HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

GRAVELLY CRESCENT, LANCING

SUSTAINABLE DRAINAGE & FLOOD RISK ASSESSMENT

OCTOBER 2022



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Client: Adur District Council

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1.0 INTRODUCTION

1.1 HOP Consulting Ltd (HOP) has been instructed to undertake a Sustainable Drainage (SuDS) and Flood Risk Assessment (FRA) on behalf of Adur District Council for the proposed redevelopment of the existing garages at Gravelly Crescent, Lancing.

1.2 This report is intended to demonstrate compliance with the National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance for the assessment of development and flood risk; and West Sussex County Council's (WSCC) SuDS policies including reference to the SuDS Manual (CIRIA C753) and the Non-statutory Technical Standards for the Design, Maintenance and Operation of SuDS.

1.3 A topographical survey conducted by Maltby Surveys in June 2020 has been forwarded to HOP by the Client, and a walkover was undertaken by HOP on the 7th December 2020. CCTV surveys of the existing drainage was conducted by Aquatech Drains Ltd and a GPR survey was conducted by Subsight Surveys Ltd in February 2021. Groundwater monitoring and infiltration testing was conducted by Ashdown SI over the winter months of 2021-2022 In addition, the content of this report and associated calculations are based on information provided by the Client; the Environment Agency (EA); the British Geological Survey (BGS); and the Adur and Worthing District Council Strategic Flood Risk Assessment (SFRA). HOP does not accept liability for the accuracy of information provided by others. Any deviation from the development proposals assessed in this report should be highlighted to the report's author.

1.4 Andrew Keen of HOP has liaised closely with Laura Gibbons, Drainage Engineer for Adur & Worthing Council, to finalise the SuDS proposals for the Gravelly Crescent development. Virtual meetings conducted during the pre-application process have concluded that the proposed SuDS strategy meets with acceptable criteria as advised by the Drainage Engineer. These include utilising infiltration SuDS where appropriate and where site investigation works indicate favourable ground conditions; and maximising the practical quantum of attenuation to minimise the post-development runoff rate to create a betterment over the existing pre-development surface water runoff management conditions.

1.5 The SuDS strategy as outlined in this report has been developed with the standing advice from AWDC and additional discussion with Laura Gibbons to establish the site-specific drainage details. Where further information is considered to be required, this is proposed to be covered by appropriate pre-commencement Planning Conditions to be addressed once further investigation and design work is concluded.

2.0 SITE DESCRIPTION AND LOCATION

2.1 The site occupies an area of approximately 2,000m² to the rear of the properties between Shadwells Road and Gravelly Crescent. The site is currently occupied by council owned garages which are accessed via Gravelly Crescent. Additionally, pedestrian access paths connect the site to the Gravelly Crescent and Shadwells Road. The site is bordered on all sides by private gardens, bounded by brick walls and wooden panelled fencing.

2.2 The wider area is generally characterised by residential development. Local features include the Shadwells Road Open Space, a recreation area located approximately 130m northeast of the site. The American Express Elite Football Performance Centre lies approximately 200m to the east of the site. The east-west trainline bisecting Lancing is situated around 400m to the south of the site. A site location map is shown in Figure 1.1.

2.3 The site comprises 100% impermeable hardstanding, consisting of garage roof area and asphalt concrete surfacing. The surfacing is in poor condition and is drained by 10No. gullies which appear to be in good condition and functional.

2.4 A topographical survey, undertaken by Maltby Surveys (Drawing ref: 20/069/101), is included in Appendix A. This survey has been reconciled to Ordnance Survey datum and shows the site to gently slope to the south with localised falls to gullies. The maximum difference in elevation between the north and south extents of the site is approximately 1.3m.

2.5 Data from the BGS online map service shows the site to be located over Newhaven Chalk Formation (Chalk), interbedded, with superficial Head deposits of clay, silt, sand and gravel recorded.

2.6 With regard to the protection of groundwater abstracted for potable supply, the site does not lie within an Environment Agency designated Source Protection Zone (SPZ)

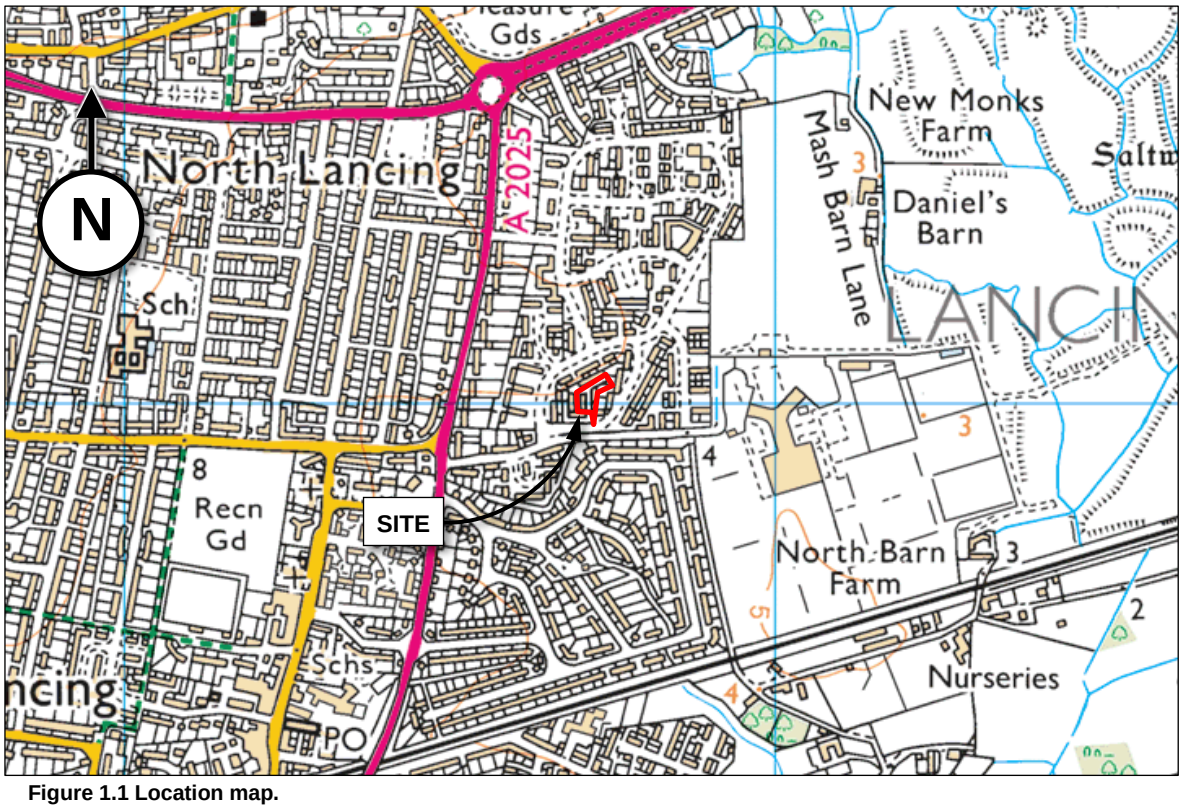


Figure 1.1 Location map.

3.0 DEVELOPMENT PROPOSALS

3.1 The development proposals involve the construction of 7No. new houses in two blocks, with associated parking, gardens and access. The architectural site plan is included in Appendix B, an extract of which is presented in Figure 3.1.

3.2 As shown in the site plan, 16 formal parking spaces will be provided within the site.

3.3 Finished floor levels of the proposed buildings are yet to be confirmed, though based on existing ground levels, there may be some difference in levels between the two housing blocks of up to approximately 0.5m.

3.4 To the rear of each plot a soft landscaped garden is provided, with patio areas and a shed for each plot. Areas of soft landscaping are proposed to the front of each of the eastern plots with private parking spaces provided to the front of the western plots. The plots to the west are enclosed by a footpath which borders the site.



Figure 3.1 Proposed site plan extract.

4.0 DRAINAGE STRATEGY

FOUL WATER

Existing

4.1 Southern Water sewer records have been obtained, which show existing 150mm diameter public foul water sewers running within the site from the northeast and northwest to the south. Foul water from Gravelly Crescent and Shadwells Road discharges to this existing public foul water sewer which lies at a depth of approximately 1.0m. The Southern Water sewer records can be found in Appendix C, and an extract is shown below in Figure 4.1.

4.2 There is not understood to be a current connection to the foul sewer on-site.

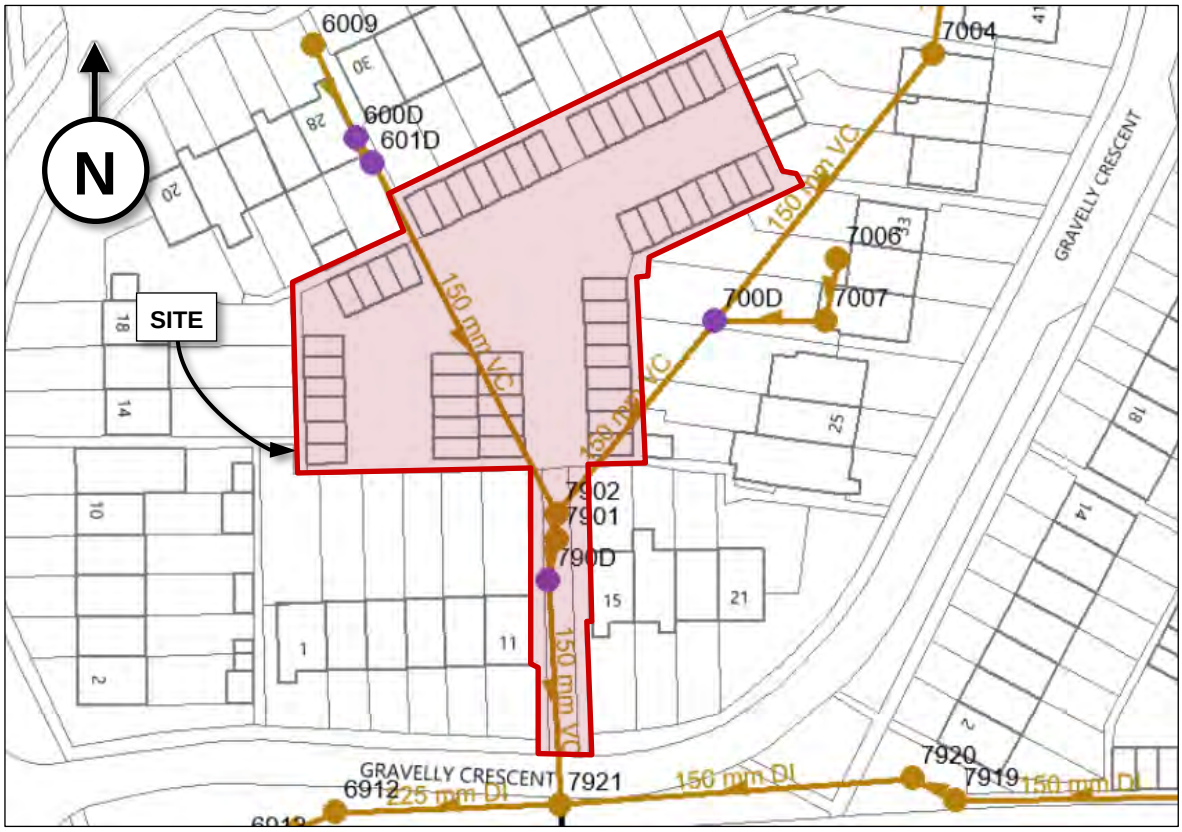


Figure 4.1 Southern Water Sewer Map extract.

Proposed

4.3 The existing Southern Water sewer running within the site from the northwest will need to be diverted to avoid the proposed buildings. Due to the existing shallow gradient of the pipe, the diversion route should extend to the public foul sewer under Gravelly Crescent by the shortest route possible to allow the steepest pipe gradient. This diverts the sewer under the proposed access road to the centre of the site. In July 2021 Southern Water gave their approval to divert the sewer in accordance with the proposals and this can be found in Appendix J.

4.4 Utilising Southern Water's Design Guidance, for the proposed 7No. residential units, a peak foul water flow rate to the public sewer of 0.051 litres/second would be generated. This calculation is shown in Table 4.2.

Table 4.2 Proposed peak foul flows.

General housing peak foul flow		
Number of properties, N	7	Units
Occupancy, O	2.4	Persons / unit
Per capita flow, G (L/D)	125	litres / head / day
Population, P (NxO)	16.8	People
Storm duration, SD	300	Minutes
Peaking Factor, PF	2	
Peak Flow	**0.051**	**l/s**

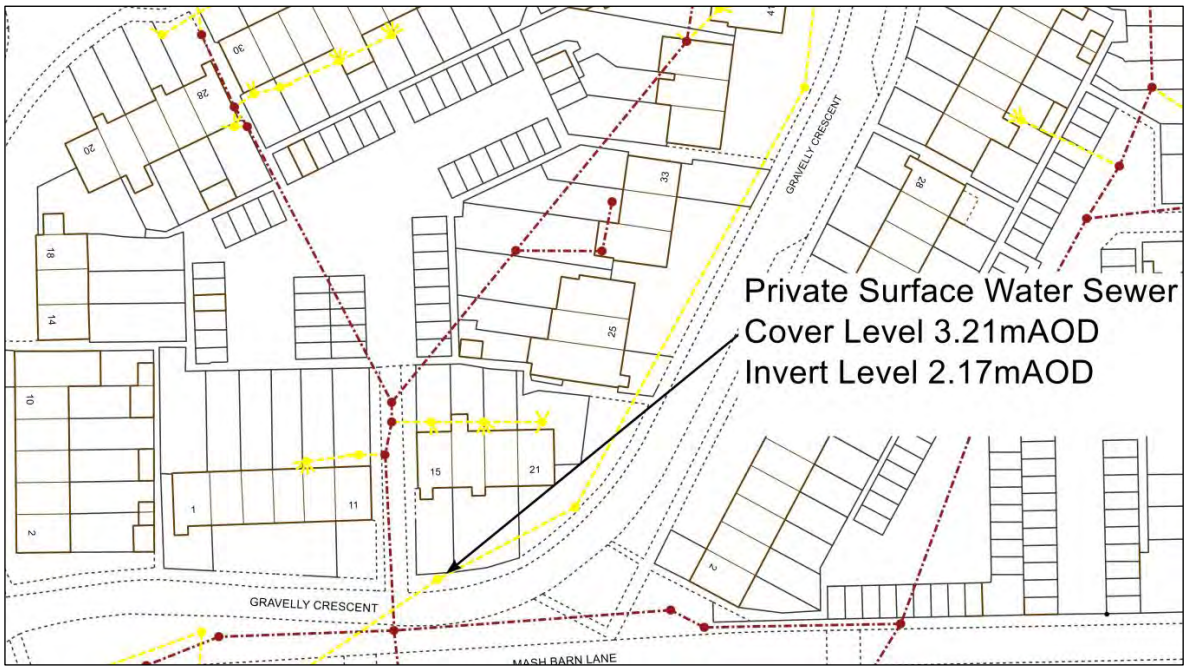
4.5 It is considered feasible that a gravity foul water drainage system can serve the development as the existing Southern Water foul manhole ref. 7921, south of the site, is at an invert level of 2.37m. This is around 1.30m below the lowest expected proposed ground levels adjacent to the new houses. The existing public foul sewer entering the site from the north west and running down the access road is to remain.

4.6 In accordance with Building Regulations, new drainage at the site should be installed as separate foul and surface water networks. A Connection to a Public Sewer Section 106 application will be required in due course to discharge the foul water to the public sewer.

SURFACE WATER

Existing

4.7 Southern Water sewer records show there to be no local public surface water sewers, however, council records show a network of AWDC surface water sewers in the vicinity of the site. An extract of the Adur and Worthing District Council sewer records, with private sewers shown in yellow, is shown below in Figure 4.3.



4.8 The site is at present 100% impermeable consisting roof area and hard surfacing, with an area of 1,996m² shown to be impermeable. The topographic survey and site visit identified existing surface water gullies on the site. The CCTV confirmed that these gullies discharge to traditional soakaways adjacent to each gully. The CCTV and GPR surveys can be found in Appendix I.

4.9 Groundwater monitoring and infiltration testing has been conducted at the site during winter months. This indicated that peak groundwater levels were 2.05m below ground level and that the soil had an infiltration rate of 5.95×10^{-5}m/s towards the centre of the site. These characteristics suggest that infiltration SuDS are feasible at this site. The groundwater monitoring and infiltration testing report can be found in Appendix D.

Proposed

4.10 The proposed surface water scheme is designed to retain and manage surface water from all developed areas within the site boundary. The principle of the surface water drainage system is to manage all rainwater falling on the developed area of the site by discharging to the ground via permeable paving and soakaways.

4.11 In line with Building Regulations Part H3, the consideration of the hierarchy of surface water disposal for the site is listed below;

a) **Discharge to soakaway** – Space for soakaways is limited on site, however, on-site testing has indicated that it is feasible to discharge surface water via infiltration.

b) **Discharge to a watercourse** – The site has the potential to discharge to a culverted watercourse located approximately 40m southwest of the site.

c) **Discharge to surface water sewer** – There is a surface water sewer to the south of the site with sufficient depth to facilitate a gravity connection.

d) **Discharge to combined sewer** – There are no public combined water sewers in the vicinity of the site that would facilitate a practical surface water connection from the site.

4.12 Based on a consideration of the SuDS hierarchy, a surface water discharge to a cellular soakaway is proposed with a cellular attenuation tank to provide additional surface water storage located in the in the roadway and parking area. Permeable paving is proposed for all trafficked surfaces except the access road which will remain as impermeable. The access road is proposed to continue to discharge unattenuated to the existing rubble filled soakaways.

4.13 Post-development, the total impermeable area of the site will be reduced to approximately 605m^2, a reduction of around 1,391m^2, comprising the roof areas and access road. The proposed surface water scheme has been calculated for the 100-year return period and an additional 45% increase in rainfall intensity to allow for climate change, in accordance with the NPPF. The calculations can be found in Appendix E.

4.14 The permeable paving storage has been calculated to require a depth of at least 124mm which we would recommend is increased to a minimum of 150mm. The proposed drainage scheme is detailed on drawing 15945-HOP-03-XX-DR-C-0910 which can be found in Appendix F. Southern Water initially objected to the use of permeable paving, however, this was based on a previously proposed surfacing type and the objection has since been withdrawn, see Appendix J.

4.15 An infiltration system, utilising a cellular crate soakaway, with an area of 18m^2, and depth of 0.8m with additional storage in the form of a 56m^2 by 0.8m deep cellular crate attenuation tank has been sized, based on managing runoff from the 420m^2 impermeable roof area.

4.16 Through the application of attenuation SuDS for the proposed development, surface water can be managed at source by using positive drainage through rainwater downpipes, gullies and conventional pipework directed to the attenuation tank and soakaway.

4.17 In accordance with the Non-Statutory Technical Standards for SuDS, the surface water drainage system should be designed so that flooding does not occur on any part of the site for a 1 in 30 year rainfall event; and so that flooding does not occur during a 1 in 100 year event in any part of a building or in any utility plant susceptible to water.

4.18 Through utilising attenuation SuDS to accommodate the 1 in 100 year rainfall event (+45% allowance for climate change), it can be shown that no part of the site is vulnerable to surface water flooding from the managed on-site runoff.

WATER QUALITY

4.19 Both the SuDS Manual (CIRIA C753) and guidance from the EA, as outlined in the recently withdrawn Pollution Prevention Guidance 3 (PPG3), state that rainwater runoff from roof areas is considered to be at very low risk of containing contaminants and does not require any pollution control to be implemented prior to discharge, outside of the removal of gross solids and sediments only.

4.20 Further reference to Table 26.2 of the SuDS Manual shows that the whilst the proposed land use also comprises residential car parks and low traffic roads, these represent a low risk of pollution hazard level. The guidance for this level of risk is to use the simple index approach to pollution control requirements for discharging to surface water sewers.

4.21 The notes to Table 26.2 state that extra measures may be required for discharges to protected resources, the guidance clarifies that in England and Wales, protected groundwater resources are represented by the catchment of a SPZ 1 classification. As discussed in Paragraph 2.6, the development site does not lie within an SPZ and therefore no additional pollution control measures are required in this regard.

4.22 The simple index approach is outlined in the SuDS Manual and provides pollution hazard indices for different land use classifications. An extract applicable to the development site is provided in Table 4.3. This shows pollution hazard indices for; total suspended solids (TSS) 0.5; Metals 0.4; and Hydrocarbons 0.4.

Table 4.3 Extract of table 26.2 from the SuDS Manual.

Pollution hazard indices for different land use classifications				
Land use	**Pollution hazard level**	**Total suspended solids (TSS)**	**Metals**	**Hydro-carbons**
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4

4.23 These are to be compared against mitigation indices for individual SuDS components, as provided in Table 26.3 of the SuDS Manual. An extract showing the mitigation indices for SuDS components is provided in Table 4.4.

Table 4.4 Extract of table 26.3 from the SuDS Manual.

Indicative SuDS mitigation indices for discharges to surface waters			
	Mitigation indices[1]		
Type of SuDS component	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

4.24 The SuDS Manual also allows for proprietary systems such as oil interceptors, smart filters, membranes and silt/debris traps to be utilised to minimise the risk of watercourse pollution. These products must demonstrate that they can address each of the contaminant types as described in Table 4.3. The proposals include permeable paving which sufficiently mitigates the pollution risk without the need for proprietary petrol interceptors

SuDS Maintenance

4.25 Details of SuDS operation and maintenance activities are provided within Chapter 32 of the SuDS Manual. A summary of typical key SuDS components is given in Table 4.5.

4.26 As can be seen, all SuDS components require regular inspection and for the first year the guidance states that monthly inspections are carried out and documented to inform the ongoing maintenance regime of the site drainage. SuDS components at the site are not to be adopted and will be maintained for their lifetime by the managing company of the development.

4.27 The key maintenance procedure for the cellular attenuation and soakaway is the management of sediment. The risk of sedimentation to these features can be mitigated through the use of silt traps prior to gullies discharging to the system.

4.28 Further operational activities for the SuDS components described for the site include regular litter and debris removal to reduce the risk of the drainage systems becoming blocked.

4.29 Contractors should protect SuDS components from adverse sediment runoff during the construction phase and an initial pre-handover inspection as required to ensure that the drainage system has been constructed as designed.

4.30 A SuDS Maintenance and Management Plan has been included in Appendix H.

Table 4.5 Extract of Table 32.1 of the SuDS Manual.

Typical key SuDS components operation and maintenance activities (for full specifications, see Chapters 11–23)

Operation and maintenance activity	SuDS component												
	Pond	Wetland	Detention basin	Infiltration basin	Soakaway	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swale/bioretention/ trees	Filter strip	Green roofs	Proprietary treatment systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed and invasive plant control	□	□	□	□		□	□		□		□	■	
Shrub management (including pruning)	□	□	□	□					□	□	□		
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional maintenance													
Sediment management[1]	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□	■	
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□		

Key

■ will be required

□ may be required

Notes

1 Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

5.0 FLOOD RISK

5.1 The development site is currently depicted within Flood Zone 3 on EA maps, which is land assessed as having at least a 1 in 200 (0.5%) Annual Exceedance Probability (AEP) of undefended tidal flooding. A full copy of EA flood data pertaining to the subject site can be found in Appendix H.

5.2 The model utilised by the EA to produce the flood extents for river and coastal flooding is the Arun to Adur Coastal Tuflow Model which was completed by JBA in 2012; this model however excludes the benefits of the existing Adur flood defence or the improved defences currently being constructed.

5.3 The EA flood data also includes the 2018 defended Arun to Adur Coastal Tuflow Model which considers the flood defences. This mapping, shown in Figure 5.1 below, demonstrates that site does not flood for the modelled 2117 horizon. This modelling does not include the further recently completes flood defences as part of the nearby New Monks Farm development and the site is therefore considered to be at a low risk of tidal flooding in the defended scenario.

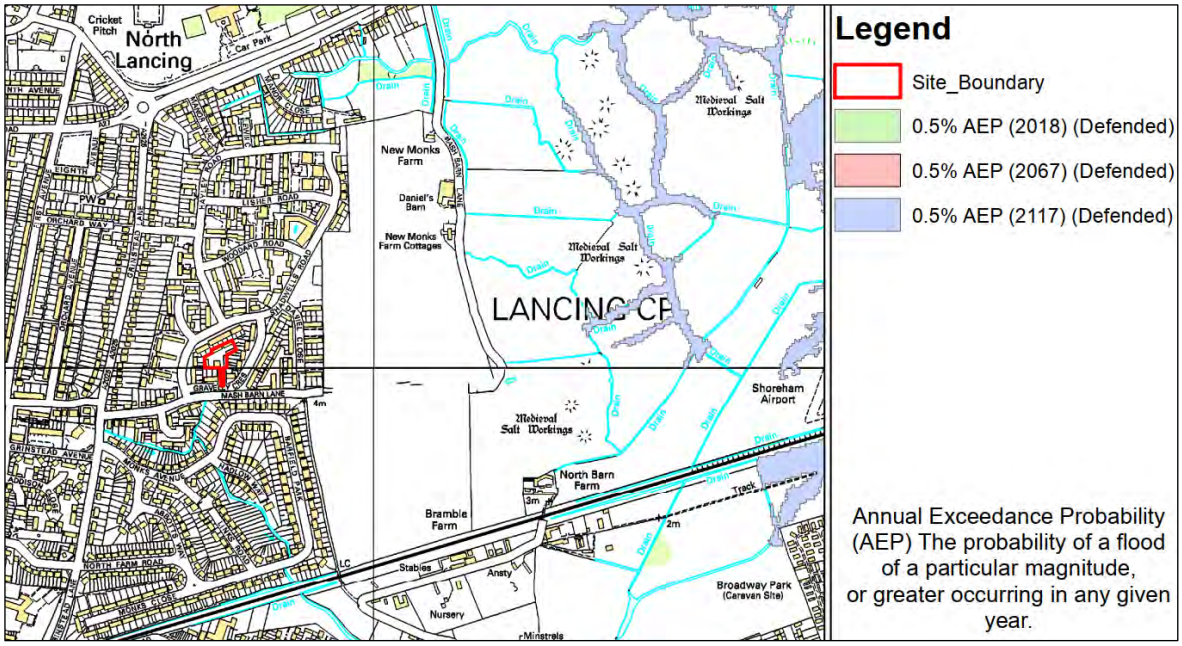


Figure 5.1 Extract of the EA Product 4 Flood Data.

5.4 The EA have requested a review of the impacts of flooding if the flood defences are not considered. As shown in Figure 5.2 below and the undefended EA mapping in Appendix H, the site and large areas of Lancing and South Lancing would be within Flood Zone 3 during the 1:200 year undefended event (2012 model). It is also important to consider the benefits that the social housing development will bring by providing much needed social housing. Six of the seven new houses have no accommodation on the ground floor, however, the development also provides one wheelchair accessible, level access home. This kind of housing must be ground floor only and is in great demand as explained in the Adur Homes' letter included in Appendix K.

5.5 With an assumed minimum FFL of 3.85mOD and a 2012 undefended flood level of 4.26mOD, the depth of flooding at the site would be up to 0.41m above FFL at current levels. No sleeping accommodation is proposed on the ground floor and as extreme tides are considered to have some degree of predictability, allowing time for suitable evacuation measures to be employed, the risk to life is considered to be low. As the site and much of Lancing is protected by flood defences which are designed to prevent flooding for the lifetime of the development, the risk is considered to be low. This can be seen in the defended plans and level data issued by the EA.

5.6 The appended EA data and the online EA allowances for sea level rise due to climate change show that the undefended flood level rises from 4.26m in 2012 to 5.31m (higher central)/ 5.66m (upper end) in the year 2121. These calculations can be found in Appendix H. As a result, with an assumed FFL of 3.85mOD the depth of flooding is protected to rise to 1.46m (higher central)/ 1.81m (upper end) in the year 2121.

5.7 Table 2 of the NPPF classifies Flood Risk Vulnerability for residential buildings as 'more vulnerable'. Table 3 of the NPPF shows that 'more vulnerable' developments require that the Sequential Test is passed for development to be acceptable. It is assumed that as Adur Council are allocating the land to meet local housing supply, that the Sequential Test has been applied and passed. 'More Vulnerable' development in Flood Zone 3 must also pass the Exception Test which is considered below.

5.8 The EA Flood Zone maps and the detailed flood risk data assess the risk from tidal and fluvial flooding. An extract of the EA Flood Zone Maps is shown in Figure 5.2. Further sources of flood risk are considered below.

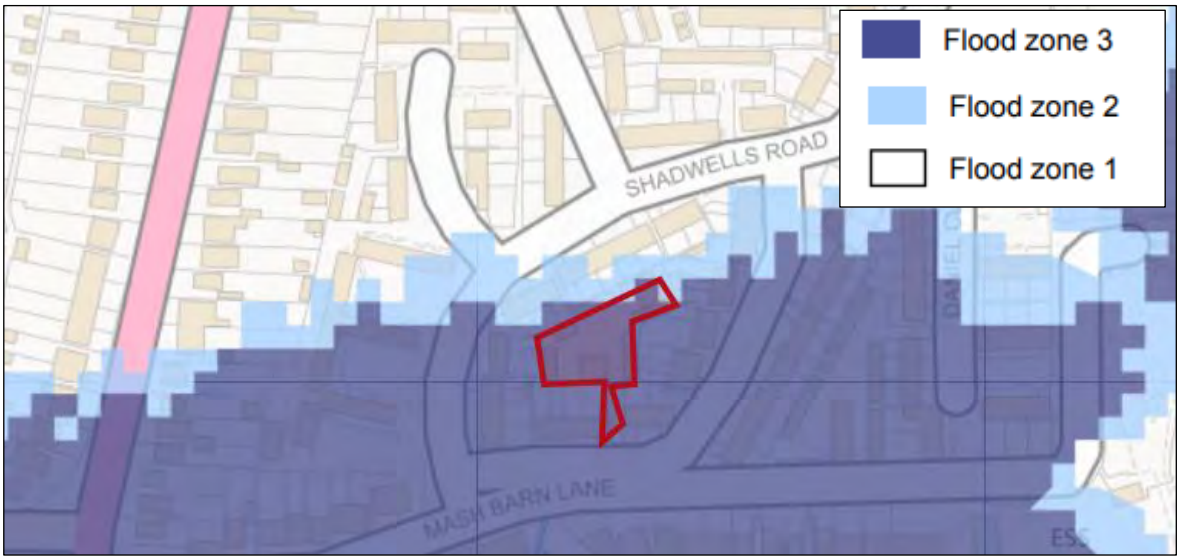


Figure 5.2 Extract of the EA online Flood Maps.

Surface Water and Sewer Flooding

5.9 The surface water flood maps from the EA online mapping service, an extract of which is shown in Figure 5.2, show that the site itself is generally in an area at very low risk of surface water flooding, with an area at medium risk of flooding on the access road to the south. The proposed levels and drainage scheme will manage surface water within the site prevent surface water ingress into buildings.

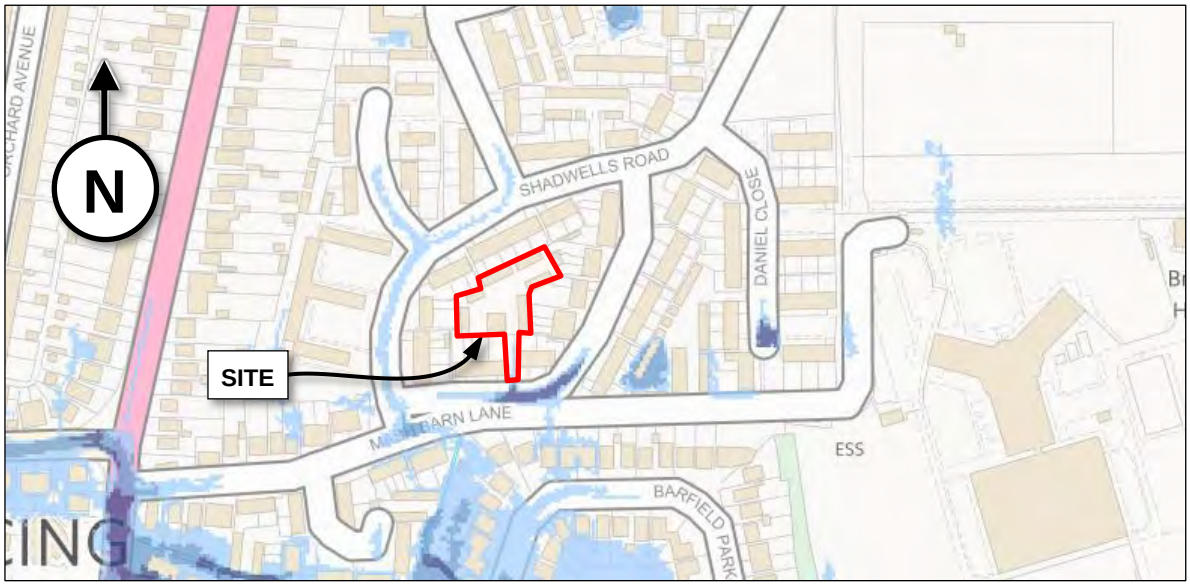


Figure 5.2 Extract from EA online surface water flood map.

5.10 The historic flood data included in the SFRA shows no incidents of surface water or sewer flooding near the site, with the nearest incident of sewer flooding approximately 450m to the north.

Groundwater flooding

5.11 The SFRA shows the area to be in a green-coloured area at 'no risk' of groundwater flooding, however the site is near to areas where groundwater is shown to be within 0.025m of the surface, coloured red to indicate a much higher risk of groundwater flooding, lying approximately 200m north, west and southeast of the site boundary. Groundwater levels are evidently highly variable in the Lancing area, and further investigation prior to finalising the detailed design is required.

5.12 The BGS website identifies no boreholes within the site, though a borehole is located around 120m to the south-east, which shows that Head deposits of Silty Clay, Gravel and Flint are present over the underlying chalk geology at depth.

Reservoir Flooding

5.13 The online EA maps show the site to be outside any areas of flood risk associated with reservoir flooding, therefore the risk from this source is considered to be very low.

Climate Change

5.14 Increased rainfall intensity, longer storm durations and rising sea levels are all attributed to global climate change. An allowance for an additional 45% rainfall intensity is taken into account in the design of surface water management for residential developments. The new surface water drainage infrastructure should be designed to manage the 1 in 100 year storm event, plus a 45% allowance for climate change, in accordance with the SFRA and the Non-Statutory Technical Standards for SuDS.

Sequential Test

5.15 The application for residential development of the Gravelly Crescent site is being made by the Local Authority and is assumed to have been allocated in Local Plans. Therefore, it is considered that the Sequential Test has been applied and passed for the proposed scheme.

Exception Test

5.16 The NPPF requires that, where it has not been possible to locate development in zones of lower flood risk probability, the Exception Test should be applied. For the Exception Test to be passed, the guidance states that;

- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared; and
- a site-specific FRA must demonstrate that the development will be safe for its lifetime taking into account the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

5.17 By infilling the garage site with residential units, it is considered that the first element of the Exception Test is passed, as the development meets housing demand within the district on what is currently an inefficient use of land with low community benefit. Replacing the garage site with housing and gardens is considered an enhancement to the local area and reduces the risk potential for anti-social behaviour.

5.18 The second element of the Exception Test is demonstrated throughout this report in that the development plans do not represent an increase in the flood risk to the site, or to neighbouring or downstream properties. The standard of protection offered by the existing tidal flood defences and are considered to provide mitigation to the primary source of flooding for the development's lifetime. Additional sources of flood risk are considered to be low or very low and flood risk management measures, discussed in the following section, provided additional sustainability to the proposals.

6.0 FLOOD RISK MANAGEMENT

6.1 Rainwater downpipes and gullies will act as positive drainage components, collecting surface water at source before joining the on-site drainage network. Surface water will be discharged to permeable sub base, attenuation tank and soakaway which discharges to the ground. New drainage infrastructure will be designed to accommodate the 1 in 100-year storm event plus a 45% climate change allowance.

6.2 Risk of surface water flooding on site is considered to be reduced following the development, due to the reduction of the impermeable surfaced area and the use of infiltration SuDS components. The new SuDS system will ensure that the proposed development buildings have a negligible risk from surface water inundation.

6.3 Proposed finished floor levels have yet to be confirmed. Due to the low risk of surface water flooding, these should be set higher than the existing ground level. When proposed levels are determined, they should be engineered to create flow paths to channel the surface water around and away from buildings, towards less vulnerable areas.

RESIDUAL RISK

6.4 Residual risks are considered to be limited to exceedance events above the design storm parameters and/or a failure of the drainage network. Should surface water flooding occur due to extreme rainfall or through infrastructure blockage or failure, the site topography should allow for potential overland flows established from such events to be directed away from the buildings to the south and to the public highway.

OFF-SITE IMPACTS

6.5 Surface water management through the use of infiltration SuDS will be designed for the positively drained areas to ensure that rainfall events up to the 1 in 100 year event plus climate change allowance are managed at source with no adverse impact on neighbouring properties.

6.6 New surface water infrastructure is to be installed at the site to serve the development.

7.0 CONCLUSIONS

7.1 With the extensive and recently constructed tidal flood defences in place, the site is considered to be at a low or very low risk of flooding from fluvial, tidal, surface water, groundwater, sewer and reservoir flooding. The development proposals for the new residential use are deemed appropriate for the Flood Zone according to the principles set out in the NPPF.

7.2 Initial investigations and suggest that surface water from the existing site discharges to rubble filled soakaways. No existing foul drainage connection is present at the site, however, a public foul sewer runs through the site and is to be diverted.

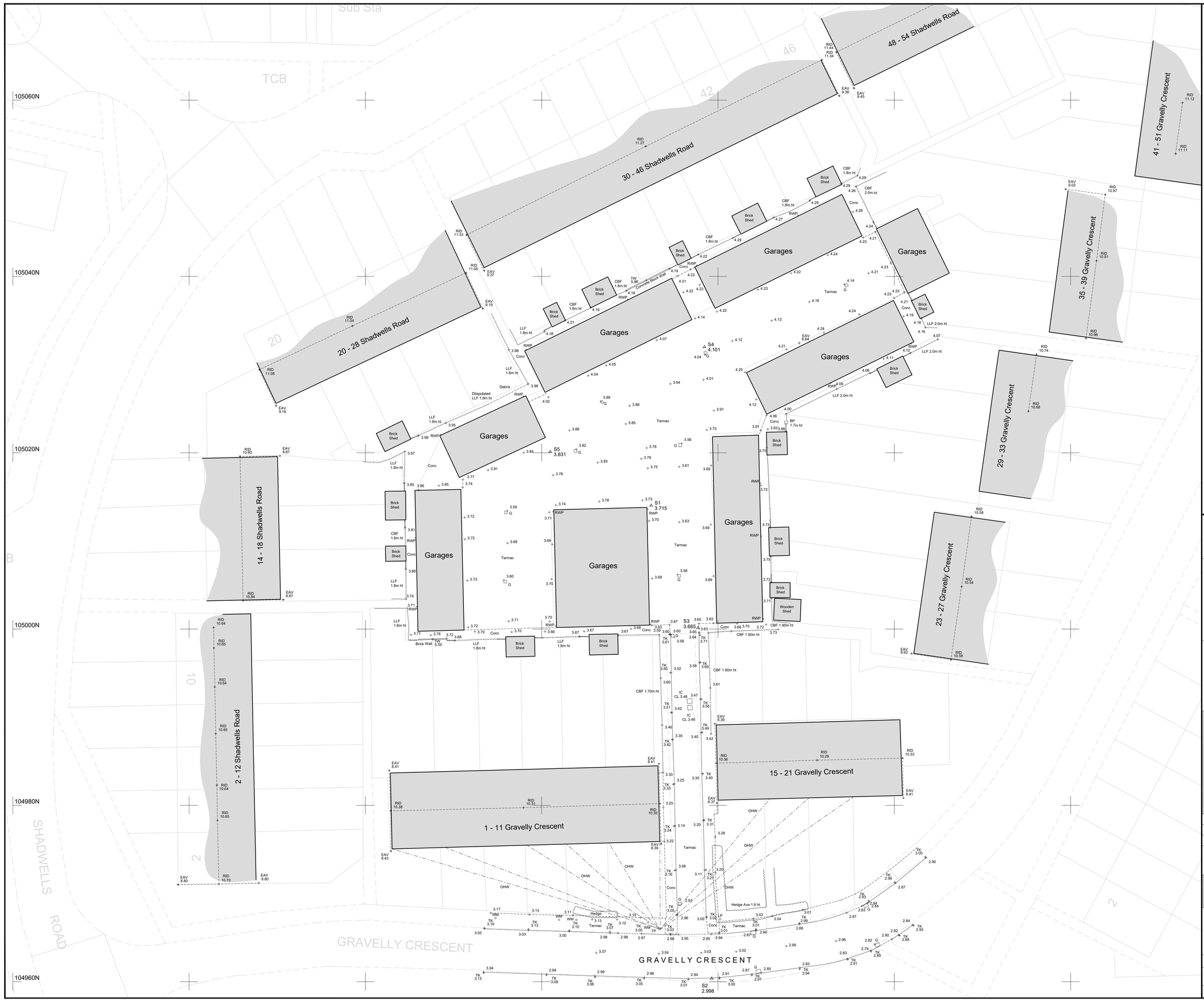
7.3 Surface water from the new impermeable areas is proposed to discharge to infiltration SuDS, consisting of a cellular attenuation tank, permeable sub base and a cellular soakaway.

7.4 The use of permeable paving is proposed to manage potential pollutants from trafficked areas, based on EA guidance and the SuDS manual in terms of water quantity and quality. The site is located outside of SPZ1, therefore no further pollution control measures are required in this regard.

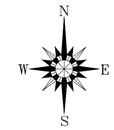
7.5 Maintenance requirements of SuDS elements during construction and operation phases have been identified in this report and should be developed in line with the detailed design to be included in the Operation and Maintenance and Health and Safety Manuals provided to the Client upon completion of the project.

7.6 In light of the above, it is considered that the proposed development is safe and does not increase the flood risk at the site or to neighbouring properties. It has been shown that the proposals for new houses at the Gravelly Crescent site can be successfully implemented and managed to provide comfort and safety to residents in regard to flood risk for the lifetime of the development, thereby demonstrating compliance with the second element of the Exception Test.

APPENDIX A - TOPOGRAPHICAL SURVEY



Grid



LEGEND

BANKING
BUSHES & HEDGES
TREES
MT / 3T / 0.2 / 6
Multiple Trunks / No of Trunks / Dia of Bole / Height of Tree
NOTE:- SPREADS AND HEIGHTS ARE INDICATIVE ONLY
GATES (Single, Double)
WALL (Top, Bottom, Width drawn to scale 0.23m)
BUILDING
OPEN SIDED BUILDING
GLASS ROOFED
CONTOURS 25.50

ABBREVIATIONS (WHERE APPLICABLE)

ARCH HEAD HEIGHT	AHH	MARKER	MKR
ARCH HEAD LEVEL	AHL	MONITORING WELL	MW
ARCH SPRINGER HEIGHT	ASH	NOTICE BOARD	NB
ARCH SPRINGER LEVEL	ASL	NAME PLATE	NP
AIR VALVE	AV	OVERHEAD WIRES	OHW
BED LEVEL	BL	PARKING METER	PM
BELISHA BEACON	BB	RIDGE LEVEL	RID
BOLLARD	B	ROOF LEVEL	RL
BRITISH TELECOM BOX	BTB	ROAD SIGN	RS
BRITISH TELECOM MANHOLE	BTMH	RODDING EYE	RE
BRICKWORK	BKWK	RETAINING WALL	RTW
BUS STOP	BS	RAIN WATER PIPE	RWP
CABLE TV	CATV	SLUICE VALVE	SV
COVER LEVEL	CL	STOP COCK	SC
CABLE MARKER	CM	SOFFIT LEVEL	SOF
COLUMN	Col	STRUCTURAL SLAB LEVEL	SSL
CONCRETE POST	CP	TREE STUMP	ST
EAVES LEVEL	EAV	SOIL AND VENT PIPE	SVP
ELECTRICAL COVER	ELEC	THRESHOLD LEVEL	THL
ELECTRICITY CONTROL BOX	ECB	TELEGRAPH POLE	TP
ELECTRICITY POLE	EP	TELEPHONE CALL BOX	TCB
EARTH ROD	ER	TOP OF KERB	TK
FLOWER BED	FB	TURNSTILE	TS
FINISHED FLOOR LEVEL	FFL	TRAFFIC LIGHT	TL
FIRE HYDRANT	FH	TOP OF WALL	TW
FLOOR LEVEL	FL	UNABLE TO LIFT	UTL
FLAG STAFF	FS	UNABLE TO SURVEY	UTS
GAS PIPE	GP	VENT PIPE	VP
GAS VALVE	GV	WATER METER	WM
GULLY	G	WATER LEVEL	WL
GATE STOP	GS	WASH OUT	WO
INSPECTION COVER	IC	WASTE PIPE	WP
INVERT LEVEL	IL	WATER TANK	WT
LAMP POST	LP	WATER VALVE	WV

FENCES

BARBED WIRE FENCE	BWF	LARCH LAP FENCE	LLF
CORRUGATED IRON FENCE	CIF	METAL RAILING FENCE	MRF
CLOSE BOARD FENCE	CBF	POST AND CHAIN FENCE	PCF
CHAIN LINK FENCE	CLF	PICKET FENCE	PIF
CHESTNUT PALING FENCE	CPF	POST AND RAIL FENCE	PRF
FENCE POST	FPO	POST AND WIRE FENCE	PWF
INTERWOVEN FENCE	IWF	STEEL PALISADE SECURITY FENCE	SPSF
IRON RAILING FENCE	IRF	TUBULAR STEEL RAIL FENCE	TSRF

REV.	NOTES	DWN	DATE
A	---	---	--/----

QMS ISO 9001 REGISTERED
A MEMBER OF THE THE SURVEY ASSOCIATION
QMS ISO 14001 REGISTERED

Notes:
Grid and levels relate to OS GPS Active Network.

Maltby Surveys Ltd
2 QUEENS ROAD
HAYWARDS HEATH
WEST SUSSEX
RH16 1EB
Tel: 01444 416246
Fax: 01444 417697
E-Mail: mls@maltbysurveys.com
WebSite: http://www.maltbysurveys.com

SURVEYED	WM	CLIENT
DRAWN	WM	Calford Seaden
CHECKED	SJM	SCALE
		1/200 (A1 Sheet)

RICS

Gravelly Crescent, Lancing, BN15 9EG

TOPOGRAPHICAL SURVEY

Job No	Rev	Drawing Number
20/069		20/069/104

Date : June 2020

APPENDIX B – ARCHITECTURAL PROPOSALS



This drawing is copyright of Yelo Architects Limited

N

External Works Key

- Tarmac
- Turfed grass
- Shrub planting
- 450 x 450mm Marshalls Charnwood textured concrete paving
- P Parking space
- R Refuse bin
- S 1.2 x 1.8m timber close boarded shed for cycle storage
- W 150l Water butt
- RD Rotary drier
- Close boarded timber fence on retaining wall
- Close boarded timber fence
- TP Telegraph Pole
- MH Manhole
- ECP Ducting for future Electric vehicle charging point

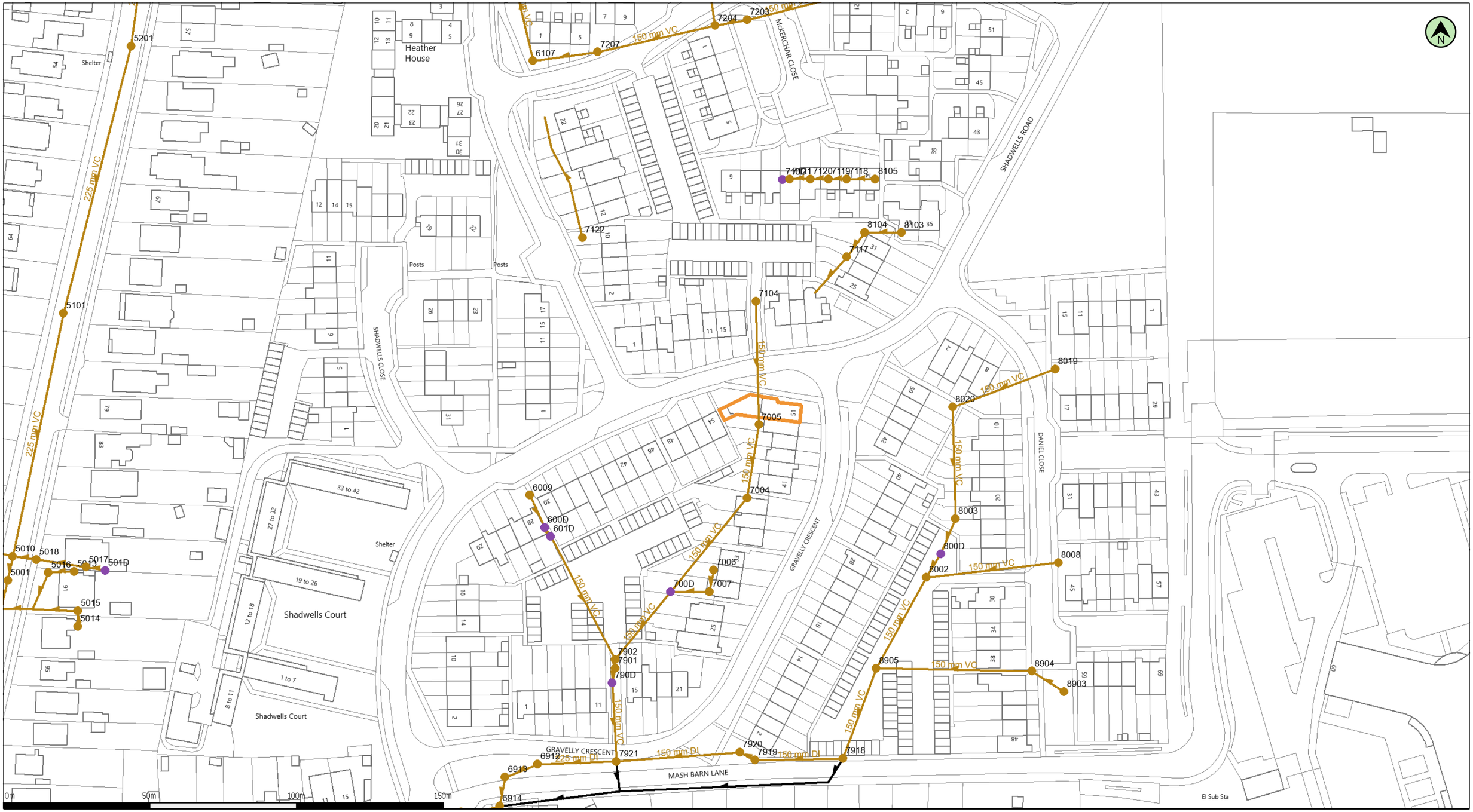
ISSUED FOR PLANNING

Rev	Date	Description
-	21/05/21	Issued for Planning

Yelo Architects Ltd
Mocatta House, Spaces
Trafalgar Place,
Brighton
BN1 4DU
T 01273 608 444
E hello@yeloarchitects.com
W yeloarchitects.com
Twitter @yeloarchitects

PROJECT	YO415-AWDC Infill
DRAWING TITLE	Gravelly Crescent Proposed Site Plan
DRAWING NO	YO415-035
SCALE	1:200 @A1
DATE	21/05/21
REV	-

APPENDIX C – SEWER RECORDS



(c) Crown copyright and database rights 2020 Ordnance Survey 100031673 | Date: 10/02/20 | Scale: 1:1250 | Map Centre: 518757,105080 | Data updated: 18/12/19 | Our Ref: 368508 - 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 2020 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.

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
WWTW Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Decarcation Chamber, Dummy Manhole or Surface Water Soakaway

vbrigginshaw@calfordseaden.co.uk

Gravvelly Shadwell

WATER for LIFE from Southern Water

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
5001	F	4.64	1.97	
5010	F	0.00	0.00	
5013	F	0.00	0.00	
5014	F	0.00	0.00	
5015	F	0.00	0.00	
5016	F	0.00	0.00	
5017	F	0.00	0.00	
5018	F	0.00	0.00	
501D	F	0.00	0.00	
5101	F	5.42	2.27	
5201	F	5.28	2.65	
6009	F	4.39	2.98	
600D	F	2.94	2.94	
601D	F	2.90	2.90	
6107	F	5.58	3.58	
6912	F	3.18	2.29	
6913	F	3.11	2.25	
6914	F	3.02	2.21	
7004	F	0.00	0.00	
7005	F	4.37	3.08	
7006	F	0.00	0.00	
7007	F	0.00	0.00	
700D	F	0.00	0.00	
7104	F	4.83	3.50	
710D	F	0.00	0.00	
7117	F	0.00	0.00	
7118	F	0.00	0.00	
7119	F	0.00	0.00	
7120	F	0.00	0.00	
7121	F	0.00	0.00	
7122	F	0.00	0.00	
7203	F	5.24	3.84	
7204	F	5.30	3.79	
7207	F	5.31	3.63	
7901	F	3.50	2.60	
7902	F	3.53	2.64	
790D	F	2.58	2.51	
7918	F	3.34	2.62	
7919	F	3.41	2.53	
7920	F	3.31	2.51	
7921	F	3.04	2.37	
8002	F	3.77	2.89	
8003	F	4.07	3.00	
8008	F	4.17	3.21	
800D	F	2.94	2.94	
8019	F	4.57	3.61	
8020	F	4.40	3.35	
8103	F	0.00	0.00	
8104	F	0.00	0.00	
8105	F	0.00	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
8903	F	3.86	3.05	
8904	F	3.87	3.00	
8905	F	3.36	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

APPENDIX D – GROUNDWATER & INFILTRATION TESTING

APPENDIX E – MICRODRAINAGE CALCS - PROPOSED

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Western Houses (4No.) Type : Catchment Area

Area (ha)	0.024

Preliminary Sizing

Volumetric Runoff Coefficient	1.000
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Eastern Houses (3No.) Type : Catchment Area

Area (ha)	0.018

Preliminary Sizing

Volumetric Runoff Coefficient	1.000
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		



Soakaway

Type : Soakaway

Dimensions

Exceedence Level (m)	3.450
Depth (m)	0.800
Base Level (m)	2.650
Freeboard (mm)	0
Soakaway Shape	Rectangular
Diameter / Width (m)	9.500
Length (m)	2.000
Porosity (%)	95
Ineffective Storage Depth (m)	0.000
Number of Soakaways	1
Base Infiltration Rate (m/hr)	0.2142
Side Infiltration Rate (m/hr)	0.2142
Safety Factor	3.0
Total Volume (m³)	14.440

Inlets

Inlet (1)

Incoming Item(s)	Western Houses (4No.)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet

Incoming Item(s)	Pipe
Bypass Destination	(None)
Capacity Type	No Restriction

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		



Cellular Storage

Type : Cellular Storage

Dimensions

Exceedence Level (m)	3.700
Depth (m)	0.800
Base Level (m)	2.700
Number of Crates Long	7
Number of Crates Wide	8
Number of Crates High	2
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	0.5
Crate Height (m)	0.4
Total Volume (m³)	21.480

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Eastern Houses (3No.)
Bypass Destination	(None)
Capacity Type	No Restriction

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Connections Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Name	Length (m)	Connection Type	Slope (1:x)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
Pipe	5.402	Pipe	108.04		0.6	225	3.700	2.700

Name	Downstream Cover Level (m)	Downstream Invert Level (m)
Pipe	3.450	2.650

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Inflow Summary Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Eastern Houses (3No.)	Cellular Storage		Time of Concentration	0.018	100	0	100	0.018
Western Houses (4No.)	Soakaway		Time of Concentration	0.024	100	0	100	0.024
TOTAL		**0.0**		**0.042**				**0.042**

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Flow Options

Peak Flow Calculation	Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Level	Level Inverts
Min. Slope (1:x)	1000.00
Max. Slope (1:x)	40.00
Use Flow Restriction	☑
Reduce Channel Depths	☑

Manhole Options

Apply Offset	☐
Synchronise Manhole Invert Levels	☑

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	Company Address: HOP House 41 Church Road Hove		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	0
Perform No Discharge Analysis	☐

Rainfall

Rainfall Details FEH

Type: FEH

Site Location	GB 518715 104987 TQ 18715 04987
Rainfall Version	2013
Data Type	Point
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	45
10.0	45

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Rainfall Details FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Soakaway	Rainfall Details FEH: 100 years: +45 %: 240 mins: Winter	3.425	3.425	0.775	0.775	4.2	13.983	0.000	17.712	0.0	3.425	3	OK
Cellular Storage	Rainfall Details FEH: 100 years: +45 %: 240 mins: Winter	3.425	3.425	0.725	0.725	3.9	19.274	0.000	0.000	0.5	7.229	10	OK

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Rainfall Details FEH: 10 years: Increase Rainfall (%): +45: Critical Storm Per Item

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Soakaway	Rainfall Details FEH: 10 years: +45 %: 240 mins: Winter	3.112	3.112	0.462	0.462	2.6	8.346	0.000	14.698	0.0	1.649	42	OK
Cellular Storage	Rainfall Details FEH: 10 years: +45 %: 240 mins: Winter	3.112	3.112	0.412	0.412	2.4	10.968	0.000	0.000	0.4	6.325	49	OK

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		



Soakaway Type : Soakaway

Critical by Return Period: Rainfall Details FEH: 100 years: Increase Rainfall (%): +45: 240 mins: Winter

Tables

Half Drain Down Time (mins)	199

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0
5	0.1	0.000	0.000	0.000	0.1
10	0.4	0.000	0.000	0.000	0.4
15	0.6	0.002	0.039	0.000	0.4
20	0.9	0.008	0.145	0.000	0.4
25	1.0	0.018	0.315	0.000	0.4
30	1.2	0.030	0.531	0.000	0.4
35	1.2	0.043	0.776	0.000	0.4
40	1.3	0.057	1.030	0.000	0.4
45	0.7	0.068	1.228	0.000	0.4
50	0.8	0.074	1.338	0.000	0.4
55	0.9	0.081	1.456	0.000	0.4
60	1.0	0.089	1.595	0.000	0.4
65	1.1	0.098	1.765	0.000	0.4
70	1.3	0.109	1.967	0.000	0.4
75	1.5	0.123	2.214	0.000	0.4
80	1.8	0.139	2.511	0.000	0.4
85	2.1	0.159	2.868	0.000	0.4
90	2.4	0.183	3.290	0.000	0.5
95	2.8	0.210	3.780	0.000	0.5
100	3.1	0.241	4.345	0.000	0.5
105	3.4	0.275	4.970	0.000	0.5
110	3.7	0.313	5.658	0.000	0.5
115	4.0	0.355	6.401	0.000	0.5
120	4.2	0.398	7.184	0.000	0.6
125	4.2	0.442	7.985	0.000	0.6
130	4.0	0.486	8.767	0.000	0.6
135	3.8	0.527	9.505	0.000	0.6
140	3.5	0.564	10.186	0.000	0.6
145	3.2	0.598	10.799	0.000	0.6
150	2.8	0.628	11.342	0.000	0.7
155	2.5	0.654	11.812	0.000	0.7
160	2.1	0.676	12.211	0.000	0.7
165	1.8	0.695	12.527	0.000	0.7
170	1.6	0.710	12.800	0.000	0.7
175	1.3	0.722	13.019	0.000	0.7
180	1.2	0.731	13.192	0.000	0.7
185	1.1	0.739	13.328	0.000	0.7
190	1.0	0.744	13.434	0.000	0.7
195	1.0	0.749	13.521	0.000	0.7
200	1.0	0.753	13.595	0.000	0.7
205	0.9	0.757	13.663	0.000	0.7
210	0.9	0.761	13.730	0.000	0.7
215	0.9	0.764	13.796	0.000	0.7
220	0.9	0.768	13.860	0.000	0.7
225	0.9	0.771	13.919	0.000	0.7

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
230	0.8	0.774	13.964	0.000	0.7
235	0.7	0.775	13.983	0.000	0.7
240	0.5	0.773	13.957	0.000	0.7
245	0.4	0.769	13.887	0.000	0.7
250	0.4	0.764	13.799	0.000	0.7
255	0.4	0.759	13.711	0.000	0.7
260	0.4	0.754	13.623	0.000	0.7
265	0.4	0.750	13.536	0.000	0.7
270	0.4	0.745	13.449	0.000	0.7
275	0.4	0.740	13.362	0.000	0.7
280	0.4	0.735	13.275	0.000	0.7
285	0.4	0.730	13.189	0.000	0.7
290	0.4	0.726	13.103	0.000	0.7
295	0.4	0.721	13.017	0.000	0.7
300	0.4	0.716	12.932	0.000	0.7
305	0.4	0.711	12.847	0.000	0.7
310	0.4	0.707	12.762	0.000	0.7
315	0.4	0.702	12.677	0.000	0.7
320	0.4	0.697	12.592	0.000	0.7
325	0.4	0.693	12.508	0.000	0.7
330	0.4	0.688	12.424	0.000	0.7
335	0.4	0.683	12.341	0.000	0.7
340	0.4	0.679	12.257	0.000	0.7
345	0.4	0.674	12.174	0.000	0.7
350	0.4	0.670	12.091	0.000	0.7
355	0.4	0.665	12.008	0.000	0.7
360	0.4	0.660	11.926	0.000	0.7
365	0.4	0.656	11.844	0.000	0.7
370	0.4	0.651	11.762	0.000	0.7
375	0.4	0.647	11.680	0.000	0.7
380	0.4	0.642	11.599	0.000	0.7
385	0.4	0.638	11.518	0.000	0.7
390	0.4	0.633	11.437	0.000	0.7
395	0.4	0.629	11.356	0.000	0.7
400	0.4	0.624	11.276	0.000	0.7
405	0.4	0.620	11.196	0.000	0.7
410	0.4	0.616	11.116	0.000	0.7
415	0.4	0.611	11.036	0.000	0.7
420	0.4	0.607	10.957	0.000	0.7
425	0.4	0.602	10.877	0.000	0.7
430	0.4	0.598	10.799	0.000	0.6
435	0.4	0.594	10.720	0.000	0.6
440	0.4	0.589	10.641	0.000	0.6
445	0.4	0.585	10.563	0.000	0.6
450	0.4	0.581	10.485	0.000	0.6
455	0.4	0.576	10.407	0.000	0.6
460	0.4	0.572	10.330	0.000	0.6
465	0.4	0.568	10.253	0.000	0.6
470	0.4	0.563	10.176	0.000	0.6
475	0.4	0.559	10.099	0.000	0.6
480	0.4	0.555	10.021	0.000	0.6

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		



Cellular Storage Type : Cellular Storage

Critical by Return Period: Rainfall Details FEH: 100 years: Increase Rainfall (%): +45: 240 mins: Winter

Tables

Half Drain Down Time (mins)	-

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0
5	0.1	0.001	0.012	0.000	0.0
10	0.3	0.003	0.066	0.000	0.0
15	0.4	0.006	0.166	0.000	0.1
20	0.5	0.010	0.271	0.000	0.2
25	0.5	0.013	0.346	0.000	0.3
30	0.5	0.015	0.390	0.000	0.4
35	0.5	0.015	0.408	0.000	0.5
40	0.5	0.016	0.415	0.000	0.5
45	0.7	0.018	0.478	0.000	-0.1
50	0.6	0.024	0.643	0.000	0.1
55	0.6	0.031	0.816	0.000	0.0
60	0.7	0.039	1.020	0.000	0.0
65	0.9	0.048	1.271	0.000	-0.1
70	1.1	0.059	1.568	0.000	-0.1
75	1.3	0.073	1.931	0.000	-0.2
80	1.6	0.089	2.370	0.000	-0.3
85	1.9	0.109	2.895	0.000	-0.4
90	2.2	0.132	3.517	0.000	-0.5
95	2.6	0.160	4.240	0.000	-0.6
100	2.9	0.191	5.071	0.000	-0.7
105	3.2	0.225	5.992	0.000	-0.8
110	3.5	0.263	7.006	0.000	-0.8
115	3.8	0.305	8.100	0.000	-0.9
120	3.9	0.348	9.255	0.000	-0.9
125	3.9	0.392	10.435	0.000	-0.9
130	3.8	0.436	11.588	0.000	-0.9
135	3.5	0.477	12.676	0.000	-0.8
140	3.2	0.514	13.678	0.000	-0.7
145	2.8	0.548	14.583	0.000	-0.6
150	2.5	0.578	15.383	0.000	-0.5
155	2.1	0.604	16.076	0.000	-0.3
160	1.8	0.626	16.663	0.000	-0.2
165	1.5	0.645	17.129	0.000	-0.1
170	1.2	0.660	17.531	0.000	-0.1
175	1.0	0.672	17.854	0.000	0.0
180	0.8	0.681	18.109	0.000	0.1
185	0.7	0.689	18.309	0.000	0.1
190	0.6	0.694	18.466	0.000	0.2
195	0.6	0.699	18.593	0.000	0.2
200	0.5	0.703	18.703	0.000	0.2
205	0.5	0.707	18.803	0.000	0.2
210	0.5	0.711	18.901	0.000	0.2
215	0.5	0.714	18.999	0.000	0.2
220	0.5	0.718	19.094	0.000	0.2
225	0.5	0.721	19.180	0.000	0.2

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
230	0.4	0.724	19.247	0.000	0.3
235	0.3	0.725	19.274	0.000	0.3
240	0.1	0.723	19.237	0.000	0.4
245	0.0	0.719	19.132	0.000	0.4
250	0.0	0.714	19.003	0.000	0.4
255	0.0	0.709	18.873	0.000	0.4
260	0.0	0.704	18.744	0.000	0.4
265	0.0	0.700	18.615	0.000	0.4
270	0.0	0.695	18.487	0.000	0.4
275	0.0	0.690	18.359	0.000	0.4
280	0.0	0.685	18.232	0.000	0.4
285	0.0	0.680	18.104	0.000	0.4
290	0.0	0.676	17.978	0.000	0.4
295	0.0	0.671	17.851	0.000	0.4
300	0.0	0.666	17.725	0.000	0.4
305	0.0	0.661	17.600	0.000	0.4
310	0.0	0.657	17.475	0.000	0.4
315	0.0	0.652	17.350	0.000	0.4
320	0.0	0.647	17.225	0.000	0.4
325	0.0	0.643	17.101	0.000	0.4
330	0.0	0.638	16.978	0.000	0.4
335	0.0	0.633	16.854	0.000	0.4
340	0.0	0.629	16.731	0.000	0.4
345	0.0	0.624	16.609	0.000	0.4
350	0.0	0.620	16.487	0.000	0.4
355	0.0	0.615	16.365	0.000	0.4
360	0.0	0.610	16.243	0.000	0.4
365	0.0	0.606	16.122	0.000	0.4
370	0.0	0.601	16.002	0.000	0.4
375	0.0	0.597	15.881	0.000	0.4
380	0.0	0.592	15.761	0.000	0.4
385	0.0	0.588	15.642	0.000	0.4
390	0.0	0.583	15.523	0.000	0.4
395	0.0	0.579	15.404	0.000	0.4
400	0.0	0.574	15.285	0.000	0.4
405	0.0	0.570	15.167	0.000	0.4
410	0.0	0.566	15.049	0.000	0.4
415	0.0	0.561	14.932	0.000	0.4
420	0.0	0.557	14.815	0.000	0.4
425	0.0	0.552	14.698	0.000	0.4
430	0.0	0.548	14.582	0.000	0.4
435	0.0	0.544	14.466	0.000	0.4
440	0.0	0.539	14.350	0.000	0.4
445	0.0	0.535	14.235	0.000	0.4
450	0.0	0.531	14.120	0.000	0.4
455	0.0	0.526	14.006	0.000	0.4
460	0.0	0.522	13.892	0.000	0.4
465	0.0	0.518	13.778	0.000	0.4
470	0.0	0.513	13.664	0.000	0.4
475	0.0	0.509	13.551	0.000	0.4
480	0.0	0.505	13.437	0.000	0.4

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		



Soakaway Type : Soakaway

Critical by Return Period: Rainfall Details FEH: 10 years: Increase Rainfall (%): +45: 240 mins: Winter

Tables

Half Drain Down Time (mins)	138

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0
5	0.1	0.000	0.000	0.000	0.1
10	0.3	0.000	0.000	0.000	0.3
15	0.4	0.000	0.000	0.000	0.4
20	0.5	0.001	0.016	0.000	0.4
25	0.6	0.004	0.062	0.000	0.4
30	0.7	0.008	0.139	0.000	0.4
35	0.8	0.013	0.241	0.000	0.4
40	0.8	0.020	0.356	0.000	0.4
45	0.8	0.027	0.480	0.000	0.4
50	0.8	0.034	0.611	0.000	0.4
55	0.9	0.042	0.756	0.000	0.4
60	1.0	0.051	0.922	0.000	0.4
65	1.1	0.062	1.122	0.000	0.4
70	0.9	0.070	1.256	0.000	0.4
75	1.0	0.077	1.394	0.000	0.4
80	1.1	0.087	1.565	0.000	0.4
85	1.3	0.098	1.774	0.000	0.4
90	1.6	0.112	2.024	0.000	0.4
95	1.8	0.129	2.319	0.000	0.4
100	2.0	0.147	2.657	0.000	0.4
105	2.2	0.169	3.038	0.000	0.5
110	2.4	0.192	3.459	0.000	0.5
115	2.5	0.217	3.917	0.000	0.5
120	2.6	0.244	4.397	0.000	0.5
125	2.6	0.271	4.887	0.000	0.5
130	2.5	0.297	5.366	0.000	0.5
135	2.4	0.322	5.817	0.000	0.5
140	2.2	0.345	6.231	0.000	0.5
145	2.0	0.366	6.586	0.000	0.5
150	1.8	0.384	6.917	0.000	0.6
155	1.6	0.400	7.201	0.000	0.6
160	1.4	0.413	7.441	0.000	0.6
165	1.2	0.424	7.637	0.000	0.6
170	1.0	0.432	7.794	0.000	0.6
175	0.9	0.439	7.916	0.000	0.6
180	0.8	0.444	8.009	0.000	0.6
185	0.8	0.448	8.079	0.000	0.6
190	0.7	0.450	8.130	0.000	0.6
195	0.7	0.453	8.170	0.000	0.6
200	0.7	0.454	8.201	0.000	0.6
205	0.7	0.456	8.229	0.000	0.6
210	0.7	0.457	8.257	0.000	0.6
215	0.7	0.459	8.284	0.000	0.6
220	0.7	0.460	8.310	0.000	0.6
225	0.7	0.462	8.332	0.000	0.6

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
230	0.6	0.462	8.346	0.000	0.6
235	0.5	0.462	8.343	0.000	0.6
240	0.4	0.460	8.311	0.000	0.6
245	0.4	0.457	8.251	0.000	0.6
250	0.3	0.453	8.181	0.000	0.6
255	0.3	0.449	8.110	0.000	0.6
260	0.3	0.445	8.039	0.000	0.6
265	0.3	0.441	7.969	0.000	0.6
270	0.3	0.437	7.899	0.000	0.6
275	0.3	0.434	7.829	0.000	0.6
280	0.3	0.430	7.760	0.000	0.6
285	0.3	0.426	7.690	0.000	0.6
290	0.3	0.422	7.621	0.000	0.6
295	0.3	0.418	7.552	0.000	0.6
300	0.3	0.414	7.483	0.000	0.6
305	0.3	0.411	7.415	0.000	0.6
310	0.3	0.407	7.346	0.000	0.6
315	0.3	0.403	7.278	0.000	0.6
320	0.3	0.399	7.210	0.000	0.6
325	0.3	0.395	7.143	0.000	0.6
330	0.3	0.392	7.075	0.000	0.6
335	0.3	0.388	7.008	0.000	0.6
340	0.3	0.384	6.941	0.000	0.6
345	0.3	0.381	6.874	0.000	0.6
350	0.3	0.377	6.807	0.000	0.5
355	0.3	0.373	6.741	0.000	0.5
360	0.3	0.370	6.674	0.000	0.5
365	0.3	0.366	6.608	0.000	0.5
370	0.3	0.362	6.542	0.000	0.5
375	0.3	0.359	6.477	0.000	0.5
380	0.3	0.355	6.411	0.000	0.5
385	0.3	0.351	6.346	0.000	0.5
390	0.3	0.348	6.281	0.000	0.5
395	0.3	0.344	6.216	0.000	0.5
400	0.3	0.341	6.151	0.000	0.5
405	0.3	0.337	6.087	0.000	0.5
410	0.3	0.333	6.023	0.000	0.5
415	0.3	0.330	5.959	0.000	0.5
420	0.3	0.326	5.895	0.000	0.5
425	0.3	0.323	5.831	0.000	0.5
430	0.3	0.319	5.768	0.000	0.5
435	0.3	0.316	5.704	0.000	0.5
440	0.3	0.312	5.641	0.000	0.5
445	0.3	0.309	5.578	0.000	0.5
450	0.3	0.305	5.515	0.000	0.5
455	0.3	0.302	5.453	0.000	0.5
460	0.3	0.298	5.391	0.000	0.5
465	0.3	0.295	5.328	0.000	0.5
470	0.3	0.292	5.266	0.000	0.5
475	0.3	0.288	5.205	0.000	0.5
480	0.3	0.285	5.141	0.000	0.5

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		



Cellular Storage Type : Cellular Storage

Critical by Return Period: Rainfall Details FEH: 10 years: Increase Rainfall (%): +45: 240 mins: Winter

Tables

Half Drain Down Time (mins)	-

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.0
5	0.1	0.000	0.007	0.000	0.0
10	0.2	0.002	0.041	0.000	0.0
15	0.3	0.004	0.106	0.000	0.0
20	0.3	0.007	0.183	0.000	0.1
25	0.3	0.010	0.252	0.000	0.1
30	0.3	0.011	0.301	0.000	0.2
35	0.3	0.012	0.328	0.000	0.3
40	0.3	0.013	0.340	0.000	0.3
45	0.3	0.013	0.345	0.000	0.3
50	0.4	0.013	0.348	0.000	0.3
55	0.4	0.013	0.354	0.000	0.4
60	0.4	0.014	0.365	0.000	0.4
65	0.5	0.014	0.383	0.000	0.4
70	0.6	0.020	0.520	0.000	0.1
75	0.8	0.027	0.723	0.000	-0.1
80	0.9	0.037	0.975	0.000	-0.1
85	1.1	0.048	1.283	0.000	-0.2
90	1.3	0.062	1.652	0.000	-0.2
95	1.6	0.079	2.086	0.000	-0.3
100	1.8	0.097	2.584	0.000	-0.3
105	2.0	0.119	3.146	0.000	-0.4
110	2.2	0.142	3.766	0.000	-0.4
115	2.3	0.167	4.442	0.000	-0.5
120	2.4	0.194	5.148	0.000	-0.5
125	2.4	0.221	5.871	0.000	-0.5
130	2.3	0.247	6.577	0.000	-0.5
135	2.1	0.272	7.241	0.000	-0.4
140	1.9	0.295	7.851	0.000	-0.4
145	1.7	0.316	8.375	0.000	-0.3
150	1.5	0.334	8.862	0.000	-0.2
155	1.3	0.350	9.281	0.000	-0.1
160	1.1	0.363	9.634	0.000	-0.1
165	0.9	0.374	9.923	0.000	0.0
170	0.7	0.382	10.154	0.000	0.0
175	0.6	0.389	10.335	0.000	0.1
180	0.5	0.394	10.472	0.000	0.1
185	0.4	0.398	10.574	0.000	0.2
190	0.4	0.401	10.650	0.000	0.2
195	0.4	0.403	10.708	0.000	0.2
200	0.3	0.404	10.755	0.000	0.2
205	0.3	0.406	10.796	0.000	0.2
210	0.3	0.407	10.836	0.000	0.2
215	0.3	0.409	10.876	0.000	0.2
220	0.3	0.410	10.915	0.000	0.2
225	0.3	0.412	10.948	0.000	0.2

Gravelly Crescent: 15945-03 Infiltration	Date: 28/07/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Time (mins)	Total Inflow (L/s)	Depth(m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
230	0.3	0.412	10.968	0.000	0.2
235	0.2	0.412	10.963	0.000	0.3
240	0.1	0.410	10.917	0.000	0.3
245	0.0	0.407	10.829	0.000	0.3
250	0.0	0.403	10.724	0.000	0.3
255	0.0	0.399	10.620	0.000	0.3
260	0.0	0.395	10.516	0.000	0.3
265	0.0	0.391	10.413	0.000	0.3
270	0.0	0.387	10.310	0.000	0.3
275	0.0	0.384	10.207	0.000	0.3
280	0.0	0.380	10.104	0.000	0.3
285	0.0	0.376	10.002	0.000	0.3
290	0.0	0.372	9.900	0.000	0.3
295	0.0	0.368	9.798	0.000	0.3
300	0.0	0.364	9.697	0.000	0.3
305	0.0	0.361	9.596	0.000	0.3
310	0.0	0.357	9.495	0.000	0.3
315	0.0	0.353	9.395	0.000	0.3
320	0.0	0.349	9.295	0.000	0.3
325	0.0	0.345	9.195	0.000	0.3
330	0.0	0.342	9.095	0.000	0.3
335	0.0	0.338	8.996	0.000	0.3
340	0.0	0.334	8.897	0.000	0.3
345	0.0	0.331	8.799	0.000	0.3
350	0.0	0.327	8.701	0.000	0.3
355	0.0	0.323	8.603	0.000	0.3
360	0.0	0.320	8.505	0.000	0.3
365	0.0	0.316	8.408	0.000	0.3
370	0.0	0.312	8.311	0.000	0.3
375	0.0	0.309	8.214	0.000	0.3
380	0.0	0.305	8.117	0.000	0.3
385	0.0	0.301	8.021	0.000	0.3
390	0.0	0.298	7.925	0.000	0.3
395	0.0	0.294	7.830	0.000	0.3
400	0.0	0.291	7.734	0.000	0.3
405	0.0	0.287	7.639	0.000	0.3
410	0.0	0.283	7.545	0.000	0.3
415	0.0	0.280	7.450	0.000	0.3
420	0.0	0.276	7.356	0.000	0.3
425	0.0	0.273	7.262	0.000	0.3
430	0.0	0.269	7.169	0.000	0.3
435	0.0	0.266	7.075	0.000	0.3
440	0.0	0.262	6.982	0.000	0.3
445	0.0	0.259	6.890	0.000	0.3
450	0.0	0.255	6.797	0.000	0.3
455	0.0	0.252	6.705	0.000	0.3
460	0.0	0.248	6.613	0.000	0.3
465	0.0	0.245	6.522	0.000	0.3
470	0.0	0.242	6.430	0.000	0.3
475	0.0	0.238	6.339	0.000	0.3
480	0.0	0.235	6.245	0.000	0.3

Gravelly Crescent: 15945-03 Permeable paving check	Date: 15/09/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Catchment Area

Type : Catchment Area

Area (ha)	0.001

Preliminary Sizing

Volumetric Runoff Coefficient	1.000
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Gravelly Crescent: 15945-03 Permeable paving check	Date: 15/09/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		



Porous Paving

Type : Porous Paving

Dimensions

Exceedence Level (m)	3.800
Depth (m)	0.250
Base Level (m)	3.550
Paving Layer Depth (mm)	100
Membrane Percolation (m/hr)	1000.0
Porosity (%)	30
Length (m)	5.000
Long. Slope (1:x)	400.00
Width (m)	2.000
Total Volume (m³)	0.587

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	5
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.2124
Safety Factor	3.0
Conductivity (m/hr)	10000.0

Gravelly Crescent: 15945-03 Permeable paving check	Date: 15/09/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Inflow Summary Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Porous Paving		Time of Concentration	0.001	100	0	100	0.001
TOTAL		**0.0**		**0.001**				**0.001**

Gravelly Crescent: 15945-03 Permeable paving check	Date: 15/09/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Flow Options

Peak Flow Calculation	Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Level	Level Inverts
Min. Slope (1:x)	1000.00
Max. Slope (1:x)	40.00
Use Flow Restriction	☑
Reduce Channel Depths	☑

Manhole Options

Apply Offset	☐
Synchronise Manhole Invert Levels	☑

Gravelly Crescent: 15945-03 Permeable paving check	Date: 15/09/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	Company Address: HOP House 41 Church Road Hove		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Shortest
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	0
Perform No Discharge Analysis	☐

Rainfall

Rainfall Details FEH

Type: FEH

Site Location	GB 518715 104987 TQ 18715 04987
Rainfall Version	2013
Data Type	Point
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	45

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520

Gravelly Crescent: 15945-03 Permeable paving check	Date: 15/09/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		

Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	Rainfall Details FEH: 100 years: +45 %: 30 mins: Summer	3.639	3.639	0.076	0.089	0.6	0.249	0.000	0.527	0.0	0.000	58	OK

Gravelly Crescent: 15945-03 Permeable paving check	Date: 15/09/2022		
	Designed by: TRB	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: HOP House 41 Church Road Hove		



Porous Paving Type : Porous Paving

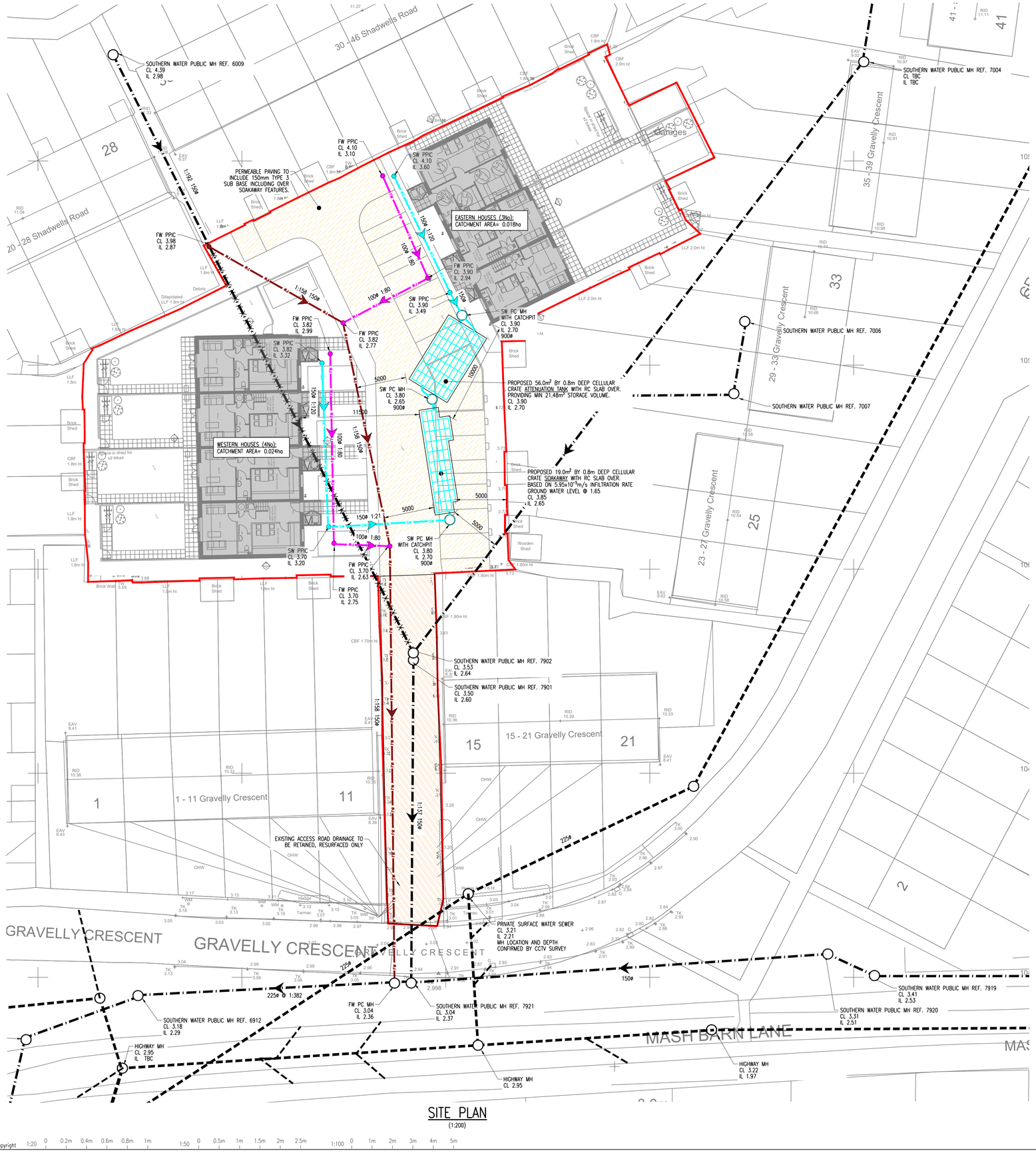
Critical Storm: Rainfall Details FEH: 100 years: Increase Rainfall (%): +45: 30 mins: Summer

Tables

Half Drain Down Time (mins)	15

Time (mins)	Total Inflow (L/s)	US Depth (m)	DS Depth (m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.000	0.0
5	0.1	0.000	0.000	0.000	0.000	0.1
10	0.2	0.005	0.000	0.008	0.000	0.1
15	0.6	0.016	0.029	0.067	0.000	0.2
20	0.6	0.057	0.070	0.191	0.000	0.2
25	0.2	0.076	0.089	0.249	0.000	0.2
30	0.1	0.070	0.083	0.230	0.000	0.2
35	0.0	0.056	0.069	0.188	0.000	0.2
40	0.0	0.036	0.049	0.128	0.000	0.2
45	0.0	0.016	0.029	0.069	0.000	0.2
50	0.0	0.000	0.010	0.015	0.000	0.1
55	0.0	0.000	0.000	0.000	0.000	0.0
60	0.0	0.000	0.000	0.000	0.000	0.0

APPENDIX F – PROPOSED DRAINAGE STRATEGY



SITE PLAN
(1:200)

LEGEND

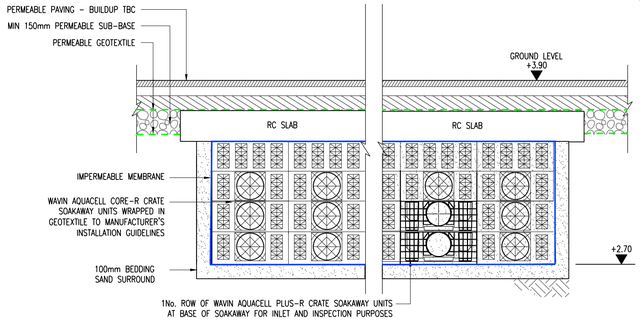
FOUL WATER	SURFACE WATER	
FW	SW	PROPOSED DRAINAGE
		EXISTING SEWER
FW		EXISTING SEWER TO BE REMOVED
		PROPOSED FOUL WATER DIVERSION
		PERFORATED PIPE
		PROPOSED CONCRETE MANHOLE
		PROPOSED TYPE 3 INSPECTION CHAMBER 450mmø / 600mmø
		CRATE SOAKAWAY/ATTENUATION
		SITE BOUNDARY
		PERMEABLE PAVING WITH MIN 150mm TYPE 3 SUB-BASE
		IMPERMEABLE PAVING RESURFACED AS REQUIRED

N

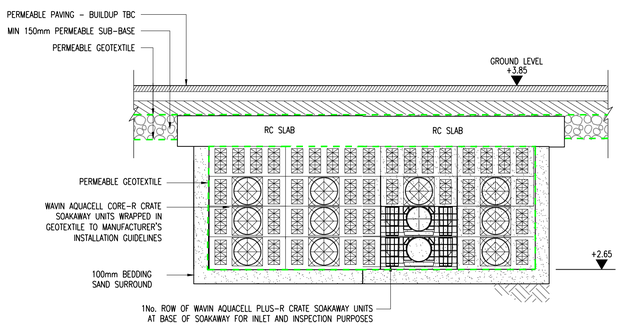
INDICATIVE ONLY

NOTES

DRAWING TO BE READ IN CONJUNCTION WITH SuDS REPORT 15945/03/HOP/SUDS BY HOP CONSULTING.



CELLULAR ATTENUATION DETAIL
(1:20)



CELLULAR SOAKAWAY DETAIL
(1:20)

1:20 0 0.2m 0.4m 0.6m 0.8m 1m

1:200 0 2m 4m 6m 8m 10m

1:50 0 0.5m 1m 1.5m 2m 2.5m

1:100 0 1m 2m 3m 4m 5m

Project/Task No. 15945-03 Scale: AS SHOWN ORIGINAL DRAWING SIZE A1

1. GENERAL

(i) This drawing is not to be scaled, work to figured dimensions only, confirmed on site.

(ii) This drawing is to be read in conjunction with all relevant architectural drawings, detailed specifications where applicable and all associated drawings in this series.

(iii) Any discrepancy on this drawing is to be reported immediately to the partnership for clarification.

(iv) The contractor is responsible for all temporary works and for the stability of the works in progress.

2. DRAINAGE GENERAL

(i) All foul and storm water drains which are not to be adopted as public sewers under a section 104 Agreement must be constructed in accordance with the Building Regulations, BS EN 752 and where appropriate the relevant agreement certificates.

(ii) Manholes, gullies, gully connections, sewers and other sewerage structures intended to convey surface water are to be constructed in accordance with the Water Authorities Association Specification 'Sewers for Adoption' 7th Edition and relevant Council Design Guide.

(iii) All concrete used in drainage works to comply with BRE Digest 363 for Class DS-2 sulphate conditions.

3. BELOW GROUND DRAINAGE

(i) Pipework to be UPVC-U pipes to BS 4660 : 2000 and Inspection Chambers to BS EN 13598.

(ii) All adoptable drainage to be constructed in accordance with 'Sewers for Adoption' 7th Edition and the relevant Council Design Guide.

(iii) All private surface water sewers to be laid at 1 in 80 unless otherwise stated on the drawing.

(iv) All private foul water sewers to be laid at 1 in 40 at the head of pipe runs and 1 in 80 elsewhere unless otherwise stated.

(v) All private foul sewer pipes to be 100mm diameter unless otherwise stated on the drawing. All private surface water sewer pipes to be 100mm diameter from downpipes and 150mm diameter elsewhere unless otherwise stated on the drawing.

(vi) Allow for rodding access above ground where rainwater downpipes do not have a direct connection to an inspection chamber.

(vii) Existing sewer pipe to be re-used to be surveyed and levelled prior to commencement of the drainage works and refurbished if necessary.

(viii) Connections to an adopted sewer only to be made following approval from the relevant adopting Authority.

(ix) All drains, sewer pipes and manholes to be cleaned and tested for water tightness on completion of construction.

4. MANHOLE COVERS & FRAMES

(i) Manhole covers to be class D400 in highways, class B125 in footways and verges, class C250 in external maintenance vehicle access areas and verges, and class A15 in non-trafficked areas.

(ii) Manhole covers and frames to be bedded and surrounded in 1:3 mortar.

5. PIPES

(i) Plastic pipes shall be of unplasticised polyvinyl chloride (UPVC) complying with the requirements of BS EN 1401-1:2009.

(ii) Concrete pipes shall be spun by a centrifugal process or be vertically pressed. They shall possess self inverting sockets and shall comply with the requirements of and be tested in accordance with BS 5911:2010.

SOAKAWAY VOLUME UPDATED	TRB	AK	15.09.22	P11
ATTENUATION RESIZED, DETAILS REVISED	TRB	AK	28.07.22	P10
REVISED TO DRAINAGE OFFICER COMMENTS	TRB	AK	22.06.22	P9
INFILTRATION SCHEME	TRB	AK	16.05.22	P8
PUBLIC SEWER EASEMENT DISTANCE SHOWN	TRB	AK	03.12.21	P7
ATTENUATION REVISED TO AVOID SEWER EASEMENTS	TRB	AK	05.11.21	P6
PRIVATE SEWER REVISED FOLLOWING CCTV SURVEY	TRB	AK	06.10.21	P5
DRAINAGE AMENDED, SECTION ADDED	BAK	TRB	03.09.21	P4
FLOW RATE REDUCED, FRA ISSUE	TRB	AK	26.07.21	P3
DRAINAGE AMENDED	BAK	TRB	23.06.21	P2
FIRST ISSUE	BAK	AK	21.12.20	P1
Description	By	Aprvd.	Date	Rev.

PRELIMINARY DRAWING
NOT FOR CONSTRUCTION

Title: DRAINAGE STRATEGY

Project: GRAVELLY CRESCENT

Client: ADUR DISTRICT COUNCIL

HOP
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
HOP House, 41 Church Road
Hove, East Sussex BN3 2BE
www.hop.uk.com
ask@hop.uk.com
+44 (0)1273 223900

Drawing No. 15945-HOP-03-XX-DR-C-09100 Status S0 Rev. P11

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P:\PROJECTS\15945 NWDC Infill Sites, Shoreham & Lancing\Drawings\HOP\15945-HOP-03-XX-DR-C-09100 Gravelly Crescent Stonnage Strategy Tom Butler

APPENDIX G – SuDS MAINTENANCE SCHEDULE

GRAVELLY CRESCENT SITE, LANCING

PROPOSED MAINTENANCE & INSPECTION SCHEDULE FOR BELOW GROUND DRAINAGE (FOUL WATER AND SURFACE WATER) INCLUDING SUSTAINABLE DRAINAGE SYSTEMS (SuDS)

Item	Required Maintenance/Monitoring	Suggested Frequency	Responsibility
Foul Water Drainage	Check inspection chambers and manholes for damage, condition and function.	Every six months	Facilities Management
	Undertake a CCTV drainage survey of the drainage network to establish condition.	Every ten years	Specialist
	Replace or repair malfunctioning parts or structures	As required	Specialist
Surface Water Drainage	Check inspection chambers and manholes for damage, condition and function.	Every six months	Facilities Management
	Undertake a CCTV drainage survey of the drainage network to establish condition.	Every ten years	Specialist
	Replace or repair malfunctioning parts or structures.	As required	Specialist
Surface Water Catch Pits	Check silt traps and inspection chambers and note the rate of sediment accumulation. Remove sediment if present.	Every month for the first year and then annually, or as conditions require	Facilities Management
Permeable Paving	Sweep clean of debris.	Every six months	Facilities Management
	Remove fines from paving using a suction road sweeper (Asphalt only)	Every 5 years or as required	Specialist
	Weed removal (Block paving only)	Every six months	Facilities Management
Attenuation Tank	Inspect for damage, blockages or erosion	Every six months and after periods of heavy rainfall	Facilities Management
	Littler, sediment and debris removal by jetting	Every 5 years or as required.	Specialist
Soakaway	Inspect for damage, blockages or erosion	Every six months and after periods of heavy rainfall	Facilities Management
	Littler, sediment and debris removal by jetting	Every 5 years or as required.	Specialist
General	Remove sediment, litter, debris and vegetation from the surface of pathways areas	As necessary and after heavy rainfall	Facilities Management
Flood Flow Routes	Ensure flood flow routes are not obstructed (i.e. lower lying portions of the land that will direct surface water runoff away from vulnerable assets in the event of drainage failure).	Every year and during periods of heavy rainfall	Facilities Management

NOTES

The facilities management team will be responsible for the implementation of the maintenance schedule for below ground drainage, by appointing appropriate persons and/or sub-consultants that are qualified to undertake these operations.

Maintenance is to be carried out by the facilities management team or by a specialist contractor, as noted in Responsibility column above.

This maintenance schedule has been produced with reference to the guidelines outlined in 'The SuDS Manual' (CIRIA C753: 2015). The suggested frequency of maintenance is considered a guide, and should not replace the guidance from manufacturers of proprietary systems.

Refer to Engineering drawings for location and details of below ground drainage assets and SuDS features.

APPENDIX H – EA SITE SPECIFIC FLOOD DATA

HOP Consulting

Model baseline date 2012 — *Date: 17/12/2021*

Baseline flood level 4.26 mOD — *By: TRB*

Design date 2121

Year range	2012 2035	2036 2065	2066 2095	2096 2121	
No. years in range	23	29	29	25	
	Sea level rise per year (mm)				Total rise (mm)
Higher central	5.7	8.7	11.6	13.1	1047
Upper end	6.9	11.3	15.8	18.2	1400

Higher central flood level 5.307 mOD

Upper end flood level 5.660 mOD

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
South east	Higher central	5.7 (200)	8.7 (261)	11.6 (348)	13.1 (393)	1.20
South east	Upper end	6.9 (242)	11.3 (339)	15.8 (474)	18.2 (546)	1.60

Solent & South Downs Area

Pre-application Advice Note

September 2019

This document sets out the environmental issues we will consider when providing our planning application consultation advice to Local Councils. It can be used by applicants, developers and consultants at the pre-planning stage.

Fluvial Flood Risk

Development must be safe and should not increase the risk of flooding.

You can view a site's flood zone on the Flood Map for Planning on our website: https://flood-map-for-planning.service.gov.uk

If your proposed development is located within flood zone 2 or 3 you should consult the Flood Risk and Coastal Change pages of the National Planning Policy Guidance (NPPG) http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/

Here you can determine whether the flood risk vulnerability of your proposed development and the flood zone are compatible. You can also establish if there are flood risk sequential test and exception test requirements for your proposed development. In the first instance we recommend the developer/applicant liaises with the Local Planning Authority (LPA) to undertake the Sequential Test in accordance with the National Planning Policy Framework (NPPF).

If your proposed development is located within flood zone 2 orf 3 and its vulnerability and flood zone are considered acceptable under the NPPG then a site specific Flood Risk Assessment (FRA) is required to support any subsequent planning application. This is required by paragraph 163 of the NPPF: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

Guidance on the content of a site specific FRA can be found in the NPPG and online: https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

More detailed flood risk modelling data is available to help you produce a FRA please contact our Customers and Engagement team at SSDenquiries@environment-agency.gov.uk.

Climate Change Allowances

On 19 February 2016, we published new guidance for planners and developers on how to use climate change allowances in a site-specific FRA: https://www.gov.uk/guidance/flood-risk-assessments-climatechange-allowances

Groundwater Quality

Development must not cause pollution to the water environment.

Source Protection Zones

We have defined Source Protection Zones (SPZs) for 2000 groundwater sources such as wells, boreholes and springs used across the country for public drinking water supply. These zones are more sensitive to contamination from activities that might cause pollution in the area. The closer the activity, the greater the risk.

SPZ1s are the areas designated as most at risk from contamination and development activities and in these areas we may consider it inappropriate for development to discharge foul or surface water into the ground.

To see if your proposed development is located within a Source Protection Zone, please use our online map: https://magic.defra.gov.uk/

Contaminated Land

The NPPF takes a precautionary approach to land contamination. Before the principle of development can be determined, land contamination should be investigated to see whether it could preclude certain development due to environmental risk or cost of remediation. Where contamination is known or suspected, a desk study, site investigation, remediation and other works may be required to enable safe development.

Pollution

If the proposed development use has the potential to pollute ground or surface water receptors then an assessment to establish whether the risk of pollution is acceptable or can be mitigated will be required within any planning application.

Foul Drainage

When drawing up wastewater treatment proposals for any development, the first presumption is to provide a system of foul drainage discharging into a public sewer to be treated at a public sewage treatment works (those provided and operated by the water and sewerage companies). This should be done in consultation with the sewerage company of the area prior to the submission of a formal planning application.

If connection to a public sewage treatment plant is not feasible, a package sewage treatment plant may be considered. If you would like further advice please call 03708 506 506.

Cemeteries

The development of new cemeteries in areas where groundwater vulnerability is high should be avoided, except where the thickness and nature of the unsaturated zone, or the impermeable formations beneath the site, protect groundwater; or where the long-term risk is mitigated by appropriate engineering methods.

Main Rivers

Ecology

In accordance with the National Planning Policy Framework (NPPF), any development proposal should avoid significant harm to biodiversity and seek to protect and enhance it. Opportunities to incorporate biodiversity in and around the development will be encouraged.

Your scheme should be designed with a naturalised buffer zone of at least 8 metres from the main river to protect and enhance the conservation value of the watercourse and ensure access for flood defence maintenance.

This buffer zone should be managed for the benefit of biodiversity for example by the planting of locally appropriate, UK native species. The buffer zone should be undisturbed by development with no fencing, footpaths or other structures. This buffer zone will help provide more space for flood waters, provide improved habitat for local biodiversity and allows access for any maintenance requirements.

To identify any Main Rivers in proximity to your proposed development please see our Main Rivers Consultation Map: http://apps.environment-agency.gov.uk/wiyby/151293.aspx

Culverting

The Environment Agency is likely to oppose culverting as it is damaging to the ecological integrity of the river channel and its corridor and acts as a barrier to the movement of wildlife, including fish and may also increase flood risk. If the proposal will impact an existing culvert the Environment Agency may oppose planning consent for development either over, or within 8 metres of an existing culvert. Wherever possible, existing culverts should be removed and the river channel and bankside habitat reinstated to restore the ecological continuity of the river channel and its corridor.

Water Framework Directive (WFD)

Any marine works below MHWS require an assessment of possible impacts on Water Framework Directive (WFD) . The assessment should include all elements of the works that fall within, or have the potential to affect, a WFD water body and any of the protected areas therein (including Bathing Waters and Shellfish Waters).

The WFD assessment should follow the 'Clearing the Waters for All' guidance available at https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters

Where appropriate, a WFD Assessment should assess any potential impacts and demonstrate that the required enhancements will be delivered. In some cases the requirements of a WFD assessment can be incorporated into an Environmental Impact Assessment (EIA). Any development that has the potential to cause deterioration in classification under WFD or that precludes the recommended actions from being delivered in the future is likely to be considered unacceptable to us.

Permits & Consents

Environmental Permitting Regulations

To see if your proposed development requires an Environmental Permit under the Environment Permitting Regulations please refer to our website: https://www.gov.uk/guidance/check-if-you-need-an-environmental-permit

From 6 April 2016 an Environmental Permit is required for any proposed works or structures, in, under, over or within 8 metres of the top of the bank of designated Main River, and within 16 metres of a tidal defence.

Ordinary Watercourse Consent

The prior written consent of the relevant Lead Local Flood Authority is required for the erection of any flow control structures, culverting or diversion of ordinary watercourses, including streams, land drains and ditches.

Marine Licence

A marine licence may be required for any activities at the mean high water spring tide up to the territorial limit.This also includes the waters of every estuary, river or channel where the tide flows at mean high water spring tide.

Any development must demonstrate how adverse impacts on migratory fish, bathing waters, shellfish waters, designated sites, protected and priority species and habitats will be avoided, minimised, mitigated and if necessary compensated for. Works within or affecting a Water Framework Directive (WFD) waterbody will need to demonstrate that compliance with WFD objectives will be achieved. 'Clearing the Waters for All' provides guidance on how the impacts on WFD should be addressed, and should be used when preparing an assessment, including the screening and scoping of activities. https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters

Further pre-application options

The information provided above details generic information which may or may not be applicable to your development. We are able to provide more detailed and bespoke advice and answer technical questions for a charged fee of £100 per person per hour +VAT.

If you are interested in finding out more about this service, please email:

planningssd@environment-agency.gov.uk

We can explain this service and provide you with a bespoke quote for further pre-application advice that you may require please see .gov - https://www.gov.uk/government/publications/pre- planning-application-enquiry-form-preliminary-opinion

Please note

Please note that the view expressed in this letter by the Environment Agency is in response to the enquiry only and does not represent our final view in relation to any future planning application made in relation to this site.

We reserve the right to change our position in relation to any such application.

As part of this preliminary response we have not technically reviewed any documents. This opinion is based on the information submitted and current planning policy and guidance.

If you have any questions please contact the Solent & South Downs Sustainable Places team:

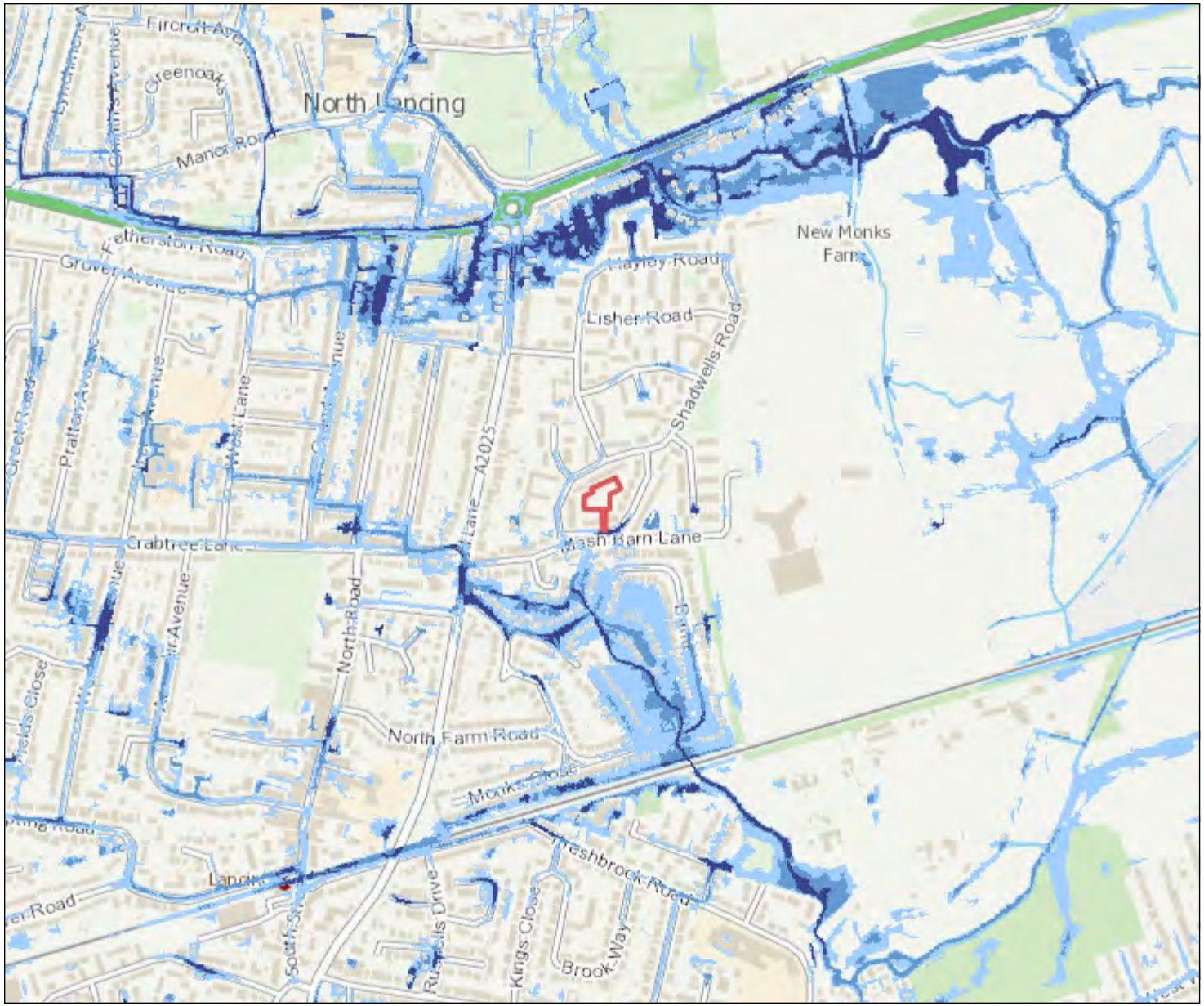
planningssd@environment-agency.gov.uk

To make a request for data

Please submit your request for data to ssdenquiries@environment-agency.gov.uk. You should get the information within 20 working days. We will tell you when to expect the information if we need more time.

There are many datasets available online at www.data.gov.uk including flood maps, historic landfill, waste exemptions, consented discharges to controlled waters, and much more.

Risk of flooding from Surface Water. Centred BN15 9EG. Created 16/12/2020.



Environment Agency

1: 10,000

0 Metres 250

N W E S

Likelihood of flooding from Surface Water

- High (>=3.3%)
- Medium (3.3% - 1%)
- Low (1% - 01%)
- Very Low
- Flood Extent 1 in 30
- Flood Extent 1 in 100
- Flood Extent 1 in 1000

Likelihood of flooding from Surface Water

High:	Greater than or equal to 3.3% (1 in 30) chance in any given year
Medium:	Less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year
Low:	Less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance in any given year
Very Low:	Less than 0.1% (1 in 1,000) chance in any given year

This information is shown on the Risk of Flooding from Surface Water map on GOV.UK.

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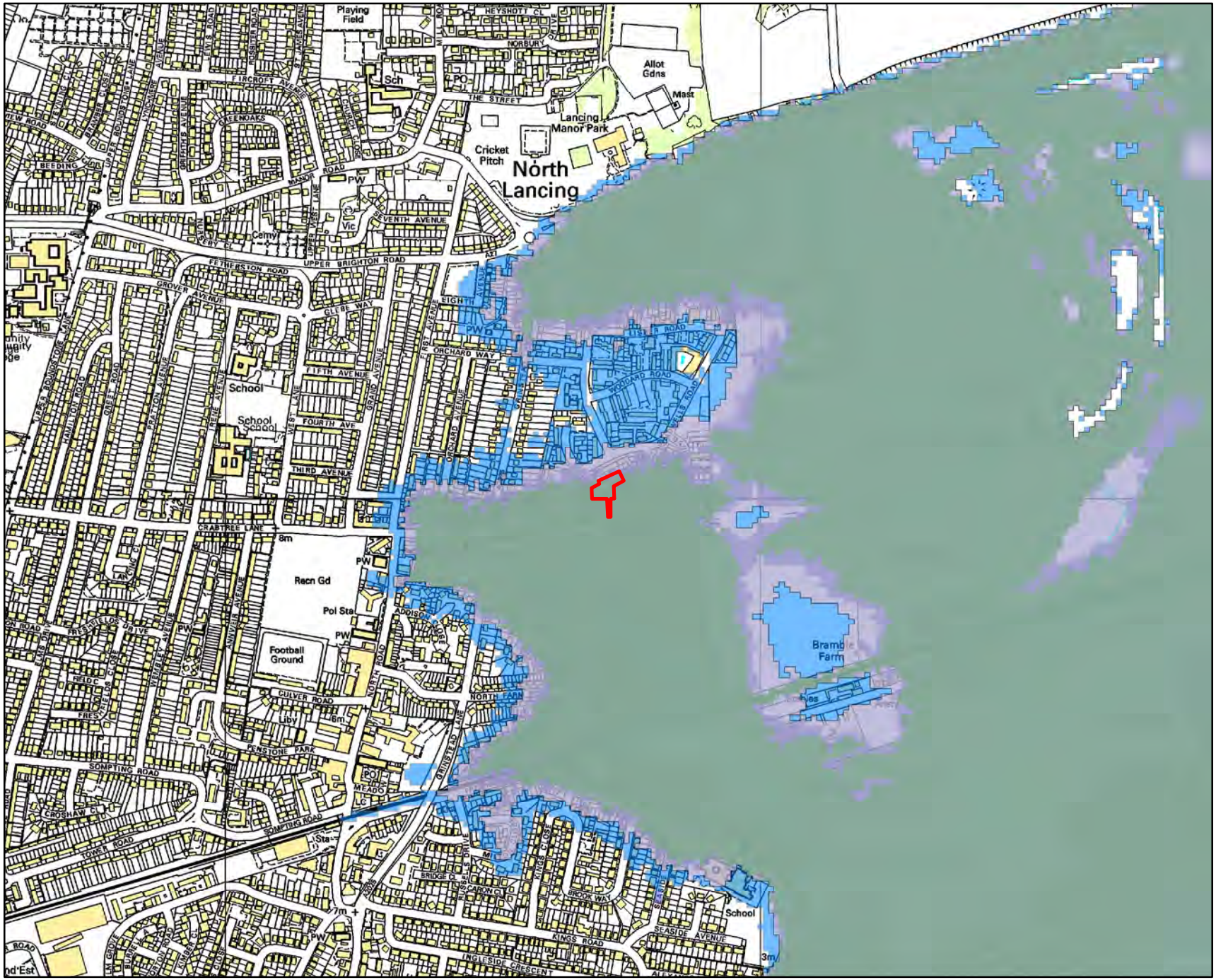
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). E-mail: enquires@environment-agency.gov.uk

Modelled Flood Outlines (Undefended Tidal). Centred BN15 9EH. Created 16/12/2020.



Environment Agency

N

Legend

- Site_Boundary
- 0.5% AEP (2012) (Undefended)
- 0.5% AEP (2070) (Undefended)
- 0.5% AEP (2115) (Undefended)
- 0.1% AEP (2012) (Undefended)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000

0 0.225 0.45
Kilometers

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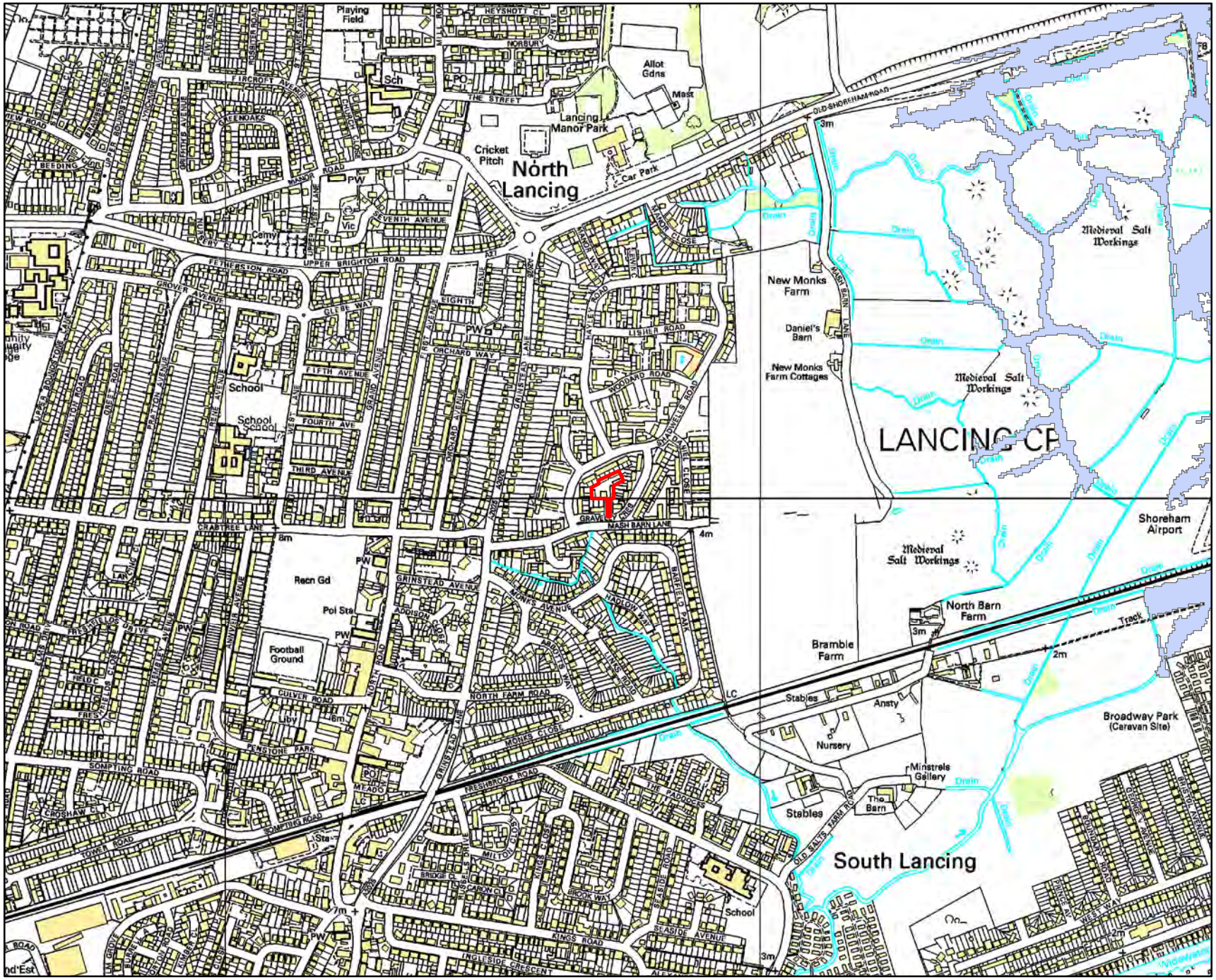
Contact us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506. Email:enquiries@environment-agency.gov.uk

Modelled Flood Outlines (Defended Tidal). Centred BN15 9EH. Created 16/12/2020.



Environment Agency

N

Legend

- Site_Boundary
- 0.5% AEP (2018) (Defended)
- 0.5% AEP (2067) (Defended)
- 0.5% AEP (2117) (Defended)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000

0 0.225 0.45
Kilometers

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Product 4 Flood Risk Data Requested by: HOP Consulting

Site: Gravelly Crescent, Lancing, BN15 9EG

Table 1: Water Levels: Tidal Undefended

	NGR		Modelled Flood Levels in Metres AOD Undefended Annual Exceedance Probability			
Node Ref	Eastings	Northings	0.5%	0.5% (2070) *	0.5% (2115) *	0.1%
1	518696	105011	4.26	4.79	5.40	4.48
2	518728	105036	4.26	4.79	5.40	4.48

Table 2: Water Levels: Tidal Defended

	NGR		Modelled Flood Levels in Metres AOD Defended Annual Exceedance Probability		
Node Ref	Eastings	Northings	0.5%	0.5% (2067) *	0.5% (2117) *
1	518696	105011	-	-	-
2	518728	105036	-	-	-

Table 3: Water Depths: Tidal Undefended

	NGR		Modelled Flood Depths in Metres Undefended Annual Exceedance Probability			
Node Ref	Eastings	Northings	0.5%	0.5% (2070) *	0.5% (2115) *	0.1%
1	518696	105011	0.51	1.04	1.65	0.73
2	518728	105036	0.01	0.52	1.13	0.21

Table 4: Water Depths: Tidal Defended

	NGR		Modelled Flood Depths in Metres Defended Annual Exceedance Probability		
Node Ref	Eastings	Northings	0.5%	0.5% (2067) *	0.5% (2117) *
1	518696	105011	-	-	-
2	518728	105036	-	-	-

All levels taken from: Adur Coastal Modelling (2012) with updated Adur Tidal Wall Scheme Modelling (2018)

Produced on: 16/12/2020

***The flood risk data provided is based on existing EA hydraulic models for existing 0.5% annual probability events with an allowance for climate change. Please note the climate change allowances provided are not up to date. These were updated on 17 December 2019.**
You should refer to 'Flood risk assessments: climate change allowances' for the most up to date allowances. You will need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.

There is no additional information or health warnings for these levels/depths or the model from which they have been produced.

Office Address: Guildbourne House, Chatsworth Road, Worthing BN11 1LD.
Customer services line: 03708 506 506. Email: enquiries@environment-agency.gov.uk
www.gov.uk/government/organisations/environment-agency

FRA Site Boundary & Node Points. Centred BN15 9EH. Created 16/12/2020.



Environment Agency

N

Legend

- Site Nodes
- Site_Boundary

Scale: 1:1,000

0 0.0225 0.045
Kilometers

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Use of Environment Agency Information for Flood Risk Assessments

Important
The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:

https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.

We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:

https://www.gov.uk/flood-risk-assessment-standing-advice
http://planningguidance.planningportal.gov.uk/

You should also consult the Strategic Flood Risk Assessment or other relevant materials produced by your local planning authority.

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but does not constitute such an assessment on its own.

2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. Information produced by the local planning authority referred to above may assist here.

3. Where a planning application requires an FRA and this is not submitted or is deficient, the Environment Agency may raise an objection.

Flood Map for Planning (Rivers and Sea). Centred BN15 9EG. Created 16/12/2020.



Environment Agency

1: 10,000

0 Metres 250

N W E S

Flood Map for Planning (Rivers & Sea)

- Defences
- Flood Storage Areas
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

Flood Map Areas (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occuring each year.

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Andy Keen
HOP Consulting

Our ref: SSD195594
Date: 16/12/2020

Dear Andy Keen,

Enquiry Regarding Product 4 for Flood Risk Assessment for Gravelly Crescent, Lancing, BN15 9EG.

Thank you for your enquiry which was received on 24th November 2020.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. The information is attached.

The information on Flood Zones in the area relating to this address is as follows:

The site is in an area located within Flood Zone 2 & 3 as shown on our Flood Map for Planning (Rivers and Sea).

Note - This information relates to the area that the above named property is in and is not specific to the property itself as it is influenced by factors such as the height of door steps, air bricks or the height of surrounding walls. We do not have access to this information and is not currently used in our flood modelling.

Flood Zone definitions can be found at www.gov.uk/guidance/flood-risk-and-coastal-change#Table-1-Flood-Zones

Flood Defences
There are no formal raised flood defences in the vicinity of the site.

Model Information
The model used was the Arun to Adur Coastal Modelling, with updated Adur Tidal Wall Scheme Modelling, completed by JBA Consulting in 2012 and updated in 2018.

Flood History
We hold no record of previous flooding events affecting this site.

Please note our records are not comprehensive and may not include all events. I recommend contacting the Lead Local Flood Authority, **West Sussex County Council** or the Local Authority, **Adur And Worthing District Councils** for a more comprehensive flood history check.

FRA advisory text

Name	Product 4
Description	Detailed Flood Risk Assessment Map for **Gravelly Crescent, Lancing, BN15 9EG.**
Licence	Open Government Licence
Information Warnings	The flood risk data provided is based on existing EA hydraulic models for existing 0.5% annual probability events with an allowance for climate change. Please note the climate change allowances provided are not up to date. These were updated on 17 December 2019. You should refer to 'Flood risk assessments: climate change allowances' for the most up to date allowances. You will need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.
Information Warning - OS background mapping	*The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.*
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2020 Ordnance Survey 100024198.

Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map
- Current Flood Warnings

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely,

Tom Lamboo
FCRM Officer, Partnership & Strategic Overview West Sussex, Solent and South Downs
Environment Agency, Guildbourne House, Chatsworth Road, Worthing, West Sussex, BN11 1LD

APPENDIX I – CCTV AND GRP SURVEYS

Aquatech Drains Ltd

Gravelly Cres, Lancing

27 February 2021



WinCan Europe Ltd, 10 Woking Business park, Albertdrive, Woking, GU21 5JY
Telephone 01483762222 Facsimile 01483 762226
www.wincaneurope.com

GRADE 3,4 & 5 Summary

STRUCTURAL DEFECTS

Structural defects			
Section	PLR	Grade	Fault description
Acceptable Structural Condition			

Grade 3; Best practice suggests consideration be given to repair in the medium term
Grade 4; Best practice suggests consideration be given to a repair to avoid potential collapse
Grade 5; Best practice suggests this pipe is at risk of collapse at any time; urgent consideration should be given to a repair to avoid collapse

SERVICE / OPERATIONAL DEFECTS

Service defects			
Section	PLR	Grade	Fault description
1	IC1 Driveway	3	Attached deposits, grease, from 4 to 7 o'clock, 15% cross-section
3	IC4 Driveway	5	Other obstacles, other , from 3 to 7 o'clock, 35% cross-sectional a
4	IC2a Driveway	3	Attached deposits, grease, from 3 to 8 o'clock, 15% cross-section

Grade 3; Best practice suggests consideration be given to maintenance activities in the medium term
Grade 4; Best practice suggests consideration be given to maintenance activity to avoid potential blockage
Grade 5; Best practice suggests this pipe is at immediate risk of backing up / causing flooding

Abandoned Surveys

Camera no access		
Section	PLR	Fault description
All Surveys Completed		

Information

These summaries are based on the SRM grading from the WRC

Aquatech Drains Ltd
Solway Ave
Brighton
Tel.: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Table of contents

Project Name:	Project number:	Date:	Contact:	
Gravelly Cres, Lancing		27/02/2021		

Profile Report 1

Inspection Summary 2

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Inspection: 1

Project Information 7

Section: 1, IC1 --- IC2 9

Section: 2, IC3 --- IC2 14

Section: 3, IC4 --- IC2a 16

Section: 4, IC2a --- IC5 21

Place :

Aquatech Drains Ltd
Solway Ave
Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

/ Main sections

Project name :	Project number :	Contact :	Date :
Gravelly Cres, Lancing			**27/02/2021**

Nr.	US MH	DS MH	Date	Road	Tape No.	Material	m	(m)
1	IC1	IC2	27/02/2021	Gravelly Crescent		Vitrified clay	64.10	**64.00**
2	IC3	IC2	27/02/2021	Gravelly Crescent		Vitrified clay	25.20	25.20
3	IC4	IC2a	27/02/2021	Gravelly Crescent		Vitrified clay	12.40	12.40
4	IC2a	IC5	27/02/2021	Gravelly Crescent		Vitrified clay	33.30	33.30

Pipe size: CIRCULAR 150/150 = 135 m (134.9 m)

All sections = 135 m (134.9 m)

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Inspection Summary

Project Name:	Project number:	Contact:	Date:	
Gravelly Cres, Lancing			27/02/2021	

Total Length of sewer network	**135.00 m**
Inspected Length of sewer network	**134.90 m**
Not inspected Length of sewer network	**0.10 m**
Total Length of sewer network (abandoned)	**0.00 m**
Inspected Length of Sewer network (abandoned)	**0.00 m**
Not inspected Length of sewer network (abandoned)	**0.00 m**
Total Length of house connections (satellite)	**0.00 m**
Inspected Length of house connections (satellite)	**0.00 m**
Not inspected Length of house connections (satellite)	**0.00 m**
Number of Sections	**4**
Number of sections (abandoned)	**0**
Number of house connections	**0**
Number of Photos	**21**

Inspection Summary

Project Name:	Project Number:	Contact:	Date:	
Gravelly Cres, Lancing			27/02/2021	

Place:	lancing	Section length:	64.10 m
Road:	Gravelly Crescent	Pipe length:	150 mm
U/S MH:	IC1	Material:	Vitrified clay
D/S MH:	IC2	Shape:	Circular

IC2	0.00	MH	Start node type, manhole, reference number : IC2	0
	0.00	WL	Water level, 20% of the vertical dimension	0
	0.00	GP	General photograph taken at this point	0
	38.10	DEG	Attached deposits, grease, from 4 to 7 o'clock, 15% cross-sectional area loss	3
	48.90	JN	Junction, at 9 o'clock, diameter 150mm	0
	54.00	JN	Junction, at 3 o'clock, diameter 150mm	0
IC1	64.00	MHF	Finish node type, manhole reference number: IC1	0

Place:	lancing	Section length:	25.20 m
Road:	Gravelly Crescent	Pipe length:	150 mm
U/S MH:	IC3	Material:	Vitrified clay
D/S MH:	IC2	Shape:	Circular

IC2	0.00	MH	Start node type, manhole, reference number : IC2	0
	0.00	WL	Water level, 10% of the vertical dimension	0
IC3	25.20	MHF	Finish node type, manhole reference number: IC3	0

Inspection Summary

Project Name:	Project Number:	Contact:	Date:	
Gravelly Cres, Lancing			27/02/2021	

Place:	lancing	Section length:	12.40 m
Road:	Gravelly Crescent	Pipe length:	150 mm
U/S MH:	IC4	Material:	Vitrified clay
D/S MH:	IC2a	Shape:	Circular

IC2a	0.00	MH	Start node type, manhole, reference number : IC2a	0
	0.00	WL	Water level, 10% of the vertical dimension	0
	2.80	OBZ	Other obstacles, other , from 3 to 7 o'clock, 35% cross-sectional area loss	5
	2.90	REM	General remark	0
	4.70	DEG	Attached deposits, grease, from 4 to 8 o'clock, 25% cross-sectional area loss	4
	7.80	DEG	Attached deposits, grease, from 4 to 7 o'clock, 25% cross-sectional area loss	4
IC4	12.40	MHF	Finish node type, manhole reference number: IC4	0

Place:	lancing	Section length:	33.30 m
Road:	Gravelly Crescent	Pipe length:	150 mm
U/S MH:	IC2a	Material:	Vitrified clay
D/S MH:	IC5	Shape:	Circular

IC2a	0.00	MH	Start node type, manhole, reference number : IC2a	0
	0.00	WL	Water level, 20% of the vertical dimension	0
	3.60	JN	Junction, at 3 o'clock, diameter 150mm	0
	15.50	DEG	Attached deposits, grease, from 3 to 8 o'clock, 15% cross-sectional area loss	3
	30.40	WL	Water level, 35% of the vertical dimension	0
IC5	33.30	MHF	Finish node type, manhole reference number: IC5	0

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Service / Operational Defects (SRM 4)

Project name :	Project Number :	Contact :	Date :
Gravelly Cres, Lancing			**27/02/2021**

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Peak Score	Grade	Mean Score	Total Score
1	IC1Driveway	U	F	C 150/150	27/02/2021	VC	64.10	64.00	1	2	3	0.03	2
2	IC3Driveway	U	F	C 150/150	27/02/2021	VC	25.20	25.20	-	0	1	0	0
3	IC4Driveway	U	F	C 150/150	27/02/2021	VC	12.40	12.40	1	10	5	1.61	20
4	IC2aDriveway	D	F	C 150/150	27/02/2021	VC	33.30	33.30	1	2	3	0.06	2

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Structural Defects (SRM 4)

Project name :	Project Number :	Contact :	Date :
Gravelly Cres, Lancing			**27/02/2021**

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Peak Score	Grade	Mean Score	Total Score
1	IC1Driveway	U	F	C 150/150	27/02/2021	VC	64.10	64.00	-	0	1	0	0
2	IC3Driveway	U	F	C 150/150	27/02/2021	VC	25.20	25.20	-	0	1	0	0
3	IC4Driveway	U	F	C 150/150	27/02/2021	VC	12.40	12.40	-	0	1	0	0
4	IC2aDriveway	D	F	C 150/150	27/02/2021	VC	33.30	33.30	-	0	1	0	0

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Project-information

Project name :	Project Number :	Contact :	Date :
Gravelly Cres, Lancing			**27/02/2021**

Client:
Contact Name:
Department:
Road:
Town:
County:
Telephone:
Fax:
Mobile:
E-mail:

Site: **Gravelly Crescent**
Contact Name: **Os Kamil**
Department: **Baily Garner LLP**
Road: **Gravelly Crescent**
Town: **Lancing**
County: **West Sussex**
Telephone:
Fax:
Mobile:
E-mail:

Contractor **Aquatech Drains Ltd**
Contact Name: **Jason Scrase**
Department:
Road: **Solway Ave**
Town: **Brighton**
County: **East Sussex**
Telephone: **01273 933705**
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Mobile: **07801 023201**
E-mail: **Jason@aquatechdrains.co.uk**

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Legend of Drawing:


WATER FLOW 1


Tree_Summer


SOAKAWAY: FOUL WATER


SURFACE WATER


PETROL INTERCEPTOR


RAINWATER PIPE


RODDING EYE


SOIL & VENT PIPE


SOAKAWAY: SURFACE WATER


W.C.


FOUL WATER


Tree_Winter


CESS PIT


GNDFLWC


SYPHON INTERCEPTOR


PIPE RUN


ROAD GULLY


SEPTIC TANK


COMBINED


GULLY


PUMP CH

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Inspection report

Date :	Job number :	Weather :	Operator :	Section number :	PLR SUFFIX:
27/02/2021		**no rain or snow**	**Jason**	**1**	**Driveway**
Weather	Vehicle :	Camera :	Preset :	Cleaned :	Operator :
no rain or snow				**no**	**Jason**

Place :	**lancing**	Location details:		U/S MH :	**IC1**
Road :	**Gravelly Crescent**	Catchment:		U/S Depth :	
Location	**Property with buildings**	Tape number :		D/S MH :	**IC2**
Inspection	**IC2 (U/S) IC1**	Pipe Length		D/S Depth :	

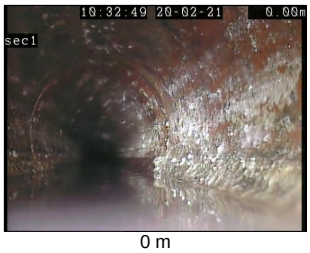
Use:	**Foul**	Pipe shape :	**Circular**
Year laid :	**1970**	Pipe size :	**150 mm**
Purpose :	**Sample survey to determine asset condition**	Pipe material :	**Vitrified clay**
Total length :	**64.10 m**	Lining :	**Vitrified clay**

Comment :

1:510	Position	Observation
IC2		
	0.00	Start node type, manhole, reference number : IC2
	0.00	Water level, 20% of the vertical dimension
	0.00	General photograph taken at this point
	38.10	Attached deposits, grease, from 4 to 7 o'clock, 15% cross-sectional area loss
	48.90	Junction, at 9 o'clock, diameter 150mm
	54.00	Junction, at 3 o'clock, diameter 150mm
	64.00	Finish node type, manhole reference number: IC1
IC1		



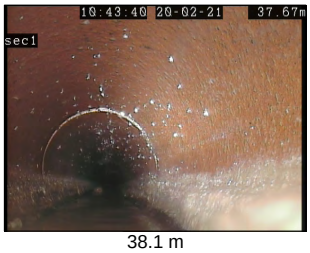
0 m



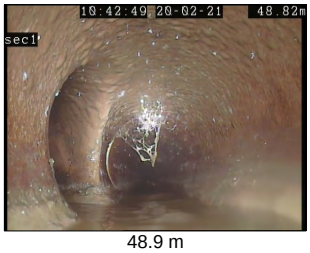
0 m



0 m



38.1 m



48.9 m

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	**0**	**0**	**0**	**1**	**1**	**2**	**0.03**	**2**	**3**

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Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**1**	**Driveway**



Photo: 1_1_1_A.jpg
0m, Start node type, manhole, reference number : IC2



Photo: 1_1_3_A.jpg
0m, Water level, 20% of the vertical dimension

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Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**1**	**Driveway**



Photo: 1_1_4_A.jpg
0m, General photograph taken at this point

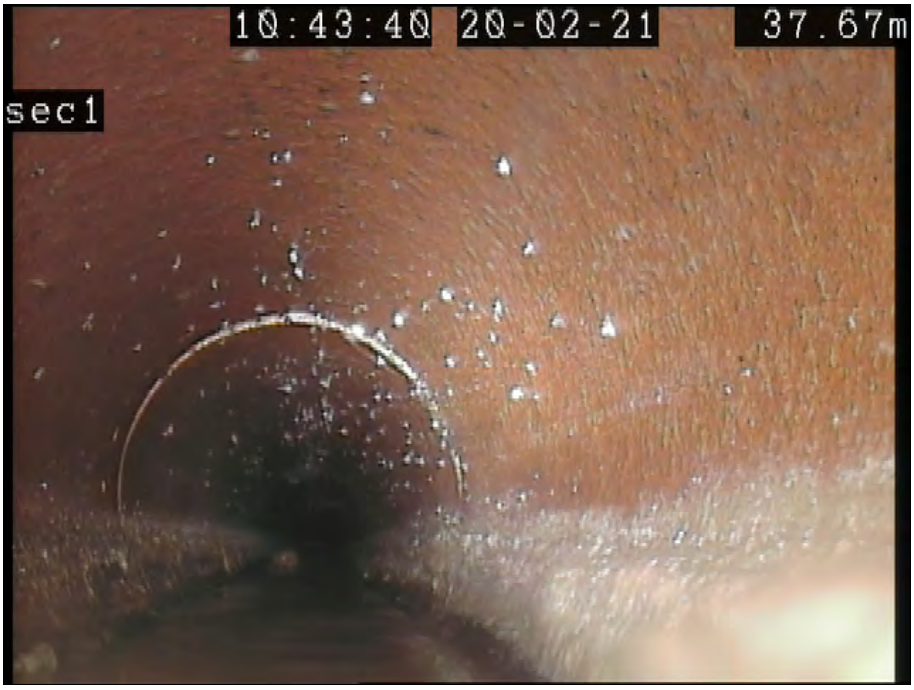

Photo: 1_1_8_A.jpg
38.1m, Attached deposits, grease, from 4 to 7 o'clock, 15% cross-sectional area loss

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Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**1**	**Driveway**

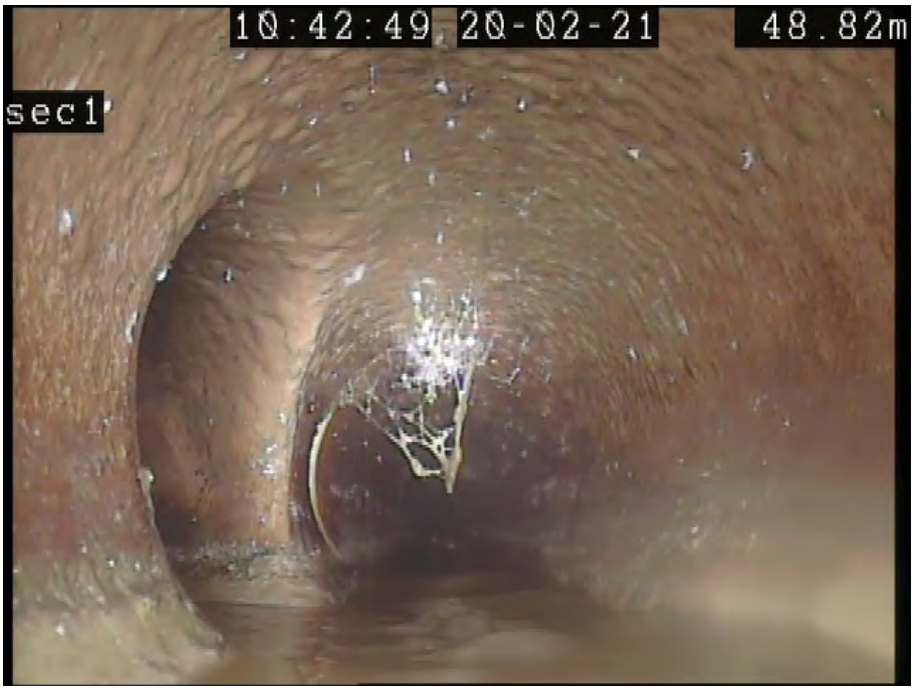

Photo: 1_1_7_A.jpg
48.9m, Junction, at 9 o'clock, diameter 150mm



Photo: 1_1_5_A.jpg
54m, Junction, at 3 o'clock, diameter 150mm

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Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**1**	**Driveway**



Photo: 1_1_6_A.jpg
64m, Finish node type, manhole reference number: IC1

Aquatech Drains Ltd
Solway Ave
Street : Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Inspection report

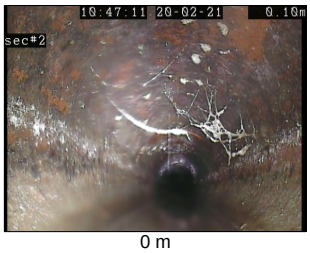
Date :	Job number :	Weather :	Operator :	Section number :	PLR SUFFIX:
27/02/2021		**no rain or snow**	**Jason**	**2**	**Driveway**
Weather	Vehicle :	Camera :	Preset :	Cleaned :	Operator :
no rain or snow				**no**	**Jason**

Place :	**lancing**	Location details:		U/S MH :	**IC3**
Road :	**Gravelly Crescent**	Catchment:		U/S Depth :	
Location	**Property with buildings**	Tape number :		D/S MH :	**IC2**
Inspection	**IC2 (U/S) IC3**	Pipe Length		D/S Depth :	

Use:	**Foul**	Pipe shape :	**Circular**
Year laid :	**1970**	Pipe size :	**150 mm**
Purpose :	**Sample survey to determine asset condition**	Pipe material :	**Vitrified clay**
Total length :	**25.20 m**	Lining :	**Vitrified clay**

Comment :

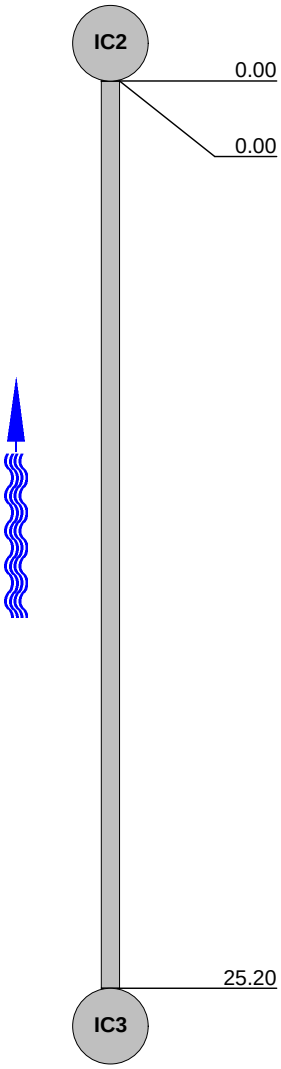
1:210 **Position** **Observation**



0 m



25.2 m



0.00 Start node type, manhole, reference number : IC2

0.00 Water level, 10% of the vertical dimension

25.20 Finish node type, manhole reference number: IC3

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**

Aquatech Drains Ltd
Solway Ave
Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**2**	**Driveway**



Photo: 3_3_10_A.jpg
0m, Water level, 10% of the vertical dimension



Photo: 3_3_11_A.jpg
25.2m, Finish node type, manhole reference number: IC3

Aquatech Drains Ltd
Solway Ave
Street : Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Inspection report

Date :	Job number :	Weather :	Operator :	Section number :	PLR SUFFIX:
27/02/2021		**no rain or snow**	**Jason**	**3**	**Driveway**
Weather	Vehicle :	Camera :	Preset :	Cleaned :	Operator :
no rain or snow				**no**	**Jason**

Place :	**lancing**	Location details:		U/S MH :	**IC4**
Road :	**Gravelly Crescent**	Catchment:		U/S Depth :	
Location	**Property with buildings**	Tape number :		D/S MH :	**IC2a**
Inspection	**IC2a (U/S) IC4**	Pipe Length		D/S Depth :	

Use:	**Foul**	Pipe shape :	**Circular**
Year laid :	**1970**	Pipe size :	**150 mm**
Purpose :	**Sample survey to determine asset condition**	Pipe material :	**Vitrified clay**
Total length :	**12.40 m**	Lining :	**Vitrified clay**

Comment :

1:105	Position	Observation	
IC2a	0.00	Start node type, manhole, reference number : IC2a	 0 m
	0.00	Water level, 10% of the vertical dimension	
	2.80	Other obstacles, other , from 3 to 7 o'clock, 35% cross-sectional area loss	 0 m
	2.90	General remark	
	4.70	Attached deposits, grease, from 4 to 8 o'clock, 25% cross-sectional area loss	 2.8 m
	7.80	Attached deposits, grease, from 4 to 7 o'clock, 25% cross-sectional area loss	 2.9 m
IC4	12.40	Finish node type, manhole reference number: IC4	 4.7 m

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	**0**	**0**	**0**	**1**	**3**	**10**	**1.61**	**20**	**5**

Aquatech Drains Ltd
Solway Ave
Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**3**	**Driveway**



Photo: 4_4_12_A.jpg
0m, Start node type, manhole, reference number : IC2a



Photo: 4_4_13_A.jpg
0m, Water level, 10% of the vertical dimension

Aquatech Drains Ltd
Solway Ave
Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**3**	**Driveway**



Photo: 4_4_14_A.jpg
2.8m, Other obstacles, other , from 3 to 7 o'clock, 35% cross-sectional area loss



Photo: 4_4_16_A.jpg
2.9m, General remark

Aquatech Drains Ltd
Solway Ave
Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**3**	**Driveway**



Photo: 4_4_17_A.jpg
4.7m, Attached deposits, grease, from 4 to 8 o'clock, 25% cross-sectional area loss



Photo: 4_4_18_A.jpg
7.8m, Attached deposits, grease, from 4 to 7 o'clock, 25% cross-sectional area loss

Aquatech Drains Ltd
Solway Ave
Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**3**	**Driveway**



Photo: 4_4_19_A.jpg
12.4m, Finish node type, manhole reference number: IC4

Aquatech Drains Ltd
Solway Ave
Street : Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Inspection report

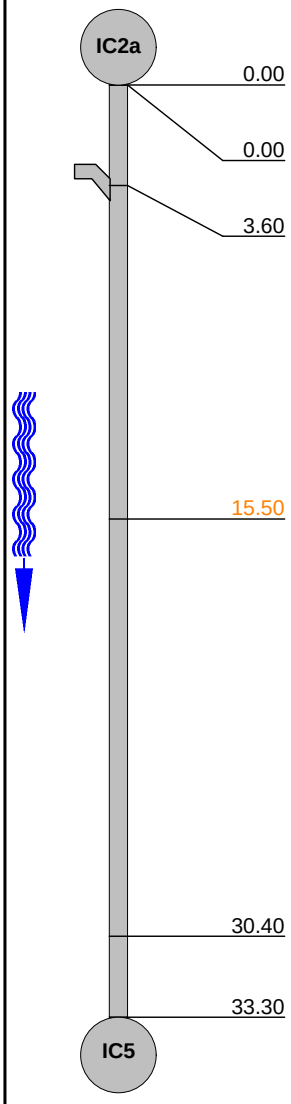
Date :	Job number :	Weather :	Operator :	Section number :	PLR SUFFIX:
27/02/2021		**no rain or snow**	**Jason**	**4**	**Driveway**
Weather	Vehicle :	Camera :	Preset :	Cleaned :	Operator :
no rain or snow				**no**	**Jason**

Place :	**lancing**	Location details:		U/S MH :	**IC2a**
Road :	**Gravelly Crescent**	Catchment:		U/S Depth :	
Location	**Property with buildings**	Tape number :		D/S MH :	**IC5**
Inspection	**IC2a (D/S) IC5**	Pipe Length		D/S Depth :	

Use:	**Foul**	Pipe shape :	**Circular**
Year laid :	**1970**	Pipe size :	**150 mm**
Purpose :	**Sample survey to determine asset condition**	Pipe material :	**Vitrified clay**
Total length :	**33.30 m**	Lining :	**Vitrified clay**

Comment :

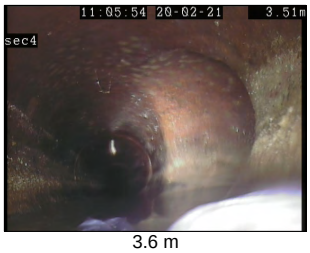
1:270 **Position** **Observation**



Position	Observation
0.00	Start node type, manhole, reference number : IC2a
0.00	Water level, 20% of the vertical dimension
3.60	Junction, at 3 o'clock, diameter 150mm
15.50	Attached deposits, grease, from 3 to 8 o'clock, 15% cross-sectional area loss
30.40	Water level, 35% of the vertical dimension
33.30	Finish node type, manhole reference number: IC5



0 m



3.6 m



15.5 m



30.4 m



33.3 m

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	**0**	**0**	**0**	**1**	**1**	**2**	**0.06**	**2**	**3**

Aquatech Drains Ltd
Solway Ave
Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**4**	**Driveway**



Photo: 5_5_21_A.jpg
0m, Water level, 20% of the vertical dimension



Photo: 5_5_22_A.jpg
3.6m, Junction, at 3 o'clock, diameter 150mm

Aquatech Drains Ltd
Solway Ave
Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**4**	**Driveway**



Photo: 5_5_23_A.jpg
15.5m, Attached deposits, grease, from 3 to 8 o'clock, 15% cross-sectional area loss



Photo: 5_5_25_A.jpg
30.4m, Water level, 35% of the vertical dimension

Aquatech Drains Ltd
Solway Ave
Brighton
Tel: 01273 933705
Fax:
Email: Jason@aquatechdrains.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
lancing	**Gravelly Crescent**	**27/02/2021**	**4**	**Driveway**



Photo: 5_5_24_A.jpg
33.3m, Finish node type, manhole reference number: IC5

Report Information

This page can be edited to contain any information you feel is necessary.

A disclaimer.

Any terms and conditions

55400_2 DRAINAGE SCHEDULE

REF. NO.	USE	COVER LEVEL	INVERT LEVEL	COVER SIZE	CHAMBER SIZE	MATERIAL	ENTRY	ACCESS	CONDITION OF COVER	CONDITION OF CHAMBER	CONDITION OF BENCHING	A PIPE INVERT LEVEL	B PIPE INVERT LEVEL	PHOTO REFERENCE	REMARKS
0001	FWMH	3.46	2.53	520x520	600x570	B	T	N	S	S	S	2.54	2.54	IMG014	SOUTHERN WATER REFERENCE NUMBER 7104.
0002	FWMH	3.48	2.55	520x520	600x570	B	T	N	S	S	S	2.56	2.56	IMG013	--

Schedule Codes

Drainage; FWMH–Foul Water Manhole; SWMH–Surface Water Manhole; CP–CatchPit; SA–SockAway; FWPS–Foul Water Pumping Station; SWPS–Surface Water Pumping Station; SWOF–Storm Water OverFlow, G–Gully, KO–Kerb Outlet; LH–Lamp Hole; RE–Rodding Eye; RO–Road Gully; IN–INlet; OUT–OUTfall

Services; BTIC–British Telecom Inspection Chamber; BTMH–British Telecom Manhole; CATV–Cable TeleVision; ECP–Electric Cable Pit; EJB–Electric Joint Box; ER–Earth Rod FH–Fire Hydrant; GV–Gas Valve; IC–Inspection Chamber; NRV–Non Return Valve; PRV–Pressure Reducing Valve; SC–Stop Cock; SV–Sluice Valve TLIC–Traffic Light Inspection Chamber; UGST–UnderGround Storage Tank; UN–UNidentified cover; WM–Water Meter

Ref. No. prefix; foul water–SD_...; surface water–SD_...; british telecom–BT_...; cable tv–TV_...; compressed air–CA_...; cctv–CC_...; multiuser–MU_...; electric–EL_...; service duct–SD_...; unidentified–UN_...; data–DA_...; fuel–FU_...; heating–HT_...; gas/low pressure–GL_...; gas/medium pressure–GM_...; gas/high pressure–GH_...; towns/potable water–TW_...; raw water–RW_...; fire main–FM_...; pumped water–PW_...; recycled water–CW_...;

Material; B–Brick; P–Pre-cast concrete sections; S–Segmental; I–In-situ concrete; PVC–PolyVinylChloride; O–Other(specify in remarks)

Entry; T–Top entry; S–Side entry; N–None

Access; I–Irons; L–Ladder; S–Stairs; O–Other(specify in remarks); N–None

Slab/Taper; R–Reducing slab; T–Tapered slab; A–brick Arch; N–None

Pipe material; VC–Vitrified Clay; CO–COncrete; PF–Pitch Fibre; CI–Cast Iron; PVC–PolyVinylChloride; O–Other(specify in remarks)

Levels information; CL–Cover Level; SL–Soffit Level; IL–Invert Level; WL–Water Level; FL–Floor Level

Cover condition; G–Good; S–Satisfactory; A–Attention required

Chamber condition; G–Good; S–Satisfactory; A–Attention required

Benching condition; G–Good; S–Satisfactory; A–Attention required

Notes for underground drainage

For additional information relative to each manhole see the drainage schedule, the main invert level is shown on the drawing as the 'A' pipe. All other invert levels follow an alphabetical sequence, in a clockwise direction from the outlet 'A' pipe.



Inferred depth positions

Sewer/duct	Metallic service	GPR target
inline EM (1.20) at chamber 1.20d	inline EM (1.20) at chamber 1.20d	inline [1.20]

BSI PAS128 Quality & Confidence Levels

QA = Verified by Inspection-trial pit, vacuum Excavation, Inspection Chamber/Manhole
QB1 = Detected service with GPR & EML - High confidence position and depth
QB1P = Detected service with GPR & EML (post processed GPR data)
High confidence position and depth
QB2 = Detected service with either GPR or EML
Medium confidence position and depth
QB2P = Detected service with either GPR or EML (post processed GPR data)
Medium confidence position and depth
QB3 = Detected service with GPR or EML - No depth/poor signal
QB3P = Detected service with GPR or EML (post processed GPR data) - No depth/poor signal
QB4 = Assumed route - Not detected /interpreted route
QC = Record data located to Street Furniture/surface features - not detected
QD = Record data, service not located/not detected
QA is inferred at all Mhs ICs etc. unless otherwise stated.
-Connections between manholes have been assumed straight and labelled as **QB4**, unless proven otherwise by sonde location and annotated accordingly
-All stand alone GPR reflections of unknown identity are inferred **QB2/QB2P** and are not individually annotated.

Type of survey

Topographical ☐ PAS 128 ☑ Drainage ☑ Services ☑

Notes for underground services

I A combination of electromagnetic techniques & ground penetrating radar have been used, as appropriate, in the location of underground services and drains.
The results are not infallible and trial excavations should be carried out to confirm service identification, positions and particularly depths, where these are critical.
Although all reasonable effort has been made in searching available record drawings, the completeness of the underground services information cannot be guaranteed.
II Where no cover level is available, depths to pipe inverts are shown thus; IL 0.95d
III Depths of services at inspection chambers, where possible, are shown thus; 0.95d
IV Depths obtained electronically are generally to the centre of the service and are shown thus; (0.80)
V Number of duct ways, where known, shown thus; 2W
VI Pipe sizes, which cannot be obtained by visual survey, are taken from record drawings/marker plates where available.
VII Cable routes shown as a single line may actually consist of many cables.
VIII Electric cable routes shown are assumed to be LV unless otherwise annotated.
IX Information taken from records is suffixed thus; (R)
X Drainage pipe sizes and invert levels have been determined without man-entry into chambers. Every effort has been made to correctly obtain this information, however, due to non-entry into chambers and if deemed project critical, this information should be verified before works commence.
XI To assist with clarity of presentation, services and drains have been extended within buildings.
XII Three or more G.P.R. reflections are required to be shown as an assumed linear service.

Key for underground services

Foul/Combined water drain
Foul/Combined drain 300Ø and above
Surface water drain
Surface water drain 300Ø and above
Pumping main
End of trace EOT
LV cables
HV cables
EHV cables EHV
Band of electrical cables
Earthing strap E E
Gas low pressure
Gas medium pressure
Gas high pressure
Water
Telephone
Catv TV TV
Multiuser ducts MU MU
End of trench scar EOSc
Unidentified
GPR reflection GPR GPR
Overhead service o/h o/h
Characteristic change
Survey Boundary
Service annotations (0.90) (EM depth) [0.90] (GPR depth) QB2P (confidence)
BSI PAS128 Quality & Confidence Level change QB1 // QB3

Where chamber extents are significantly greater than the cover size, their approximate extents are shown thus;
Inaccessible areas, shown thus;
Inaccessible areas due to vegetation, shown thus;
Inaccessible areas for GPR due to terrain, (Dark Ground) shown thus;

Abbreviations for underground services

AC	Asbestos cement	Mkr	Marker post
ALK	Alkathene	NFI	No further information
AV	Air valve	NL-A	Not located - route assumed
BD	Back drop	NL-I	Not located - route plotted from on-site information
BH	Bore hole		
Br	Brick	NL-R	Not located - route plotted from records
BTIC	British Telecom inspection chamber	NL-T	Not located - plotted from visible trench scar detail
BTMH	British Telecom manhole		
CA	Compressed air	NRV	Non return valve
CATV	Cable tv	NS	No signal
CCTV	Closed circuit television	o/h	Overhead
CH	Coal hole	PE	Polyethylene
CI	Cast iron	pe	Pot ended
CL	Cover level	PR	Pipe riser
CM	Cable marker	PRV	Pressure reducing valve
CONC	Concrete	PVC	Polyvinyl chloride
C/PIT	Catch pit	RE	Rodding eye
CU	Copper	RG	Road gully
CR	Cable riser	RS	Road sign
DB	Direct buried	RWP	Rain water pipe
DI	Ductile iron	S/A	Soakaway
ECP	Electric cable pit	SC	Stop cock
EHV	Extra high voltage	SE	Side entry
EJB	Electric joint box	SI	Spun iron
EP	Electricity pole	SL	Soffit level
ER	Earthing rod	SP	Soil pipe
ES	Earthing strap	ST	Steel
FH	Fire hydrant	SV	Stop valve
FL	Floor level	SVP	Soil vent pipe
FLT	Flood light	SW	Sink waste
F/O	Fibre optic	TCB	Telephone call box
FP	Feeder pillar	T/I	Trapped inlet
G	Gully	T/O	Trapped outlet
GM	Gas meter	TP	Telephone pole
GPR	Ground penetrating radar	UST	Underground storage tank
GV	Gas valve	UTL	Unable to lift
HV	High voltage	UTF	Unable to find
IC	Inspection chamber	UTGA	Unable to gain access
IL	Invert level	UTR	Unable to rod
Kv	Kilo volts	UTS	Unable to survey
LD	Land drain	UTT	Unable to trace
LH	Lamp hole	VC	Vitrified clay
LP	Lamp post	VP	Vent pipe
LPG	Liquid petroleum gas	WL	Water level
LV	Low voltage	WM	Water meter
MDPE	Medium density polyethylene	WO	Wash out
MH	Manhole		

REV NO	REV NOTE	DATE	SIGNED	CHECKED

Unit 5
Braunston Business Park
London Road
Braunston
Daventry
Northants. NN11 7HB

Subsight SURVEYS LIMITED
T: 01788 891721
E: mail@subsight.co.uk
W: www.subsight.co.uk

Client: Adur & Worthing Councils

Title: Location of Underground Services and Drains
Gravelly Crescent
Lancing

Surveyed	AW/RK	Date	February 2021
Drawn	AW	Scale	1:200 @ A0
Checked	MPW		

Drawing No. 55400_2 Rev.

APPENDIX J – SOUTHERN WATER CORRESPONDANCE

from Southern Water

Mr Tom Butler
HOP Consulting
Hop House
41 Church Road
West Sussex
BN32BE

Your ref

Our ref
DSA000000285

Date
22nd July 2021

Contact

Tel
0330 303 0119

Email
Developer.Services@southernwater.co.uk

F.A.O. Mr Tom Butler

Dear Sir,

Diversion of Sewers – Section 185, Water Industry Act 1991
Development: Garage Block 1 to 17 Odd, Gravelly, Crescent, Lancing, West Sussex, BN15 9EG.

I refer to the proposed public sewer diversion at the above site and I thank you for your email dated 20th July 2021. I am pleased to confirm that your proposals shown on drawing number 8916/306 Rev-C is acceptable.

The application has been processed and a total fee of £21,623.40 is required.

In accordance with clause 1 of the agreement, a refundable performance deposit of £20,700.00 is included in the above fee to cover the cost of the works.

The above offer remains open for a period of three months from the date of this letter. If the offer is not accepted within three months Southern Water Services reserves the right to recalculate the cost of the works.

Please complete the Solicitors/Landowners form and return it with your cheque and the remittance slip to the address provided on the slip. Please make cheques payable to **Southern Water Services Ltd**. The drawings requested at point O to Q on this form below are required for preparation of the legal agreement

Legal Agreement

The amount of time that it will take to complete the standard Diversion Agreement is dependent upon how quickly the document can be approved by your legal representative and executed. However, please note that if an easement is required to protect the diverted sewer, the registration of the Deed of Grant at the Land Registry may cause further delay, as will any requests from your solicitor to amend the standard documents. **Southern Water will not permit connection to the existing sewer until all monies have been paid and the legal agreement has been signed**. You may start work on site and lay the diversion

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX Registered in England No. 2366670

dry, but this will be at your own risk and Southern Water will not adopt the work if it does not comply with sewers for adoption 6th edition. Legal fees will be separately invoiced by Southern Water's solicitor and must be paid before the agreement is engrossed.

A copy of a typical legal agreement for information purposes only can be obtained from this office.

Refund of the Performance Deposit

The refund will be issued in two staged payments.

Stage 1. (80%) released when

- The Legal Agreement and Deed of Grant of Easement (if required) have been signed.
- We have received in this office 3 sets of 'As constructed Drawings' of the works in accordance with the attached requirements.
- A pre maintenance inspection of the works has satisfactorily been completed by our clerk of works. A copy of the above drawings will be required before the inspection.

A Provisional Certificate will be issued by this office signifying that the works will go into a maintenance period for one year from the date of the above inspection. At the same time Southern Water's finance team will be instructed to issue the 1st stage payment.

Stage 2. (20% plus accrued interest) released when

- A final inspection has satisfactorily been completed by our clerk of works**.**
- A Final Certificate will be issued by this office.

At both stages it will take up to 28 days from the date of either the provisional or the final certificate to receive the refund.

I refer you to Southern Water Health and Safety Advisory which can be viewed in the Developer and Builders section of the Southern Water website as the link below:
https://www.southernwater.co.uk/health-safety-advisory

This approval is given on the basis that you will review this Advisory and take the necessary actions with regards to Health and Safety.

Please do not hesitate to contact me if you require any further information.

Here at Southern Water, we are keen to use feedback from our customers to understand what you think we do well and where we can do better. We would be grateful if you completed this quick survey to inform our continuous improvement.

https://www.southernwater.co.uk/developing-building/feedback

Yours sincerely,



Ashley Marshman
Head of Business Channels
Business Channels

S185 Water Industry Act 1991 Sewer Diversion

Our ref: **DSA000000285** **Date:** **22nd July 2021**

Location: **Garage Block 1 to 17 Odd, Gravelly, Crescent, Lancing, West Sussex, BN15 9EG**

I/we enclose a cheque to the value totalled below:

Vetting & Administration Fee	£	563.00	325050-	A-DEVSRV-S185
VAT	£	112.60		
Sub Total	£	675.60		
Supervision Fee	£	517.50	325050-	A-DEVSRV-S185
VAT	£	103.50		
Sub Total	£	621.00		
Performance Deposit	£	20,700.00	235230 - Y0112 - SUSXW-	658
Sub Total	£	21,996.60		
Less				
Initial Application Fee	£	311.00		
VAT	£	62.20		
Sub Total	£	373.20		
Total (Incl VAT)	**£**	**21,623.40**		

*Please make the cheque payable to **Southern Water Services Ltd**

For us to process payment this remittance advice sheet needs to be completed and returned with your payment. Should this not be provided this will cause delays in processing your payment.

Applicant details:
Name: Mr Tom Butler
Address:
HOP Consulting
Hop House
41 Church Road
West Sussex
BN32BE
Contact tel: 07789824334/ 01273 223900

Payer details if different:
Name:
Address:

Contact tel:

Signed…… Print name: ……

Company: …… Position: ……

Date: ……

Landowner/Developer/Solicitor Details

If you wish to proceed with the diversion, please complete the form (**block capitals)**

A	Landowner's Name.	
B	Landowner's Address.	
C	Developer's Name (If Different from A).	
D	Developer's Address (If Different from B).	
E	Landowner's Solicitors Name	
F	Landowner's Solicitors Email	
G	Landowner's Solicitors Address.	
H	Developer's Solicitors Name (if different from E).	

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I	Developer's Solicitors Email (if different from E).	
J	Developer's Solicitors Address (If different from E).	
K	Development Address.	
L	Construction Period of Works (in Weeks)	
M	Drawing Numbers	

Please supply the following information.

N	Method statement dealing with flows when making connections to the existing sewer.
O	<u>WHERE NO EASEMENT IS REQUIRED</u> 2 Copies of the drainage layout drawing to show: - • Abandoned Sewer - RED, New Sewer - BLUE, Site Border- GREEN. • Scale. • North Point. <u>WHERE AN EASEMENT IS REQUIRED</u> 2 Copies of the drainage layout drawing to show: - • Abandoned Sewer - RED, New Sewer - BLUE, Site Border- GREEN. • Scale. • North Point • Easements coloured solid yellow with the easement width dimensioned.
P	2 Copies of all other drawings (If applicable).
Q	2 Copies of a separate 1:1250 location plan of the site, showing the site border in GREEN
R	Return attached remittance note with the payment cheque, made payable to **Southern Water Services Limited.**

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX Registered in England No. 2366670

Requirements for ‘As-Constructed’ Drawings

Section 104/185 Agreement

Drainage Layout Plan to include:

- Site boundary clearly marked in GREEN.
- Clearly defined plot boundaries, buildings, and floor levels
- The abandoned section of sewer only is coloured RED
- The diverted sewer section of sewer only is coloured BLUE.
- Pipe sizes, materials, and gradients.
- Manhole **cover and invert levels**
- Private drains/sewers/highway drains clearly marked but **not** coloured

Tom Butler

From: Kanagalingam, Nilani <Nilani.Kanagalingam@southernwater.co.uk>
Sent: 11 August 2022 12:25
To: Tom Butler
Cc: Jackie Strube; Emma Davies; Andy Keen; Dunn, Graham
Subject: RE: Daniel Close & Gravelly Crescent permeable paving objection

Hi Tom,

The permeable paving won't be a problem as per your drawing 15945-HOP-03-XX-DR-C-09100 -P13. However we will not accept surface water sewer below foul water sewer. Also we wouldn't compromise on 300mm clearance.

It is also worth noting that Southern Water requires minimum 1200mm top cover for any sewers in carriage ways or parking areas and minimum 900mm top cover on any grassed area.

Thank you

Kind Regards,

Nilani Kanagalingam BEng (Hons)
Technical Coordinator
Developer Services
Business Channels

M. 07922859245
T. 03303030119
W. southernwater.co.uk

From: Tom Butler <tomb@hop.uk.com>
Sent: 01 August 2022 17:05
To: Kanagalingam, Nilani <Nilani.Kanagalingam@southernwater.co.uk>
Cc: Jackie Strube <jackie.strube@adur-worthing.gov.uk>; Emma Davies <emma.davies@adur-worthing.gov.uk>; Andy Keen <AndyK@hop.uk.com>
Subject: RE: Daniel Close & Gravelly Crescent permeable paving objection

Hi Nilani,

Thanks for looking at this.

Regarding the permeable paving, the triangular area directly north of the houses is actually proposed to be unpaved if this helps the discussions with your team. Please see attached revised drawing.

I believe an incorrect cover level was shown on the proposed foul manhole on the sewer that crosses the site east west. The correct IL is 3.65 (now corrected) based on existing levels which gives the existing sewer 640mm cover. For this reason, along with the topography, means that it is not feasible to run any surface water drains over this sewer while providing sufficient cover and the 300mm clearance. This effectively splits the site in two and we are unable to discharge to sewers south of the site and the infiltration rates and space for soakaways in the south are negligible.

We can potentially run the surface water under the foul sewer but deeper to give the 300mm gap. This will cause us problems with the AWDC drainage officer but may be possible. Alternately, I would propose that we lower the surface water pipe slightly giving a 180mm gap between the pipes but install a 100mm concrete slab over the

APPENDIX K – ADUR HOMES HOUSING NEED LETTER

ADUR DISTRICT COUNCIL

AdurHomes
PUTTING RESIDENTS AT THE HEART OF WHAT WE DO

Adur Homes
Portland House
44 Richmond Road
Worthing
West Sussex, BN11 1HS
www.adur-worthing.gov.uk/adur-homes

Neal Thompson
ROBINSON ESCOTT PLANNING LLP
Downe House,
303 High Street
Orpington
BR6 0NN

Date: 05/10/2022
Service: Tenancy Services
Tel: 01273 263030
tenancy.services@adur-worthing.gov.uk

Our Reference: Ground Floor Bedrooms - Gravelly Crescent

Dear Neal

We have been asked to comment on the proposals for ground floor and wheelchair accessible homes at Daniel Close.

There is a strong demand for wheelchair accessible and adaptable properties in the Adur District area, with a high level of residents with disabilities currently waiting for new accessible properties or adaptations to existing homes. For some individuals and families with acute needs it is not possible to adapt their existing homes to the level of accessibility that they require and it is not safe or practical to be re-housed in flats with lifts.

For many residents the only practical accommodation is that with good, ground floor level-access with a bedroom, kitchen and adaptable bathroom on the ground floor and a wheelchair accessible car parking space within close proximity. At any given time there may be around 85 households waiting for one bedroom, level access homes.

Adur District Council's New Affordable Homes programme seeks to address these needs where possible and has identified one potentially wheelchair accessible bungalow at Gravelly Crescent that could have fully accessible facilities on the ground floor which would meet the needs of individuals and couples currently waiting on the housing register.

Yours Sincerely

Amanda Eremie
Housing Needs Manager
Adur Homes