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1.0 INTRODUCTION

- 1.1 This surface water drainage statement has been prepared by Atelier T&B Limited ('Atelier T&B') on behalf Mr & Mrs Manning in support of a full planning application made to Wokingham Borough Council ('Wokingham Council') relating to the site at 149 Victoria Road, Wargrave, Reading, RG10 8AG ('the site').
- 1.2 Planning permission is sought for the construction of a detached single storey dwelling, double garage and associated works at 149 Victoria Road, Wargrave, Reading, RG10 8AG.
- 1.3 The objectives of this report are:
- To detail a suitable strategy for the management of foul and surface water generated from the proposed development allowing for future climate change.
 - To satisfy the local planning authority that the most sustainable foul and surface water drainage solutions have been considered, in line with Environment Agency guidance, The Building Regulations (Document H 2002) and government legislation such as the Flood and Water Management Act 2010 (Defra) and The National Planning Policy Framework (NPPF 2023 & FRG PPG 2014) and the local surface water management plan.

2.0 SITE CONTEXT

Site Location and Description

- 2.1 149 Victoria Road is located within a residential street in the village of Wargrave, which lies in the civil parish of Wargrave, Wokingham Borough, Berkshire. The site is situated to the east of the village centre, accessed from School Lane, and benefits from close proximity to a range of local services and facilities including shops, schools, and community amenities.
- 2.2 The property is located within Wargrave, which is identified by Wokingham Borough Council as a *Modest Development Location*. This designation supports small-scale, sustainable growth within established settlements.
- 2.3 The site is well served by sustainable transport connections. Wargrave railway station, on the Henley Branch Line, is within walking distance and provides direct services to Twyford, with onward connections to London Paddington and the wider national rail network. By road, the settlement has convenient access to the A4 and A404(M), offering direct links to Reading, Maidenhead, and the South East region more generally.
- 2.4 Victoria Road is characterised by residential development, with a mixture of detached and semi-detached properties generally set back from the street. The area forms part of a well-established settlement pattern, where dwellings are of a comparable scale and contribute to a coherent residential environment.
- 2.5 The prevailing character of the built form is defined by traditional brick properties dating from the late Victorian and early Edwardian periods. However, more recent infill and replacement development is also evident, which has introduced a variety of architectural styles into the street scene while maintaining its overall residential character.

3.0 SURFACE WATER DRAINAGE STRATEGY

- 3.1 The National Planning Policy Framework (NPPF) requires that developments do not exacerbate flood risks both to the development site and to offsite parties and land, which means there is a need to control surface water drainage and overland runoff to ensure there are no increases in peak rates and volumes of runoff as a result of the development.
- 3.2 Environment Agency guidance and government legislation such as the Flood and Water Management Act (Defra 2010) require surface water drainage strategies for new developments to be in accordance with the ideals of 'sustainable development' via the provision of Sustainable Drainage Systems (SuDS).
- 3.3 SuDS are more sustainable than conventional drainage methods because they can mitigate many of the adverse effects of urban stormwater runoff on the environment. This can be achieved through reducing peak runoff rates and volumes to sewer networks and watercourses, reducing the risk of downstream flooding.
- 3.4 The Building Regulations Document H (2015) and The SuDS Manual CIRIA 753 (2015) detail the appropriate hierarchy of potential methods for disposing of surface water from a development:
1. Discharge to ground via infiltration.
 2. Discharge to a surface water body such as a watercourse.
 3. Discharge to a surface water sewer.
 4. Discharge to a combined sewer.
- 3.5 Following a review of the permeable geology, groundwater levels and soil permeability at the site, infiltration as a method of disposing of the surface water runoff generated from the proposed development is considered to be feasible, subject to infiltration testing to BRE365 to confirm soil permeability rates.
- 3.6 Infiltration is a sustainable drainage technique that enables stormwater to be managed within the site rather than discharging offsite into a watercourse or sewer network. This method of disposal improves the quality of the stormwater runoff while maintaining the existing natural hydrological drainage regime and the pre-development rates of runoff and volumes.
- 3.7 All SuDS will be sized to manage the runoff from the 1 in 100 rainfall event (1% AEP), plus an additional 45% allowance for predicted future

effects of climate change (in accordance with EA recommendations up to the year 2115).

- 3.8 The proposed surface water drainage strategy offers a sustainable, safe, and robust system that will afford complete flood risk protection to the occupants of the proposed dwellings and the existing properties and land within the vicinity of the site. This strategy replicates the natural drainage regime for the greenfield site and ensures that the peak rate and volume of surface water runoff will be no greater than the existing greenfield runoff rate for the site for all rainfall events up to the 100 year +50% rainfall event. This ensures compliance with the Policy NE15 'Flood Risk and Water Management' of the Chichester District Council Local Plan.

SuDS Selection

- 3.9 A range of SuDS types and components have been assessed to identify the suitability for use at this development in terms of the requirements to manage water quality, water quantity and amenity provision within the constraints and opportunities of the site.

Table 1 – SuDS Selection Matrix

SuDS Type	Description	Suitable for this site	Comments
Green/Blue Roofs	Green roofs comprise a multi-layered system that covers the roof of a building with vegetation cover over a drainage layer. They are designed to intercept and retain rainfall, reducing the volume of runoff and attenuating peak flows.	X	Living roofs and podium deck (blue roofs) could not be incorporated into this development.
Rainwater Harvesting	Re-using rainwater for non-potable purposes such as irrigation and toilet flushing.	√	Rainwater harvesting techniques can be utilised for non-potable (grey-water) re-use subject to factors such as spatial constraints, whole-life costs, and maintenance burden. The watering of landscaped areas by connecting RWP's to planters can easily be achieved at this site to reduce potable water demand at the development.
Soakaways	Soakaways provide stormwater attenuation. Stormwater treatment and groundwater recharge.	√	Subject to BRE365 infiltration testing and groundwater level confirmation.
Filter Strip / Trenches / Swales	Filter strips are linear, or grassed or vegetated strips of land / channels designed to accept runoff as overland sheet flow from impermeable surfaces usually located adjacent to road or parking areas and used to treat infiltrated or convey runoff.	√	There is the potential to use such methods on site.
Permeable Paving	Pervious pavements provide a pavement suitable for pedestrian and vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. The water is temporarily stored before infiltration to the ground, reuse, or discharge to a watercourse or other drainage system.	√	Permeable surfacing with stone (Type 3 OGCR 4/20mm) sub-base would be suitable for this development. Testing to BRE365 is required to confirm.
Bio Retention	Bioretention areas are shallow landscaped depressions which are typically under-drained and rely on engineered soils and enhanced vegetation and filtration to remove pollution and reduce runoff downstream. They are aimed at managing and treating runoff from frequent rainfall events.	X	Not practical on this development.

Ponds / Basins	Ponds can be used to store and treat water. 'Wet' ponds have a constant body of water and run-off is additional, while 'dry' ponds are empty during periods without rainfall. Ponds can be designed to allow infiltration into the ground or to store water for a period of time before discharge.	√	This is a feasible option on this site and is a recommendation of the ecologist. To be investigated further at a later stage.
Underground Storage	Underground Concrete or Geocellular Tanks to reduce and attenuate peak flows.	√	The use of underground storage to attenuate and infiltrate runoff would be suitable for this development.

- 3.10 It is proposed that the surface water runoff from the roof is drained into a cellular soakaway. The proposed hardstanding will be surfaced with permeable paving with runoff infiltrating into the stone sub-base. This sub-base provides attenuation and treatment to the runoff prior to infiltrating into the underlying soils.

Pollution Prevention and Groundwater Protection

- 3.11 It is important that the development of this site does not adversely affect the existing hydrological conditions and impact the quantity and quality of runoff from the site. As such, all surface water runoff from impermeable areas at this development will receive an appropriate level of treatment to remove hydrocarbons and other contaminants prior to discharge from the site. This ensures compliance with Policy NE15 '*Water Management and Water Quality*' of the Chichester District Council Local Plan.
- 3.12 In terms of water quality, the proposed surface system offers a suitable level of mitigation in accordance with the Environment Agency pollution prevention guidance GP3, CIRIA C753 and DEFRA guidance.
- 3.13 The pollution hazard of surface water runoff from residential roofs is very low and the hazard of surface water runoff from residential hardstanding (car parking), and low-traffic roads (e.g. cul-de-sacs, home zones, general access roads) is low.
- 3.14 The CIRIA SuDS Manual 2015 details an approach for establishing the hazard posed by the intended land use activities and the extent to which the proposed SuDS components can reduce and mitigate the contamination risk to the receiving waterbody.
- 3.15 Referring to Table 26.2 – '*Pollution hazard indices for different land use classifications*' the proposed development and land use results in a low pollution hazard, therefore a 'Simple Index' method can be used to make a qualitative assessment of the proposed SuDS management.

Table 2 – Table 26.2 – ‘Pollution hazard indices for different land use classifications’ CIRIA C753, 2015

TABLE 26.2 Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	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

- 3.16 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index that equals or exceeds the pollution hazard index:

Total SuDS mitigation index $\geq$ pollution hazard index
For the development site: TSS = 0.5, Metals = 0.4,
Hydrocarbons = 0.4

Table 3 – Table 26.4 – ‘Indicative SuDS mitigation indices for discharges to groundwaters’ CIRIA C753, 2015

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater				
Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates ¹	TSS	Metals	Hydrocarbons	
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.6 ⁴	0.5	0.6	
A soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.3	0.3	
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.4	0.4	
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.7	0.6	0.7	
Bioretention underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.8 ⁴	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 inflow concentrations relevant to the contributing drainage area.			

- 3.17 The proposed development surface water drainage system consists of the following SuDS components:

Primary Treatment – Permeable Pavement

Using mitigation Indices:

TSS = 0.7 which is > 0.5 therefore ok.

Metals = 0.6 which is > 0.4 therefore ok.

Hydrocarbons = 0.7 which is > 0.4 therefore ok.

- 3.18 Runoff from residential roofs is considered clean and therefore does not require further treatment prior to discharge via infiltration. Inspection chambers prior to the cellular soakaway will be catchpits to capture sediments and debris.

SuDS Management and Maintenance

- 3.19 It is envisaged that the maintenance liability of all private drainage infrastructure including permeable surfacing, cellular soakaways and ancillary drainage components will be managed by the client. A SuDS maintenance and management plan will be provided to the client (by others), detailing the location of all SuDS components and the ongoing maintenance requirements to ensure the optimum operation of the surface water drainage network in perpetuity.

Stormwater Pipework and Inspection Chambers

- 3.20 The key maintenance requirement for the upstream surface water drainage system includes the removal of sediments and debris from the system as required.
- 3.21 All stormwater pipework should be visually inspected a minimum of monthly for the first three months after installation and then a minimum of once a year. As road gullies are the first on the treatment train and susceptible to higher silt loadings, these will need to be inspected a minimum of monthly for the first three months after installation and then a minimum of every four months.
- 3.22 During this inspection identify any gully pots or pipes that require remedial maintenance such as removal of sediment, debris, leaves, and litter as required. This involves the removal of all protective covers and grids and the cleaning out of channels or gully pots by hand or with suitable jetting equipment. CCTV inspection is to be carried out and reviewed to confirm no root ingress from adjacent trees. Should roots be encountered then further investigation of the root barrier to be undertaken with the view to remedial action or replacement of the tree

barriers in accordance with the tree root barrier manufacturer's requirements and specifications.

- 3.23 During the inspections the general operation and structural integrity of all components should be recorded and repaired as required.

Permeable Block Paving

Routine Visual Inspections

- 3.24 A major benefit of permeable paving is the ability to quickly and cost-effectively assess that it is working correctly. This can be done by visually inspecting the block paving during heavy rainfall or following heavy rainfall. In general, routine visual inspections are all that is required to determine whether or not remedial maintenance is required. Any infiltration issues are shown up by water ponding on the surface of the paving. If ponding is not visible then remedial action is not required. In the unlikely event that individual blocks are damaged, these should be removed and replaced. Note that any materials which may clog up the permeable joints such as soil and mulch should not be stored on top of the paving without protection. *Frequency: Once a year during or following heavy rainfall.*

Remedial Maintenance for Ponding

- 3.25 If surface water ponding is visible, the joints should be manually brushed to remove moss, leaves, weeds, or other debris and agitate the jointing material. Brushing should be carried out in a manner which ensures that the paving blocks are not damaged, and that jointing material is not completely removed from the joints. Any jointing material which is removed must be replaced with 2-6mm grit in accordance with BSEN7533. Weeds tend not to establish in areas which receive regular trafficking by vehicles. If weeds are an issue they can be dealt with by using a weed killer containing Glyphosate. The manufacturer's instruction should always be followed, and adequate Health and Safety measures should also be put in place when handling chemicals. *Frequency: As and when required.*

Maintenance for Aesthetics of the Paving Blocks

- 3.26 Brushing with soapy water and a stiff brush will revive the colour of concrete block permeable paving. For a deep clean of the block surface, a pressure washer can be used to maintain the appearance and colour of the paving blocks. A pressure washer set to a light/medium pressure should be all that is required to remove general dirt and grime. High

pressure should not be used as this can damage the surface of the blocks. After the cleaning is finished ensure that any jointing material which has been removed is topped up with the correct material (2-6mm grit).

Maintenance During the Winter Months

- 3.27 Permeable paving generally requires less de-icing than conventional concrete block paving. The controlled use of conventional road de-icing techniques can be used without affecting the overall performance of the paving. Some de-icing salts may leave temporary discolouration after the thaw. Normal weathering should soon remove this discoloration from the paving. De-icing salts should be applied before snow or ice develops as this helps protect the concrete surface. It is unlikely that the levels of chloride in the ground will increase significantly by employing conventional de-icing techniques. *Frequency: As required during winter.*

Structural Maintenance

- 3.28 If a visual inspection has indicated that the individual blocks have been damaged, these blocks should be removed and replaced with new blocks. If rutting of the surface has occurred the area needs to be lifted and reinstated immediately as it may be a hazard to users. Any blocks which are removed need to be reinstated correctly ensuring that the correct sub-base, bedding, and jointing aggregates are used. The installation

SCHEDULE	ACTION	FREQUENCY
Routine visual inspection	Visually inspect the paving for ponding during heavy rainfall or following heavy rainfall.	Once a year
Remedial maintenance for ponding	Brush / vacuum joints Replace any lost jointing material	As required
Structural Maintenance	Replace damaged blocks Repair any rutting	As required
Maintenance for aesthetics of the joints	Brush / vacuum joints as required Replace any lost jointing material	Recommended once a year
Maintenance for aesthetics of the paving blocks	Brush with soapy water Light pressure wash	As required
Weed control	Treat with weedkiller	As required
Maintenance during the winter months	De-icing salts	As required during winter
WARNING !	Do not replace the jointing grit with kiln dried sand as this will block the joints and prevent infiltration. Do not store materials which may clog up the permeable joints such as soil and mulch on top of the paving.	

method should be in accordance with BS 7533 Part 3. In particular, the joints should be filled to the top to ensure structural integrity. Any geotextiles or membranes which are damaged during the reinstating process should be replaced. If the blocks are not damaged they can be lifted, cleaned, and re-used. *Frequency: As required.*

Cellular Attenuation Tank

- 3.29 The key maintenance requirement for the cellular attenuation tank will be the visual inspection of the internal units via built-in access chambers and an integral maintenance tunnel for the removal of sediment and jetting as required. A visual inspection of the impermeable geomembrane that envelopes the structure should also be carried out to check for structural integrity.
- 3.30 The attenuation tank is to be constructed from cellular units that allow internal CCTV and jetting access for inspection and maintenance. CCTV is to be reviewed to confirm no root ingress from adjacent trees. Should roots be encountered then further investigation of the root barrier is to be undertaken with the view to carry out remedial action or replacement of the tree barriers in accordance with the tree root barrier manufacturer's requirements and specifications. The built-in modular inspection unit and maintenance tunnels within the attenuation tank allow almost the entire volume of the structure to be inspected via CCTV camera and flushed through. A catchpit chamber is to be installed immediately upstream of the attenuation tank to reduce the amount of silt entering the tank and it will generally only be necessary to ensure that the upstream catchpits/silt traps are free from debris such as leaves or sediment.
- 3.31 It is recommended that the attenuation tank system be inspected no less frequently than at monthly intervals for the first 3 months and thereafter at 6 monthly intervals. In addition, it is suggested that the installation is inspected immediately following the first storm event, whenever this should occur post-installation.
- 3.32 It should also be noted that more regular inspections may be required should the catchpit(s) fill more frequently and/or if the initial site inspections reveal that the maintenance/cleaning will be required more regularly than at six-month intervals.
- 3.33 Flushing of the system can be achieved using a jetting system with 150 bar pump pressure (i.e. approximately 80 bar at the nozzle) at a discharge flow of 300l/min. The jet nozzle should be introduced to the system via the Inspection manhole and the integral inspection/maintenance tunnel.
- 3.34 Any silt & debris should be flushed to the inspection or catch-pit manhole and removed in accordance with correct waste management procedures.
- 3.35 The tanks have a design life of greater than 100 years; greater than the design life of the development. The current product is 'Wavin Aquacell

Prime'. If inspections show any degradation to the system than any replacement should have a void ration of >95%.

Cellular Systems – Operation and Maintenance Requirements

Maintenance Schedule	Action Required	Recommended Frequency
<i>Regular Maintenance</i>	<i>Inspect and identify any areas that are not operating correctly. If required, take remedial action.</i>	<i>Monthly for 3 months, then 6 monthly</i>
	<i>Debris removal</i>	<i>Monthly (and after large storms)</i>
<i>Remedial actions</i>	<i>Repair/rehabilitation of inlets, outlets, overflows and vents</i>	<i>As required</i>
<i>Monitoring</i>	<i>Inspect/ check all inlets, vents and overflows to ensure that they are in good condition and operating as designed</i>	<i>Annually and after large storms</i>
	<i>Inspect Bentomat fleece liner for signs of degradation.</i>	<i>Once a decade (replace after 100 years)</i>
	<i>Inspect root protection barrier for signs of degradation.</i>	<i>Once a decade (replace after 50 years)</i>

4.0 FOUL WATER DRAINAGE STRATEGY

- 4.1 Foul water generated by the development will be directed to the existing public foul sewer network currently serving the site, which has been established to accommodate the former three-bedroom dwelling.
- 4.2 The predicted peak foul sewer discharge from the proposed dwelling is not expected to exceed that of the existing three-bedroom property currently on the site.
- 4.3 Following the grant of planning permission, it is recommended that the details of the approved development are forwarded to the relevant water company to ensure they are aware of, and can accommodate, any additional capacity requirements arising from the proposal.