6**	Grade B	**DRB Grade: B** **Pipe Size: 100** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**
Section: 10 **From: F6** **To: F7**	Grade B	**DRB Grade: B** **Pipe Size: 100** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**
Section: 11 **From: F7** **To: MAIN**	Grade C	**DRB Grade: C** **Pipe Size: 100** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**
Section: 12 **From: F7** **To: F8**	Grade B	**DRB Grade: B** **Pipe Size: 100** **Material: Vitrified Clay (i.e. all clayware)** **Use: Foul**

Site: 68 & 70 KEYMER ROAD, HASSOCKS

Section 1

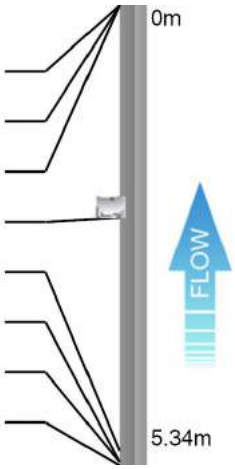
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	F1	Finish Node Ref:	SPUR A	Direction:	U	Height/Dia:	100
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	N

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	5.34	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 0%			0:00:00
00.00m	REM	General remark			0:00:11
02.46m	JN	Junction 03 : 100mm Diameter		0_3	0:00:20
05.17m	R	Roots		0_4	0:00:54
05.30m	REM	General remark			0:01:08
05.30m	REM	General remark			0:01:08
05.34m	SA	Survey abandoned			



Total Defects for section

0	0	1	0	0

DRB Grade for Section

B

Descriptive Report with Remarks and Observation Images

Section 1

Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole F1	
00.00m	0:00:00	WL	Water level: 0% Height/Diameter	
00.00m	0:00:11	REM	General remark PIPE LINED	
02.46m	0:00:20	JN	Junction at 03 o'clock: 100mm Diameter	Image Provided - Ref: 0_3 
05.17m	0:00:54	R	Roots - Severity 3 MASS ROOTS	Image Provided - Ref: 0_4 
05.30m	0:01:08	REM	General remark ENTERS BURIED MANHOLE	
05.30m	0:01:08	REM	General remark MASS ROOTS IN MANHOLE	
05.34m		SA	Survey abandoned BURIED MANHOLE	

Site: 68 & 70 KEYMER ROAD, HASSOCKS

Section 2

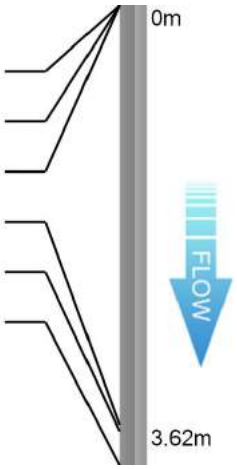
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	F1	Finish Node Ref:	F2	Direction:	D	Height/Dia:	100
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	N

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	3.62	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 0%			0:00:00
00.00m	REM	General remark			0:00:05
03.30m	R	Roots			0:00:44
03.35m	LRQ	Line of drain/sewer deviates right [quarter]			0:00:44
03.62m	MHF	Finish node type, manhole			



Total Defects for section

0	0	1	0	0

DRB Grade for Section

B

Descriptive Report with Remarks and Observation Images — Section 2

Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole F1	
00.00m	0:00:00	WL	Water level: 0% Height/Diameter	
00.00m	0:00:05	REM	General remark PIPE LINED	
03.30m	0:00:44	R	Roots - Severity 3 FINE ROOTS	
03.35m	0:00:44	LRQ	Line of drain/sewer deviates right [quarter]	
03.62m		MHF	Finish node type, manhole F2	

Site: 68 & 70 KEYMER ROAD, HASSOCKS

Section 3

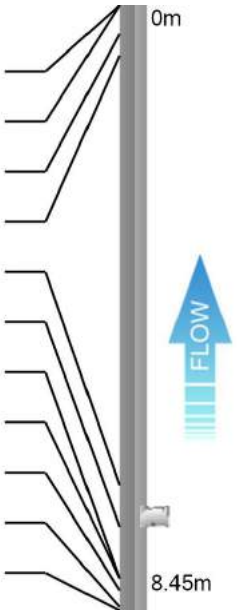
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	F2	Finish Node Ref:	SPUR A	Direction:	U	Height/Dia:	100
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	N

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	8.45	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 0%			0:00:00
00.40m	DES	S1 Settled deposits fine 10%	S1		0:00:00
00.70m	R	Roots		2_3	0:00:06
06.70m	FC	Fracture circumferential 06-06		2_4	0:01:10
07.28m	JN	Junction 10 : 100mm Diameter			0:01:17
08.00m	DES	F1 Settled deposits fine 10%	F1		0:00:00
08.00m	DES	Settled deposits fine 20%			0:01:27
08.17m	LLF	Line of drain/sewer deviates left [full]			0:01:27
08.40m	DES	Settled deposits fine 50%			0:01:32
08.45m	SA	Survey abandoned			



Total Defects for section

0	0	6	0	0

DRB Grade for Section

B

Descriptive Report with Remarks and Observation Images — Section 3

Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole F2	
00.00m	0:00:00	WL	Water level: 0% Height/Diameter	
00.40m	0:00:00	S1 DES	Settled deposits fine 0.4m - 8m: 10% Cross sectional area loss - Severity 3	
00.70m	0:00:06	R	Roots - Severity 3 FINE ROOTS	Image Provided - Ref: 2_3 
06.70m	0:01:10	FC	Fracture circumferential from 06 o'clock to 06 o'clock - Severity 3	Image Provided - Ref: 2_4 
07.28m	0:01:17	JN	Junction at 10 o'clock: 100mm Diameter	
08.00m	0:00:00	F1 DES	Settled deposits fine Defect End: 10% Cross sectional area loss - Severity 3	
08.00m	0:01:27	DES	Settled deposits fine: 20% Cross sectional area loss - Severity 3	
08.17m	0:01:27	LLF	Line of drain/sewer deviates left [full]	

Total Defects for section

0 | 0 | 6 | 0 | 0

DRB Grade for Section

B

Pos	Video Ref	Code	Description	Image
08.40m	0:01:32	DES	Settled deposits fine: 50% Cross sectional area loss - Severity 3	
08.45m		SA	Survey abandoned UNABLE TO PASS DEBRIS	

Site: 68 & 70 KEYMER ROAD, HASSOCKS — Section 4

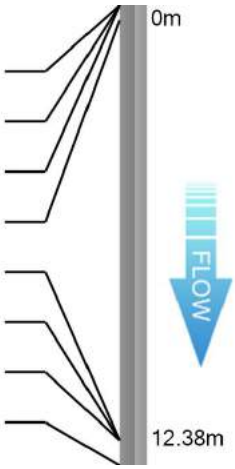
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	f2	Finish Node Ref:	f3	Direction:	D	Height/Dia:	100
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	N

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	12.38	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 0%			0:00:00
00.00m	REM	General remark			0:00:15
00.40m	DES	S1 Settled deposits fine 5%	S1		0:00:15
11.70m	DES	F1 Settled deposits fine 5%	F1		0:00:15
11.70m	DES	Settled deposits fine 20%		3_4	0:01:35
11.70m	R	Roots			0:01:35
12.38m	MHF	Finish node type, manhole			



Total Defects for section

0	0	4	0	0

DRB Grade for Section

B

Descriptive Report with Remarks and Observation Images — Section 4

Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole f2	
00.00m	0:00:00	WL	Water level: 0% Height/Diameter	
00.00m	0:00:15	REM	General remark PIPE LINED	
00.40m	0:00:15	S1 DES	Settled deposits fine 0.4m - 11.7m: 5% Cross sectional area loss - Severity 3	
11.70m	0:00:15	F1 DES	Settled deposits fine Defect End: 5% Cross sectional area loss - Severity 3	
11.70m	0:01:35	DES	Settled deposits fine: 20% Cross sectional area loss - Severity 3	Image Provided - Ref: 3_4 
11.70m	0:01:35	R	Roots - Severity 3 MASS ROOTS	
12.38m		MHF	Finish node type, manhole f3	

Site: 68 & 70 KEYMER ROAD, HASSOCKS

Section 5

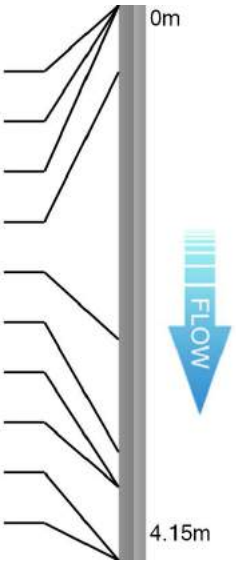
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	F3	Finish Node Ref:	MAIN	Direction:	D	Height/Dia:	150
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	Y

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	4.15	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 5%			0:00:00
00.00m	REM	General remark			0:00:00
00.50m	LDQ	Line of drain/sewer deviates down [quarter]		4_3	0:00:05
02.50m	REM	General remark		4_4	0:00:24
03.34m	JDM	Joint displaced medium		4_5	0:00:34
03.60m	LDQ	Line of drain/sewer deviates down [quarter]			0:00:36
03.60m	LLQ	Line of drain/sewer deviates left [quarter]		4_7	0:00:36
04.15m	REM	General remark		4_8	0:00:46
04.15m	WRF	Finish node type, major connection without			



Total Defects for section

0	0	1	0	0

DRB Grade for Section

B

Descriptive Report with Remarks and Observation Images — Section 5

Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole F3	
00.00m	0:00:00	WL	Water level: 5% Height/Diameter	
00.00m	0:00:00	REM	General remark PIPE LINED	
00.50m	0:00:05	LDQ	Line of drain/sewer deviates down [quarter] LINE DOWN	Image Provided - Ref: 4_3 
02.50m	0:00:24	REM	General remark LINER STOPS	Image Provided - Ref: 4_4 
03.34m	0:00:34	JDM	Joint displaced medium - Severity 3	Image Provided - Ref: 4_5 
03.60m	0:00:36	LDQ	Line of drain/sewer deviates down [quarter]	

Total Defects for section

0	0	1	0	0

DRB Grade for Section

B

Pos	Video Ref	Code	Description	Image
03.60m	0:00:36	LLQ	Line of drain/sewer deviates left [quarter]	Image Provided - Ref: 4_7 
04.15m	0:00:46	REM	General remark JOINS MAIN	Image Provided - Ref: 4_8 
04.15m		WRF	Finish node type, major connection without manhole JOINS MAIN	

Site: 68 & 70 KEYMER ROAD, HASSOCKS

Section 6

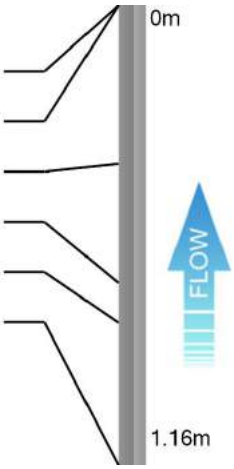
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	F4	Finish Node Ref:	SPUR A	Direction:	U	Height/Dia:	100
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	N

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	1.16	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 5%			0:00:00
00.40m	R	Roots		5_2	0:00:02
00.70m	R	Roots		5_3	0:00:09
00.80m	DEG	Attached deposits, grease 04-09 20%			0:00:16
01.16m	SA	Survey abandoned			



Total Defects for section

0	0	3	0	0

DRB Grade for Section

B

Descriptive Report with Remarks and Observation Images — Section 6

Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole F4	
00.00m	0:00:00	WL	Water level: 5% Height/Diameter	
00.40m	0:00:02	R	Roots - Severity 3 TAP ROOTS	Image Provided - Ref: 5_2 
00.70m	0:00:09	R	Roots - Severity 3 MASS ROOTS	Image Provided - Ref: 5_3 
00.80m	0:00:16	DEG	Attached deposits, grease from 04 o'clock to 09 o'clock: 20% Cross sectional area loss - Severity 3	
01.16m		SA	Survey abandoned UNABLE TO PASS ROOTS AND DEBRIS	

Site: 68 & 70 KEYMER ROAD, HASSOCKS

Section 7

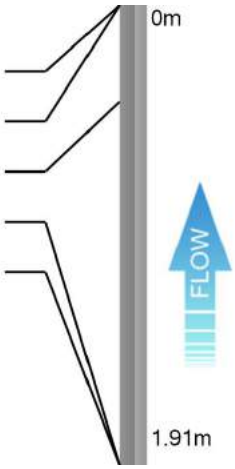
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	F4	Finish Node Ref:	SPUR B	Direction:	U	Height/Dia:	100
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	N

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	1.91	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 10%			0:00:00
00.40m	R	S1 Roots	S1		0:00:00
01.91m	R	F1 Roots	F1		0:00:00
01.91m	SA	Survey abandoned			



Total Defects for section

0	0	2	0	0

DRB Grade for Section

B

Descriptive Report with Remarks and Observation Images

Section 7

Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole F4	
00.00m	0:00:00	WL	Water level: 10% Height/Diameter	
00.40m	0:00:00	S1 R	Roots 0.4m - 1.91m - Severity 3 MASS ROOTS	
01.91m	0:00:00	F1 R	Roots Defect End - Severity 3 MASS ROOTS	
01.91m		SA	Survey abandoned MASS ROOTS	

Site: 68 & 70 KEYMER ROAD, HASSOCKS

Section 8

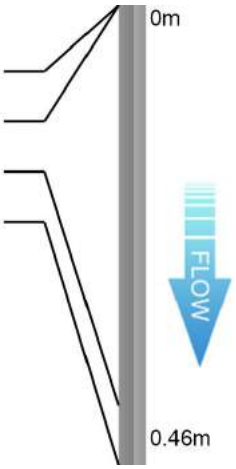
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	F4	Finish Node Ref:	F5	Direction:	D	Height/Dia:	100
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	N

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	0.46	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 10%			0:00:00
00.40m	R	Roots			0:00:04
00.46m	SA	Survey abandoned			



Total Defects for section

0	0	1	0	0

DRB Grade for Section

B

Descriptive Report with Remarks and Observation Images — Section 8

Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole F4	
00.00m	0:00:00	WL	Water level: 10% Height/Diameter	
00.40m	0:00:04	R	Roots - Severity 3 MASS ROOTS	
00.46m		SA	Survey abandoned MASS ROOTS	

Site: 68 & 70 KEYMER ROAD, HASSOCKS

Section 9

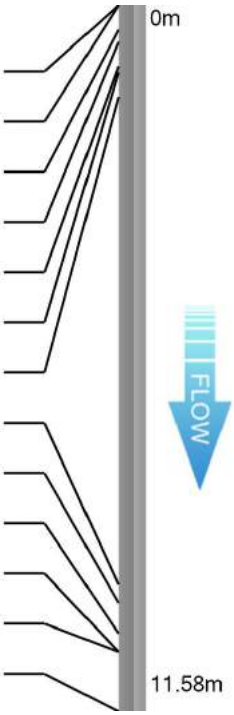
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	F5	Finish Node Ref:	F6	Direction:	D	Height/Dia:	100
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	N

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	11.58	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 10%			0:00:00
00.40m	DEG	Attached deposits, grease 04-08 20%		8_2	0:00:00
00.60m	WL	Water level 5%			0:00:10
01.00m	CC	Crack, circumferential 07-05			0:00:12
01.10m	RJ	Roots at joint		8_5	0:00:12
01.50m	DEG	S1 Attached deposits, grease 04-08 5%	S1		0:00:19
09.50m	WL	Water level 10%			0:02:13
09.80m	WL	Water level 20%			0:02:20
10.30m	WL	Water level 30%			0:02:29
10.60m	DEG	F1 Attached deposits, grease 04-08 5%	F1		0:00:19
10.60m	CUW	Loss of vision, camera under water			0:00:00
11.58m	MHF	Finish node type, manhole			



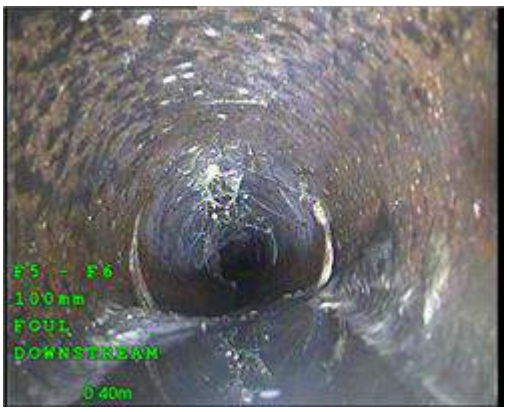
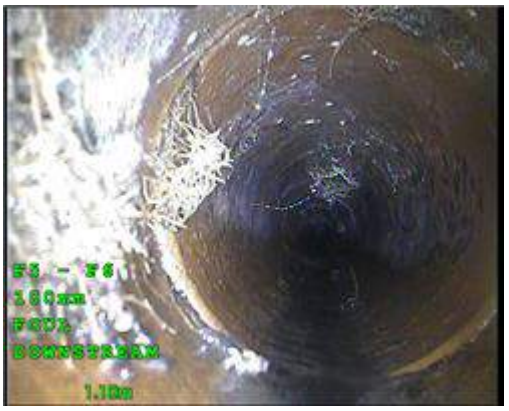
Total Defects for section

1	0	4	0	0

DRB Grade for Section

B

Descriptive Report with Remarks and Observation Images — Section 9

Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole F5	
00.00m	0:00:00	WL	Water level: 10% Height/Diameter	
00.40m	0:00:00	DEG	Attached deposits, grease from 04 o'clock to 08 o'clock: 20% Cross sectional area loss - Severity 3	Image Provided - Ref: 8_2 
00.60m	0:00:10	WL	Water level: 5% Height/Diameter	
01.00m	0:00:12	CC	Crack, circumferential from 07 o'clock to 05 o'clock - Severity 1	
01.10m	0:00:12	RJ	Roots at joint - Severity 3 FINE ROOTS	Image Provided - Ref: 8_5 
01.50m	0:00:19	S1 DEG	Attached deposits, grease 1.5m - 10.6m from 04 o'clock to 08 o'clock: 5% Cross sectional area loss - Severity 3	
09.50m	0:02:13	WL	Water level: 10% Height/Diameter	
09.80m	0:02:20	WL	Water level: 20% Height/Diameter	

Total Defects for section

1	0	4	0	0

DRB Grade for Section

B

Pos	Video Ref	Code	Description	Image
10.30m	0:02:29	WL	Water level: 30% Height/Diameter	
10.60m	0:00:19	F1 DEG	Attached deposits, grease Defect End from 04 o'clock to 08 o'clock: 5% Cross sectional area loss - Severity 3	
10.60m	0:00:00	CUW	Loss of vision, camera under water	
11.58m		MHF	Finish node type, manhole F6	

Site: 68 & 70 KEYMER ROAD, HASSOCKS

Section 10

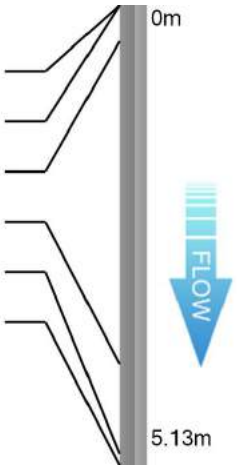
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	F6	Finish Node Ref:	F7	Direction:	D	Height/Dia:	100
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	N

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	5.13	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 5%			0:00:00
00.40m	DEG	S1 Attached deposits, grease 07-05 5%	S1		0:00:26
04.00m	R	Roots		9_3	0:00:46
05.00m	DEG	F1 Attached deposits, grease 07-05 5%	F1		0:00:26
05.13m	MHF	Finish node type, manhole			



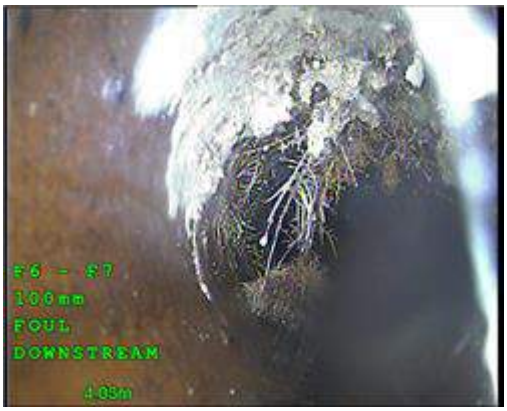
Total Defects for section

0	0	3	0	0

DRB Grade for Section

B

Descriptive Report with Remarks and Observation Images — Section 10

Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole F6	
00.00m	0:00:00	WL	Water level: 5% Height/Diameter	
00.40m	0:00:26	S1 DEG	Attached deposits, grease 0.4m - 5m from 07 o'clock to 05 o'clock: 5% Cross sectional area loss - Severity 3	
04.00m	0:00:46	R	Roots - Severity 3 MASS ROOTS	Image Provided - Ref: 9_3 
05.00m	0:00:26	F1 DEG	Attached deposits, grease Defect End from 07 o'clock to 05 o'clock: 5% Cross sectional area loss - Severity 3	
05.13m		MHF	Finish node type, manhole F7	

Site: 68 & 70 KEYMER ROAD, HASSOCKS

Section 11

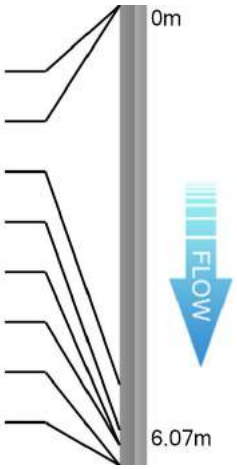
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	F7	Finish Node Ref:	MAIN	Direction:	D	Height/Dia:	100
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	N

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	6.07	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 5%			0:00:00
05.00m	JDM	Joint displaced medium		10_2	0:00:59
05.60m	LLQ	Line of drain/sewer deviates left [quarter]			0:01:09
05.80m	JDL	Joint displaced large		10_4	0:01:12
05.80m	LDH	Line of drain/sewer deviates down [half]			0:01:12
06.07m	REM	General remark		10_6	0:01:18
06.07m	WRF	Finish node type, major connection without			



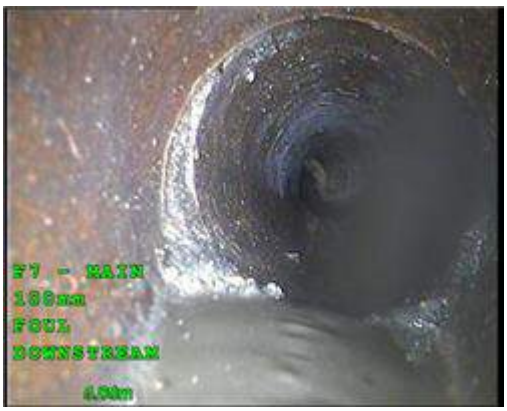
Total Defects for section

0	0	1	1	0

DRB Grade for Section

C

Descriptive Report with Remarks and Observation Images — Section 11

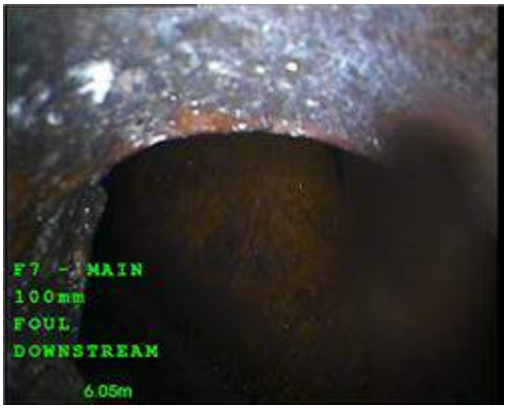
Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole F7	
00.00m	0:00:00	WL	Water level: 5% Height/Diameter	
05.00m	0:00:59	JDM	Joint displaced medium - Severity 3	Image Provided - Ref: 10_2 
05.60m	0:01:09	LLQ	Line of drain/sewer deviates left [quarter]	
05.80m	0:01:12	JDL	Joint displaced large - Severity 4	Image Provided - Ref: 10_4 
05.80m	0:01:12	LDH	Line of drain/sewer deviates down [half]	

Total Defects for section

0 0 1 1 0

DRB Grade for Section

C

Pos	Video Ref	Code	Description	Image
06.07m	0:01:18	REM	General remark JOINS MAIN	Image Provided - Ref: 10_6 
06.07m		WRF	Finish node type, major connection without manhole JOINS MAIN	

Site: 68 & 70 KEYMER ROAD, HASSOCKS

Section 12

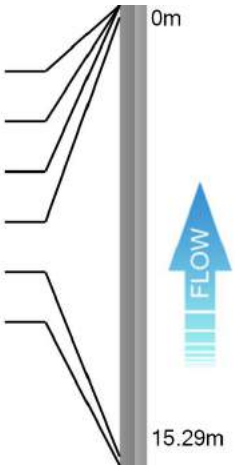
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT LIVING	68 & 70 KEYMER ROAD	HASSOCKS		Simon Gardiner	15/08/2023

Start Node Ref:	F7	Finish Node Ref:	F8	Direction:	U	Height/Dia:	100
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	F	Shape:	C
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Cleaned	N

Node Type	Cover Condition	Benching Condition	1/2 Channel Condition	Node Condition Remarks
MH				

Drain Type	Lining Type	Lining Mat.	Year Const.	Weather	Flow Cont.	Length	General Remarks
A				D	N	15.29	

Position	Code	Description	CD	Pic	Video Ref
00.00m	MH	Start node type, manhole			
00.00m	WL	Water level 5%			0:00:00
00.00m	REM	General remark			0:00:00
00.40m	DES	S1 Settled deposits fine 5%	S1		0:00:00
15.00m	DES	F1 Settled deposits fine 5%	F1		0:00:00
15.29m	MHF	Finish node type, manhole			



Total Defects for section

0 0 2 0 0

DRB Grade for Section

B

Descriptive Report with Remarks and Observation Images — Section 12

Pos	Video Ref	Code	Description	Image
00.00m		MH	Start node type, manhole F7	
00.00m	0:00:00	WL	Water level: 5% Height/Diameter	
00.00m	0:00:00	REM	General remark PIPE LINED	
00.40m	0:00:00	S1 DES	Settled deposits fine 0.4m - 15m: 5% Cross sectional area loss - Severity 3	
15.00m	0:00:00	F1 DES	Settled deposits fine Defect End: 5% Cross sectional area loss - Severity 3	
15.29m		MHF	Finish node type, manhole F8	

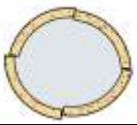
A guide to defects and other observations in drainage systems

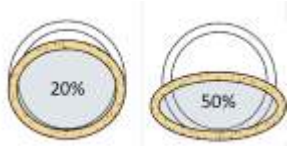
More detailed information can be found in the National Standard (BS EN 13508-1:2003) and in the Manual of Sewer Condition Classification (MSCC) 5th Edition, written by the Water Research Centre (WRc).

Use	
Code	**Description**
C	Combined
F	Foul
S	Surface Water
T	Trade Effulent
W	Culverted Watercourse
Z	Other

Common Materials	
Code	**Description**
VC	Vitrified Clay
PVC	Polyvinyl Chloride
CO	Concrete
CI	Cast Iron
PF	Pitch Fibre
PE	Polyethylene
DI	Ductile Iron

Start Node	Description	Finish Node
MH	Manhole	MHF
IC	Inspection Chamber	ICF
GY	Gulley	GYF
RE	Rodding Eye	REF
SK	Soakaway	SKF
BN	Buchan Trap	BNF
BR	Major Connection without Ref	BRF
CP	Cacth Pit	CPF
OC	Other Special Chamber	OCF
OF	Outfall	OFF
OS	Oil Seperator	OSF
WR	Major Connection without mh	WRF
LH	Lamphole	LHF

Code	Observation	Description	Attributes	
B	Broken	Pieces pipe have visibly moved	Defined by clock references. Associated with deformity in rigid pipe	
CC CL CM CR	Cracks	Cracks are break lines that are not visibly open	Defined by clock reference position/s. Longitudinal and radiating cracks attract only one clock reference	
CN	Connection	Lateral pipe has been connected after original construction	Described by clock reference position and diameter	

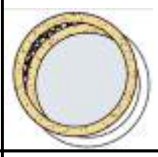
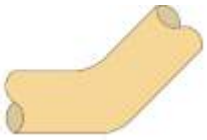
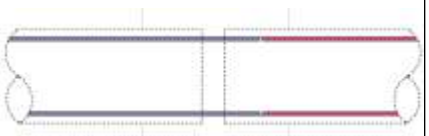
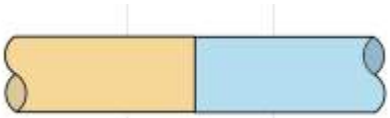
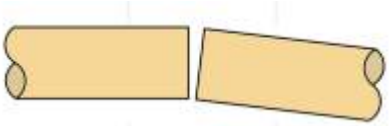
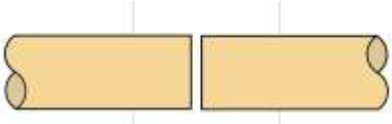
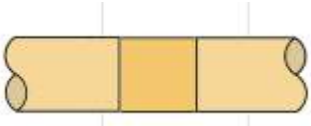
CX(I)	Defective Connection (Intruding)	Defective by intrusion or damage due to factors including: cracks, fractures, obstruction, position etc	Described by clock reference position and diameter (+ % intrusion)	
CU	Loss of Vision	Lens of camera is obscured by debris, water etc. Operator is unable to see drain clearly	'W' can be added if loss of vision is due to wate	
D	Deformed	Pipe has lost its structure	Described by percentage loss of height or width. Recorded in 5% increments	
DEE	Deposits Encrustation	Eg. Attached scale deposits evident	Described by clock referenced position and percentage loss of cross-sectional area (5% increments)	
DEG	Deposits Grease	Attached grease deposits evident	Described by clock referenced position and percentage loss of cross-sectional area (5% increments)	
DER DES	Deposits Coarse/Fine	Settled deposits on the invert of the pipe.	Described by percentage loss of height or diameter. Recorded in 5% increments.	
FC FL FM FR	Fractures	Fractures are visibly open. Pieces of pipe have not moved	Defined by clock reference position/s. Longitudinal and radiating fractures attract only one clock reference	
H	Holes	Section of pipe fabric is missing	Defined by clock reference location. Normally two clock references	
I	Infiltration	Water is infiltrating the pipe, normally via a joint but could be via another defect	Can be described in Remarks using terms such as Seeper, Dripper and Runner	
JDL	Joint Displaced Large	Pipe has moved at joint, perpendicular to axis of pipe	More than 1.5 times the pipe wall thickness must be visible	

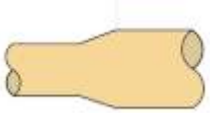
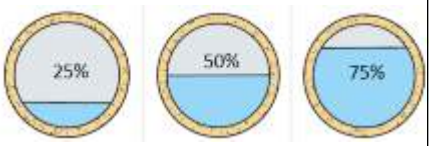
Total Defects for section

0	0	2	0	0

DRB Grade for Section

B

JDM	Joint Displaced Medium	Pipe has moved at joint, perpendicular to axis of pipe	Between 1 and 1.5 times the pipe wall thickness must be visible	
JN	Junction	Lateral pipe was installed at construction	Described by clock reference position and diameter	
JX	Defective Junction	Lateral pipe was installed at construction but is defective in some way	Joint can be defective due to factors including: cracks, fractures, obstruction, position etc	
LD **LU** **LL** **LR**	Line Deviation	LD = Line Down, LU = Line Up, LL = Line Left, LR = Line Right. Not related to CIPP lining.	Additional modifiers are added: Q = Quarter (22.5), H = Half (45), F = Full (90). In degrees.	
LC	Lining Changes	If the drain is lined, the lining material has changed	Position of lining material change	
MC	Material Change	The pipe material has changed	Position of change is noted. Type of material change can be defined	
OB	Obstruction/Obstacle	An obstruction or obstacle is affecting the flow through the pipe	Described in percentage loss of cross-sectional area	
OJL	Open Joint Large	Pipe has moved at joint, along the axis of pipe	More than 1.5 times the pipe wall thickness must be visible	
OJM	Open Joint Medium	Pipe has moved at joint, along the axis of pipe	Between 1 and 1.5 times the pipe wall thickness must be visible	
PC	Pipe Length Changes	Length of individual pipe changes	New length described at this position	

R	Roots	Evidence of root ingress	Roots will normally infiltrate via bad joints, cracks, fractures, breaks etc	
REM	Remark	General remark	Used for additional information	
S	Surface Damage	This might include corrosion, spalling and chemical attack	Position only. Additional information can be added in Remarks	
SA	Survey Abandoned	Used when a survey cannot continue for any reason	The reason for abandoning a survey should be noted in the remarks area	
SC	Shape Changes	Dimension of drain changes	Diameter dimension change recorded. Second dimension is recorded for no circular pipe changes	
SR	Sealing Ring	Sealing ring intrudes into pipe at joint	Described by clock reference position	
V	Vermin	Evidence of Vermin in pipe	Can also be used for evidence within manhole etc	
WL	Water Level	Used to record changes in water level. Always shown at the beginning of every survey, if dry noted as 00.	Described by percentage of height or diameter. Recorded in 5% increments	
XP	Collapsed	Drain is suffering from complete loss of structural integrity. Always followed by SA - Survey Abandoned	Percentage loss of cross-sectional area is recorded. Other related structural defects are not recorded	

REGISTER OF APPENDICES

A. MANHOLE INSPECTION REPORT

B. COPIES OF SITE HAND WRITTEN DAILY RECORD SHEETS

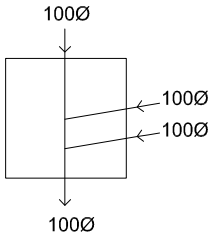
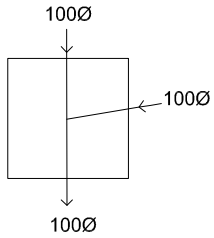
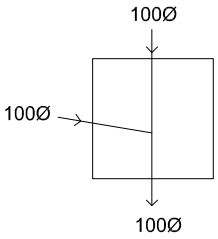
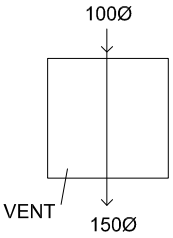
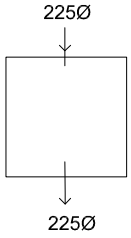
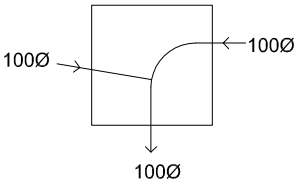
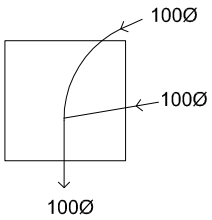
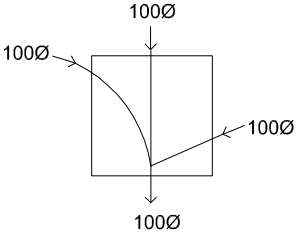
C. ANNOTATED SITE DRAWINGS

UTILITY SURVEYS LTD

5 SUFFOLK ROAD MALDON ESSEX CM9 6AX

LOCATION: 68 & 70 KEYMER ROAD HASSOCKS JOB REF: 071522

CLIENT: CHURCHILL RETIREMENT LIVING DATE: 15/08/2023

MH No. F1 DEPTH. 0.64 COVER. RM CONSTRUCTION. Br REMARKS.		MH No. F7 DEPTH. 2.24 COVER. RL CONSTRUCTION. Br REMARKS.	
MH No. F2 DEPTH. 0.70 COVER. RM CONSTRUCTION. Br REMARKS.		MH No. F8 DEPTH. COVER. CONSTRUCTION. REMARKS.	OFF SITE
MH No. F3 DEPTH. 1.65 COVER. RM CONSTRUCTION. Br REMARKS.		MH No. S1 DEPTH. 1.25 COVER. RH CONSTRUCTION. Br REMARKS. ROOTS IN MANHOLE	
MH No. F4 DEPTH. 0.52 COVER. RM CONSTRUCTION. Br REMARKS.			
MH No. F5 DEPTH. 0.77 COVER. RM CONSTRUCTION. Br REMARKS. ROOTS IN MANHOLE			
MH No. F6 DEPTH. 0.96 COVER. RL CONSTRUCTION. Br REMARKS. ROOTS IN MANHOLE			

KEY:

C - Circular	L - Light Duty	Co - Concrete
S - Square	M - Medium Duty	Br - Brick
T - Triangular	H - Heavy Duty	R - Rectangular

MANHOLE F3

MANHOLE S1 (HIGHWAYS DRAIN)

POSSIBLE SURFACE WATER OUTFALL INTO WATER COURSE

CCTV Sewer Survey – Daily Record Sheet

Date	15/08/2023	Job No	071522
Client	CHURCHILL RETIREMENT LIVING		
Site Address	68 & 70 KEYMER ROAD		
	HASSOCKS		
	WEST SUSSEX BN6 8QP		
Rig Manager	S. GARDINER	Operative	M. CAMPBELL

UTILITY SURVEYS LTD.
5 Suffolk Road
Maldon
Essex
CM9 6AX
Tel: 07971910370

Manhole Start	Manhole Finish	Sewer dia.	Recorded Metreage	Survey Abandoned	Remarks
F1	SPURA	100	5-3A	✓	BURIED MH
F1	F2	100	3-62		
F2	SPURA	100	8-45	✓	DEBRIS
F2	F3	100	12-38		
F3	MAIN	150	A-15		
FA	SPURA	100	1-16	✓	DEBRIS
FA	SPURB	100	1-91	✓	ROOTS
FA	F5	100	0-A6	✓	ROOTS
F5	F6	100	11-58		
F6	F7	100	5-13		
F7	MAIN	100	6-07		
F7	F8	100	15-29		
	TOTAL				

Standing Time | Meterage check: X | Length: OK

Reason for standing time

Remarks: F5 - FA MASS ROOTS

RWP'S GO DIRECTLY INTO THE GROUND OR GULLY'S WITH NO ACCESS

Checked

UTL

SOUS MAIN

HIGHWAYS SI

F1

F2

F3

F4

F5

F6

F7

F8

SVP

RWP IG

RWP G

BURIED MH

Oak

5m Conifer

1.0m F/R

Tarmac

1.6M

Horse Chestnut

Laurel

Stone

Number 68

Conifer

Paved

Conc

Number 70

Top

2.0m Yew

1.8m C/B

Grass

RWP'S DRAIN INTO GROUND OR GULLY'S

Shed

Beech

Holly

1.2m Panel

2.0m Stone

1.8m C/L

Fruit

Yew

1.4m Panel

Brick

POSSIBLE SURFACE WATER OUTFALL INTO WATERCOURSE

PHOTO

Copper Beech

Appendix E Brownfield Rates Calculation

Colebrook-White Pipe Capacity Analysis

Project No.	1592
Project Title	68 & 70 Keymer Road, Hassocks
Client	Planning Issues Ltd
Sheet Ref	P:\1592 68 & 70 Keymer Road, Hassocks\D Design and Analysis\SPREADSHEETS\01 Drainage\03 Sewer Design\[Colebrook White Equation (pipe velocity & capacity).xlsx]Colebrook-White

Calcs by	BJG
Checked by	RL
Approved by	CPY
Date	17.11.2023
Revision	A

Pipe capacity calculation based on the Colebrook White Equation (HR Wallingford, 1990);

$$V = -2\sqrt{(2gDS)}\log_{10}\left(\frac{k_s}{3.7D} + \frac{2.51\nu}{D\sqrt{(2gDS)}}\right)$$

Fluid type: **Surface**

Where:

D	*Pipe diameter*		150	mm
S	*Hydraulic gradient*	1 in	100	m/m
k_s	Effective pipe roughness		0.6	mm
g	*Gravitiational acceleration*		9.81	m/s^2
ν	*kinematic viscosity*		1.01E-06	m^2/s
A	*Cross-sectional flow area*		0.018	m^2
Q	*Discharge*		17.754	l/s
V	Velocity		1.00	m/s

Catchment area analysis based on Modified Rational Method equation (HR Wallingford, 1990);

$$Q_{BAR} = 2.78 \cdot i \cdot A$$

Hydrological Region: 7 *see map

Where:

Q_{BAR}	*Average discharge (l/s)*			
i	*Rainfall intensity (mm/hr)*	i	50.0	mm/hr *see map
A	*Catchment area (m^2)*			

Return Period	2yr	30yr	100yr	
Growth Factor (Q/QBAR)	0.88	2.4	3.19	
Critical Area (ha)	0.1451	0.0532	0.0400	(area that can freely drain)

Brownfield flow rate analysis based on Modified Rational Method (HR Wallingford, 1990);

Area (ha):	0.069	BF flow (l/s):	2yr	30yr	100yr	QBAR
			8.44	23.02	30.60	9.59

Foul capacity analysis for dwellings based on Sewers for Adoption (6th Edition);

l/dwelling/day	0.046
No. dwellings served	383
No. dwellings served +10% infiltration	349

Appendix F Greenfield Rates Calculation

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	2 year (l/s)	3.0
Summer CV	0.750	Drain Down Time (mins)	240	30 year (l/s)	8.1
Winter CV	0.840	Additional Storage (m³/ha)	20.0	100 year (l/s)	10.7
Analysis Speed	Normal	Check Discharge Rate(s)	✓	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	45	0	0
30	45	0	0
100	45	0	0

Pre-development Discharge Rate

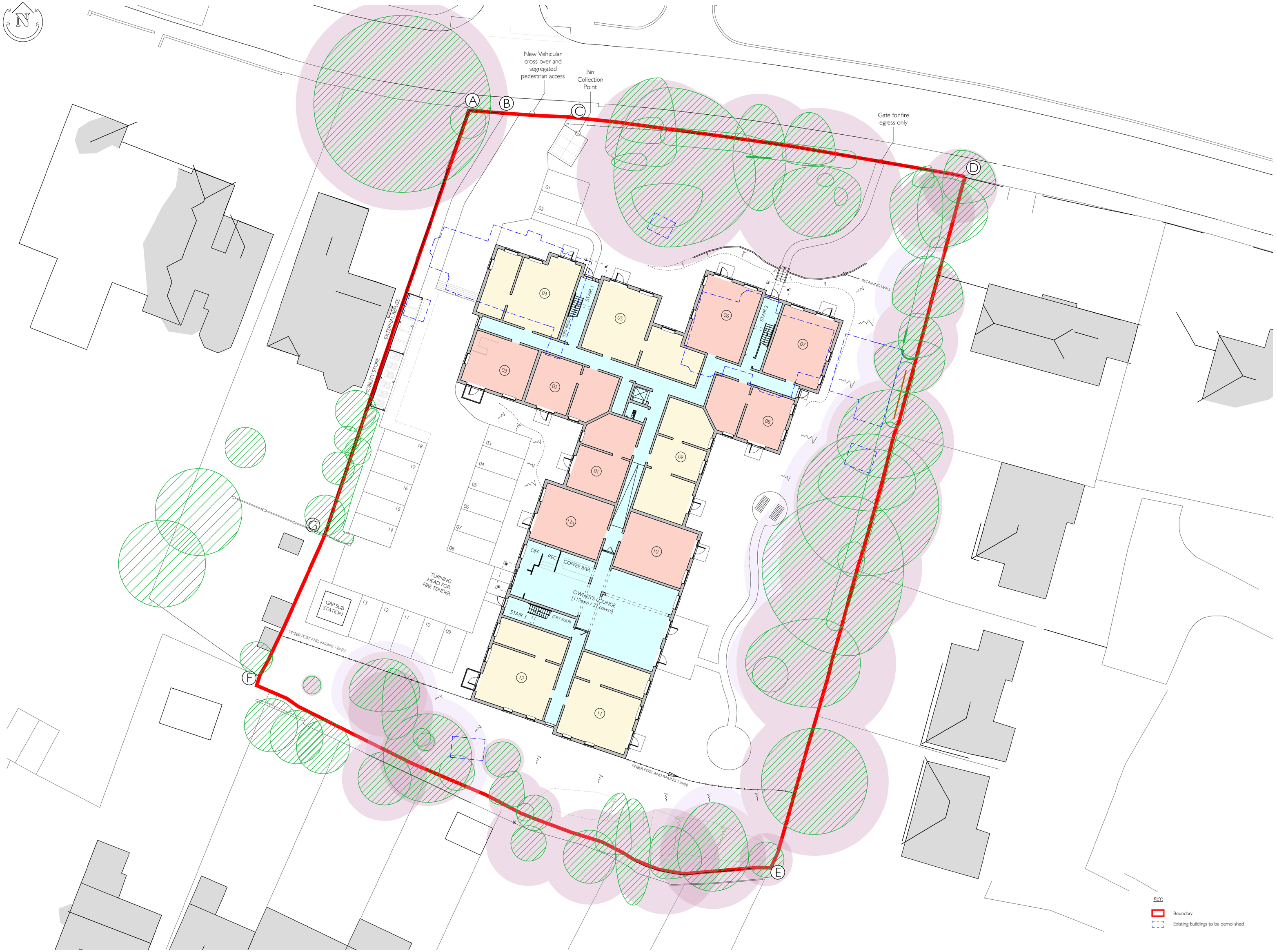
Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	FEH	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.457	Betterment (%)	0
SAAR (mm)	891	QMed	3.0
Host	1	QBar	3.4
BFIHost	0.423	Q 2 year (l/s)	3.0
Region	7	Q 30 year (l/s)	8.1
QBar/QMed conversion factor	1.136	Q 100 year (l/s)	10.7
Growth Factor 2 year	0.88		

Appendix G Proposed Site Layout

REVISIONS

Rev.		Date	By
P1	Planning Issue	01/12/23	AS
P2	Design Review ammendments - garden path extended - parking revised to provide un additional 3 spaces (18 overall) - Buggy store relocated & hard surface access / table top introduced - landscaping enhanced to provide natural screening to boundaries - Dual aspect Owner's Lounge provided - External Reuse provided / 1Bed & 2Bed locations @ GF revised to provide larger OL - additional landscaping areas to west boundary provided	26/02/24	AS

Proposed Retirement Living Apartments at 68 & 70 Keymer Road, Hassocks, West Sussex, BN6 8QP



PROPOSED FLAT MIX

	1BED	2BED
GRD	11	03
1st	12	04
2nd	04	07
TOTAL	27	14

TOTAL - 41 units (34.1% 2Bed)

- 1 BED APARTMENTS
- 2 BED APARTMENTS
- COMMUNAL AREAS

BOUNDARY TREATMENT

A - B	:	1.2m(h) Railing
B - C	:	New vehicular access with 1.5m segregated foot path. Brick piers to either side of opening
C - D	:	1.2m(h) Railing with gated access for escape from stair 2
D - E	:	Make good exisiting c/b fence as requires
E - F	:	Open boundary along length of stream
F - G	:	New 1.8m c/b fence
G - A	:	Existing boundary wall made good

KEY:

- Boundary
- Existing buildings to be demolished

Churchill Retirement Living
Churchill House * 6 Chertsey Road
Byfleet * Surrey KT14 7AG
www.churchillretirement.co.uk
Telephone: (01932) 338700 Fax : (01932) 338701

planningissues TOWN PLANNING AND ARCHITECTURE
Churchill House * Christchurch Road
Parkside * Ringwood
Hampshire* BH24 3SG
Telephone: (01425) 462372 Fax : (01425) 462101

Project Title
PROPOSED RETIREMENT LIVING APARTMENTS
68 & 70 Keymer Road
HASSOCKS, West Sussex
BN6 8QP

Drawing Title
SITE PLAN
PLANNING

Scale	1: 200@ A1	Date	DEC23
Drawn	AS	Checked	BS
Drawing No.			Rev.
20090HK_PL_002			P2

PLOT DATE:- 26 February 2024

Appendix H Causeway Flow Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
Tank	0.195	5.00	100.000	1200	2.000
Outfall			99.000	1200	1.083

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1	Tank	Outfall	14.000	0.600	98.000	97.917	0.083	168.7	225	5.23	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1	1.004	39.9	26.4	1.775	0.858	0.195	0.0	134	1.071

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1	14.000	168.7	225	Circular	100.000	98.000	1.775	99.000	97.917	0.858

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1	Tank	1200	Manhole	Adoptable	Outfall	1200	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	2 year (l/s)	3.0
Summer CV	0.750	Drain Down Time (mins)	240	30 year (l/s)	8.1
Winter CV	0.840	Additional Storage (m³/ha)	20.0	100 year (l/s)	10.7
Analysis Speed	Normal	Check Discharge Rate(s)	✓	Check Discharge Volume	x

Storm Durations

15	60	180	240	360	600	720	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	45	0	0
30	45	0	0
100	45	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	FEH	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.457	Betterment (%)	0
SAAR (mm)	891	QMed	3.0
Host	1	QBar	3.4
BFIHost	0.423	Q 2 year (l/s)	3.0
Region	7	Q 30 year (l/s)	8.1
QBar/QMed conversion factor	1.136	Q 100 year (l/s)	10.7
Growth Factor 2 year	0.88		

Node Tank Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	98.000	Product Number	CTL-SHE-0091-3400-0800-3400
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	3.4	Min Node Diameter (mm)	1200

Node Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	98.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	143.0	0.0	0.800	143.0	0.0	0.801	0.0	0.0

Results for 2 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Tank	176	98.241	0.241	10.5	33.4296	0.0000	SURCHARGED
15 minute summer	Outfall	1	97.917	0.000	3.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	Tank	Hydro-Brake®	Outfall	3.4	56.7

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Tank	232	98.617	0.617	20.9	85.7323	0.0000	SURCHARGED
15 minute summer	Outfall	1	97.917	0.000	3.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	Tank	Hydro-Brake®	Outfall	3.4	78.8

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Tank	232	98.797	0.797	25.8	110.6784	0.0000	SURCHARGED
15 minute summer	Outfall	1	97.917	0.000	3.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	Tank	Hydro-Brake®	Outfall	3.4	81.5

Long Term Storage (LTS) Volume Calculation

Project No.	1592
Project Title	68 & 70 Keymer Road, Hassocks
Client	Planning Issues Ltd

Calcs by	TMR
Reviewed by	CPY
Date	30/11/2023
Revision	INITIAL ISSUE

awcockward partnership

LTS calculation method based on equation 24.10 from CIRIA C753 - The SuDS Manual (2015);

$$Vol_{xs} = RD \times A \times 10\,[PIMP/100 \times (\alpha \times Cv) + (1\text{-}PIMP/100) \times (\beta \times SPR) - SPR]$$

Where;

Vol $_{xs}$ Extra runoff volume from a dev. site compared to the greenfield equivalent during the 100 yr 6 hr storm

RD	Rainfall Depth	**70**	mm	*(for 100 year 6 hour storm)*
A	*Site Area*	**0.457**	ha	*(Exc. large undeveloped areas)*
	Impermeable Catchment	**0.195**	ha	
PIMP	*Percentage Impermeable*	**42.7**	%	
α	Proportion Impermeable to Network	**1.0**		
Cv	Impermeable Runoff Coefficient	**0.84**		*(0.84 Modified Rational Method)*
	Permeable Catchment	**0.26**	ha	
	Permeable Catchment to Network	**0.11**	ha	
β	Proportion Perm. to Network	**0.4**		
SPR	Soil Proportion Runoff	**0.47**		*(Ref. to WRAP map)*

	RD		A			PIMP		α		Cv			PIMP		β		SPR		SPR
Vol$_{xs}$ =	70	x	0.46	x	10	x ((	43	/	100)	x (	1.00	x	0.84)	+ (	1 -	43	/	100)	x (	0.41	x	0.47) -	0.47)

Volume$_{xs}$ **-0.49** ***Volume of runoff reduced during 100 year 6 hour storm***

LTS Discharge Rate **0.91** *(2 l/s/ha)*

As above, assuming all permeable surfaces do not enter the drainage system

Vol $_{xs}$ = *-35.69*

As above, assuming all permeable surfaces enter the drainage system

Vol $_{xs}$ = *50.51*

Appendix I Preliminary Drainage Layout

Foul Water Strategy

Foul flows to discharge to existing adopted sewer in Keymer Road via new connection.

9401
CL 47.40
IL IN ~ 44.175 150Ø proposed
IL OUT ~ 44.100 225Ø existing

Area of car park to remain clear to facilitate future crane base throughout the construction period.

Surface Water Strategy:

Cellular Attenuation

Cellular tank to receive flows from external hard paving and roof catchments. Chambers immediately upstream of tank to include silt traps.

Maintenance

Geocellular Attenuation to be fitted with access turrets for maintenance of feature. Minimum 1no. cover to be vented in accordance with manufacturer recommendations.

Flow Control

Proposed surface water control chamber to restrict flows up to the 100 year return period and discharge at the Qbar rate. Controlled flows are to discharge into watercourse south of site

Surface Water Discharge

Attenuated surface water flows to discharge to watercourse south of site. The outfall should be located outside of any RPA's and more than 2m away from the existing headwall.

Exceedance Flows

Beyond the capacity of the proposed surface water network and attenuation, exceedance flows would be directed away from the proposed buildings and towards areas of landscaping, and/or car parking, wherever possible. Beyond the capacity of the site, flows would continue on to the watercourse south of the site as per existing conditions.

Area Summary Schedule

Total Site Area	0.457ha
Impermeable Catchment	0.195ha
Existing Impermeable Catchment	0.069ha
Permeable Area to Network	0.110ha

Pre-Development Runoff

The site is predominantly brownfield however the equivalent greenfield runoff rates have been assessed for the total site area using the FEH Method. The whole site brownfield rate has been calculated using the Modified Rational Method (MRM).

Existing Runoff Rates

Return Period	Equivalent Greenfield Rate (l/s) (0.457ha)	Brownfield Rate (l/s) (0.069ha)
2yr	3.0	8.4
30yr	8.1	23.0
100yr	10.7	30.6
QBar	3.4	N/A

LLFA has requested all onsite discharge is limited to Qbar in up to the 100yr+45%CC storm event.

Attenuation Summary

Cellular Storage Tank

Ownership	Private
Catchment	0.195ha
Hydraulic Control	Hydrobrake @ IL CTL-SHE-0091-3400-0800-3400
Porosity	95%
Tank Dimensions:	11.0m x 13.0m x 0.8m
Total 100yr+45% Volume Required:	110.7 m^3
Total 2+45% Peak Discharge	3.4 l/s
Total 30+45% Peak Discharge	3.4 l/s
Total 100yr+45% Peak Discharge	3.4 l/s

NOTE: Long Term Storage has been calculated in line with CIRIA C753 Equation 24.10 and due to the high Soil Proportion Runoff value (SPR) and low Percentage Impermeable (PIMP) the calculation confirms that LTS is not required because during the Q100 6hr storm the volume is runoff is not being increased.

Notes

1. The proposed development has been assessed in line with NPPF and found to be acceptable from a flood risk perspective.
2. The proposed development is not susceptible to flooding from all assessed sources including consideration for climate change
3. The surface water strategy will ensure that the development is safe from flooding up to the 1 in 100-year return period.
4. The strategy will also safeguard against climate change (45%).
5. Infiltration is not viable. Surface water runoff will be attenuated on-site and discharged at the Qbar rate.
6. Exceedance runoff will be directed away from buildings and towards any residual areas of open space.
7. Foul flows will be served by a new private gravity network connecting to the Southern Water manhole in Keymer Road, subject to agreement as agreed with SW.
8. The existing on-site adopted Southern Water foul sewer will be retained.
9. All new on-site drainage will become the responsibility of Churchill Estates Management.
10. The proposed development will be safe from flooding and will reduce the flood risk to properties downstream.

Key

- Site Boundary
- Root Protection Area
- Flood Zone 2
- Flood zone 3

Existing Drainage

- Adopted Foul Water Sewer
- Adopted Foul Water Manhole
- Adopted Foul Water Sewer to be Abandoned
- Private Foul Water Inspection Chamber
- Private Foul Water Sewer to be Abandoned
- Easement
- Watercourse

Proposed Drainage

- Impermeable Building Catchment
- Impermeable Highway Catchment
- Permeable Area to Network
- Surface Water Sewer
- Surface Water Flow Control Chamber
- Surface Water Inspection Chamber
- Cellular Attenuation Tank
- Foul Water Sewer
- Foul Water Inspection Chamber
- Overland Flood Flow Route

REV	DATE	DESCRIPTION	BY	CHK	APD
B	05.03.2024	UPDATED TO SUITE NEW LAYOUT	TMR	RL	CPY
A	30.11.2023	INITIAL ISSUE	BJG	RL	CPY

CLIENT: PLANNING ISSUES LTD

DRAWING STATUS: PLANNING APPLICATION

PROJECT: 68 & 70 KEYMER ROAD, HASSOCKS

TITLE: PRELIMINARY DRAINAGE LAYOUT

PROJECT No:	DRAWING No:	REV:
1592	01-PDL-1001	B

SCALE @ A1: 0 1:200 10 metres

DESIGN BY:

awcockward partnership
Awcock Ward Partnership, Ada House, Pynes Hill, Exeter, EX2 5TU
Tel: 01392 409007 Web: www.awpexeter.com