PATRICK PARSONS

CREATING PLACES FOR FUTURE GENERATIONS TO THRIVE

Flood Risk Assessment & Drainage Strategy Technical Note

Knoll House Hotel

Ferry Road, Studland, Swanage, BH19 3AH

for

Kingfisher Resorts Studland Ltd

11088

October 2022

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1.0 Introduction

1.1 Patrick Parsons have been commissioned by Kingfisher Resorts Studland Ltd to prepare a Flood Risk Assessment and Drainage Strategy to support their planning application for the development at Knoll House Hotel, Ferry Road, Studland, Swanage, BH19 3AH (hereinafter referred to as 'Site').

1.2 There has been change in the legislation and guidance relating to the functions and responsibilities of the Lead Local Flood Authority (LLFA). Under the new legislation (Flood and Water Management Act 2010), the LLFAs have become a statutory consultee within the development planning process advising Local Planning Authorities on local flood risk and the suitability of surface water drainage arrangements for developments.

1.3 Dorset County Council as the LLFA is the statutory consultee as well as the Local Planning Authority (LPA) for matters relating to the developments which have surface water or other local flooding impacts.

1.4 The scope of this document is to outline the proposed sustainable urban drainage and foul drainage strategy for the site and shall include but not limited to:

- A summary of environmental setting inclusive of the Site's geological and hydrogeological characteristics
- An assessment of the flood risk to the site
- A summary of existing site drainage arrangement and the present method of drainage for surface water and foul water from the site
- Calculation of the pre-development brownfield discharge rates
- An assessment of the final surface water discharge in line with Sustainable Urban Drainage Systems (SuDS) drainage discharge hierarchy; summary of final discharge method and calculation of final discharge rates
- An assessment of the surface water attenuation storage volumes to cope with high exceedance storms i.e., 1 in 100 years plus climate change
- An assessment of the applicability of Sustainable Urban Drainage Systems (SuDS)
- An assessment of foul peak flows and a proposal for foul water drainage strategy
- A SuDS management plan comprising relevant operation and maintenance plans for proposed SuDS components.

2.0 Location

2.1 The site is located off Ferry Road and currently contains approximately 30 buildings including a main hotel building which comprises of 106 guest bedrooms along with 57no. Staff bedrooms and ancillary facilities with associated car parking and landscaping. The topography varies significantly on site approximately 25m AOD at its highest point. With the gradient lower towards the north, south and significantly to the east leading to Ferry Road. The site has been redeveloped in a piecemeal fashion over the years and lacks a coherent form with informal parking across the site and a number of low quality ancillary buildings.

2.2 There are no rivers in close proximity however the site is within 350m of Studland Bay Beach.

2.3 There is an existing ditch (informal ditchcourse) along Ferry Road which discharges into the sea at Studland Bay and takes surface water from adjacent lands.

2.4 The site address is:
Knoll House Hotel,
Ferry Road,
Studland,
Swanage,
BH19 3AH

2.5 The Ordnance Survey Grid reference at the centre of the site is E: 403093 N: 83276.

Figure 1 Site Red Line Boundary

3.0 Policy Context

3.1 This drainage strategy has been produced in line with the requirements of all national and regional policies and in particular the following:

3.2 Purbeck Local Plan (2012)

Policy FR "Flood Risk" states:

"The impact of flooding will be managed by locating development in accordance with Purbeck's Strategic Flood Risk Assessment (SFRA).

Flood Risk Assessments (FRA)

In Flood Zone 1, an FRA will be required for planning applications with a site area under 1 hectare that:

- *Will alter the natural rate of surface water run-off; or*
- *Are located in areas where there is known to be a localised flooding, or drainage problem as set out in the SFRA maps; or*
- *Are located in areas below 3.55 metres above ordnance datum; or*
- *Are located in areas below 6 metres above ordnance datum and are within 50 metres of the coast (defined as back edge of beach or coast protection line).*

An FRA will not normally be required for householder development in Flood Zone 1. Exceptional circumstances will need to be agreed with the Council on a site by site basis.

All FRAs should include topographic survey with levels reduced to ordnance datum. Finished Floor levels must be set at an agreed level above ordnance datum which should include 600 millimetres freeboard.

Where appropriate, sustainable drainage systems (SuDS) should be incorporated into the design of the development."

3.3 Sustainable Design and Construction Supplementary Planning Guidance, 2014

Paragraph 3.4.10 states that:

'All developments on greenfield sites must maintain greenfield runoff rates. On previously developed sites, runoff rates should not be more than three times the calculated greenfield rate. The only exceptions to this; where greater discharge rates may be acceptable; are where a pumped discharge would be required to meet the standards or where surface water drainage is to tidal waters and therefore would be able to discharge at unrestricted rates provided unacceptable scour would not result.'

3.4 Non-Statutory National Standards for Sustainable Drainage Systems, 2015

The National Standards for Sustainable Drainage Systems published by DEFRA sets out the technical standards, which are non-statutory, to be utilised in conjunction with the NPPF and the PPG.

3.5 The Water Resources Act, 1991, as amended by The Water Act, 2014

Under the Water Resources Act 1991 (section 85) it is an offence to cause or knowingly permit poisonous, noxious, or polluting matter, or any solid waste matter to enter controlled waters (which include rivers). The consenting regime for discharges to controlled waters is set out in the Environmental Permitting (England and Wales) Regulations 2010.

3.6 Building Regulations – Part H

Buildings Regulations Part H provides guidance in terms of foul drainage, wastewater treatment systems and cesspools, rainwater drainage, building over sewers, separate systems for surface water and foul waste disposal.

Infrastructure protocol states that a designer should consider the following in order of preference before finalising a surface water design statement for the development.

- Discharge to SuDS devices, e.g. an adequate soakaway or some other adequate infiltration system or where this is not reasonably practicable;
- Discharge to a watercourse or where this is not reasonably practicable; and
- Discharge to a public sewer network.

3.7 Environment Agency Climate Change Guidance, 2016

This guidance note provides advise on how risk management authorities should account for climate change within their flood and coastal erosion risk management investment decisions. This guidance includes UK Climate Projections (UKCP09) data to produce more representative climate change allowances for England.

3.8 Construction Industry Research and Information Association (CIRIA) Guidance, 2015

The CIRIA guidance of relevance to the Proposed Development include:

- C532 – Control of Water Pollution from Construction Sites. Describes in great detail the sources of water on construction sites, pathways, and pollutants. In addition to this, this guidance also describes suitable pollution control measures.

- C753 – The SuDS Manual. Provides best practice guidance on the planning, design, construction, operation, and maintenance of SuDS to facilitate their effective implementation within developments.

4.0 Site Description

4.1 Existing Site

4.1.1 The existing site covers an area of 1.722 hectares comprising of 30 buildings including the main hotel building. Leisure facilities are also provided on site which includes restaurant, play areas and indoor and outdoor pool. 86 car parking spaces are available on site which are unmarked and are provided in an informal arrangement within areas of gravel and hard standing.

4.1.2 The proposals will maintain the existing access off Ferry Road that is currently used to access the site. The topographical survey of the site is enclosed within **Appendix A**.

4.2 Topography

4.2.1 The existing topography of the site is shown in ground model in Figure 2. Areas highlighted in orange denote high points and blue denote areas of low points. As can be seen, the existing Site generally sits on a knoll, a small natural round hill or mound.

4.2.2 The highest point is at the centre of the Site with elevations of 25-30mAOD. The existing vehicular access into the site has an elevation of approximately 22.26mAOD therefore there is a relatively steep incline into the site of circa 1:15 – 1:20 gradients.

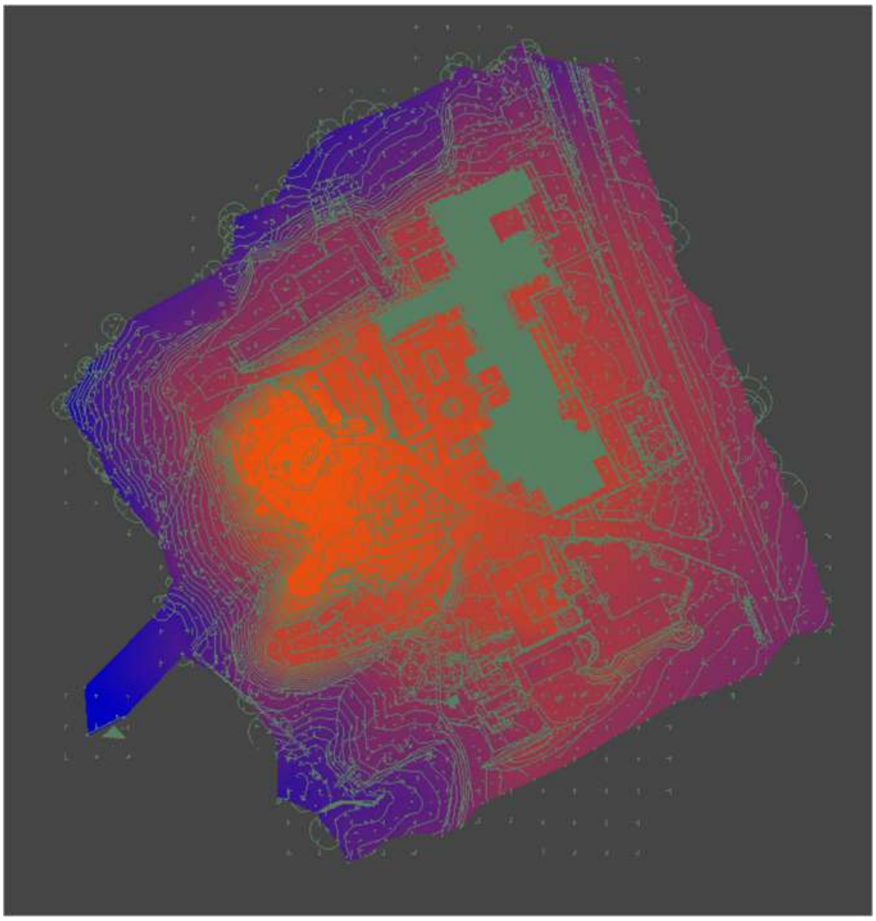


Figure 2 Existing Site Ground Model

4.3 Existing Geology

The British Geological Survey (BGS) indicates that the site has an underlying bedrock of Parkstone Sand Member consisting of sand. This sedimentary bedrock was formed between 66 and 23 million years ago during the Palaeogene Period. There were no superficial deposits recorded.

4.4 Hydrogeology Setting

The Environment Agency (EA) mapping service, as provided by Magic Map, indicates the aquifer designation for the bedrock and superficial drift geology and the groundwater vulnerability in the area. The mapping, as included at **Appendix B**, provide the following information for the site:

Geology Map	Site Description
Aquifer Designation (Bedrock)	Unproductive / Secondary A
Aquifer Designation (Superficial Drift)	Secondary
Groundwater Vulnerability	High
Groundwater Source Protection Zone	None

Table 1 Hydrogeology Setting

5.0 Proposed Use

5.1 The proposal seeks to optimise the potential of the site by developing a new masterplan removing poor quality ancillary buildings and linking green spaces, providing a high quality hotel, holiday villas and leisure facilities in this key location within Studland. Collectively, the new elements will comprise a single resort, operated by Kingfisher and delivering a luxury destination. It seeks to contribute positively to its setting by creating a contemporary and balanced building that connects with the surrounding area and skyline through the introduction of a well-proportioned facade design and the creation of vibrant ground floor and garden spaces.

5.2 The proposals will comprise of 30 hotel rooms and ancillary accommodation, 22 apartments, 26 villas, spa and outdoor pool, 79 car parking spaces, 36 cycle spaces and an introduction of public realm space. The proposed site plan is included within **Appendix C** as drawing 4561-AWW-SI-ZZ-DR-A-20004.

6.0 Flood Risk Assessment

6.1 Flood Information

6.1.1 As set out in the National Planning Policy Framework (NPPF), inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. For these purposes:

- “areas at risk of flooding” means land within Flood Zones 2 and 3; or land within Flood Zone 1 which has critical drainage problems, and which has been notified to the local planning authority by the Environment Agency;
- “flood risk” means risk from all sources of flooding - including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources.

6.1.2 Flooding information for Planning from the Environment Agency (EA) has indicated the site is located within Flood Zone 1, as found in the map at **Appendix D**.

6.1.3 As the site is within Flood Zone 1, no further data was required from the Environment Agency.

6.1.4 As part of the data capture, data and mapping from the Dorset Strategic Flood Risk Assessment (SFRA) was sought. This is included and referenced in the relevant sections below.

6.2 Flood Risk

6.2.1 The data on the EA’s website in their updated mapping, shows the site has a “very low” risk of flooding.

6.2.2 The EA confirmed that the proposed development site is located in Flood Zone 1 for Planning.

6.2.3 According to Table 2 of National Planning Policy Framework (NPPF), the proposed use, being a hotel, is classed as ‘more vulnerable’.

6.2.4 According to NPPF Table 3 ‘Flood Risk Vulnerability and Flood Zone Compatibility’, the proposed use should be permitted.

Table 3: Flood risk vulnerability and flood zone 'compatibility'

	Flood risk vulnerability classification (see table 2)	Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

Table 2 Flood Risk Vulnerability and Flood Zone 'Compatibility'

6.3 **Sequential Test**

6.3.1 Local Planning Authorities (LPA) are encouraged to take a risk-based approach to proposals for development in or affecting flood risk areas through the application of the Sequential Test and the objectives of this test are to steer new development away from high-risk areas towards those at lower risk of flooding.

6.3.2 However, in some areas where developable land is in short supply, there can be an overriding need to build in areas that are at risk of flooding. In such circumstances, the application of the Sequential Test is used to ensure that the lower risk sites are developed before the higher risk ones.

6.3.3 NPPF (PPG25) states that the Sequential Test should be applied at all stages of the planning process and the starting point is generally the Environment Agency's flood zone maps.

6.3.4 These maps and the associated information are intended for guidance and cannot provide details for individual properties. They do not consider other considerations such as existing flood defences, alternative flooding mechanisms and detailed site-based surveys. They do, however, provide high level information on the type and likelihood of flood risk in any area of the country.

6.3.5 The site is within Flood Zone 1 and therefore does not require a sequential test assessment.

6.4 **Exception Test**

6.4.1 The Exception Test is an additional test to be applied by decision-makers following application of the Sequential Test. The Exception Test has two elements as shown below, both of which must be satisfied for development in a flood risk area to be considered acceptable.

6.4.2 The Exception Test is only appropriate for use when there are large areas in Flood Zones 2 and 3, where the Sequential Test alone cannot deliver acceptable sites, but where some continuing development is needed for wider sustainable development reasons, considering the need to avoid social or economic blight and the need for essential civil infrastructure to remain operational during floods.

6.4.3 For the Exception Test to be passed:

a. It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA; and,
b. A site-specific FRA must demonstrate that the development will be safe for its lifetime, without increasing flood risk elsewhere and, where possible, reducing flood risk overall.

6.4.4 As the site sits in Flood Zone 1, an exception test is not required in accordance with NPPF.

6.5 **Fluvial Flooding Risk**

6.5.1 The Environment Agency flood information indicates no risk from fluvial sources on the site.

6.6 **Historic Flood Data**

6.6.1 The Environment Agency have no information indicating that the site was flooded historically from fluvial sources.

6.6.2 The Dorset SFRA does not indicate any historical fluvial flooding on the site.

6.7 **Groundwater**

6.7.1 Groundwater flooding is caused by the emergence of water originating from sub-surface permeable strata. A ground water flood event results from a rise in ground water level, sufficient for the water table to intersect the ground surface and inundate low lying land. Groundwater floods may emerge from either a single point or diffuse locations.

6.7.2 The underlying strata throughout the area and investigations into the SFRA geology data suggest that there is a risk of groundwater emergence which is likely to relate to the geology of the area. However, groundwater flooding risks are often highly localised, and dependent upon geological interfaces between permeable and impermeable subsoils. Therefore, sustainable construction techniques for surfacing will minimise any potential groundwater risk.

6.8 Flooding from Sewers

6.8.1 Flooding from sewers can occur because of different reasons; if sewers are blocked during the heavy rainfalls, or if a sewer cannot provide adequate capacity, then flooding can cause a large amount of damage.

6.8.2 The Dorset SFRA mapping indicates the site has not been historically flooded from artificial sources.

6.9 Flooding from Reservoirs

6.9.1 Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensures that reservoirs are inspected regularly, and essential safety work is carried out.

6.9.2 However, in the unlikely event that a reservoir dam failed, a large volume of water would escape at once and flooding could happen with little or no warning. If the site is within a risk area, plans should be made for safe evacuation and escape. Operators/workers on site may need to evacuate immediately, know the safest route to safety, and be ready to follow the advice of emergency services.

6.9.3 The EA data indicates that the site is at no risk from reservoir flooding.

6.10 Surface Water Flooding

6.10.1 Overland flow / surface water flooding typically arises because of intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems. It can run quickly off land and result in localised flooding.

6.10.2 The Environment Agency has produced illustrative mapping (Flood Map for Surface Water) relating to flooding risks from surface water. They are classified as Flood Hazard Maps for the purpose of the Flood Risk Regulations 2009. These maps are the next generation on from the previous “Area Susceptible to Surface Water Flooding” maps, which are contained within the SFRA.

6.10.3 The EA maps show high resolution image and indicative flow paths for pluvial events. The maps are based on coarse level data and indicate ridges, valleys and flat spots where water would collect. Typically, the flow paths follow valleys, rivers and watercourses.

6.10.4 The surface water maps, and the associated information are intended for guidance only and cannot provide details for individual properties. They do, however, provide high level information and indicate areas in which surface water flooding issues should be investigated further. The risk categories are classified as follows:

- Very low probability of flooding – This zone is assessed as having less than a 1 in 1000 annual probability of surface water flooding.

- Low probability of flooding – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of surface water flooding.
- Medium probability of flooding - This zone comprises land assessed as having between a 1 in 30 and 1 in 100 annual probability of surface water flooding.
- High probability of flooding – This zone is assessed as having greater than a 1 in 30 annual probability of surface water flooding.

6.10.5 A review of the EA mapping indicates there is no risk of surface water flooding to the site. This is localised to existing flow routes and identified as a low hazard.

6.10.6 An assessment of the "medium" risk scenario (up to 1 in 100-year event) has been obtained from the EA surface water flood map which indicates that there would be no flood water on the site as shown on Figure 2 below.

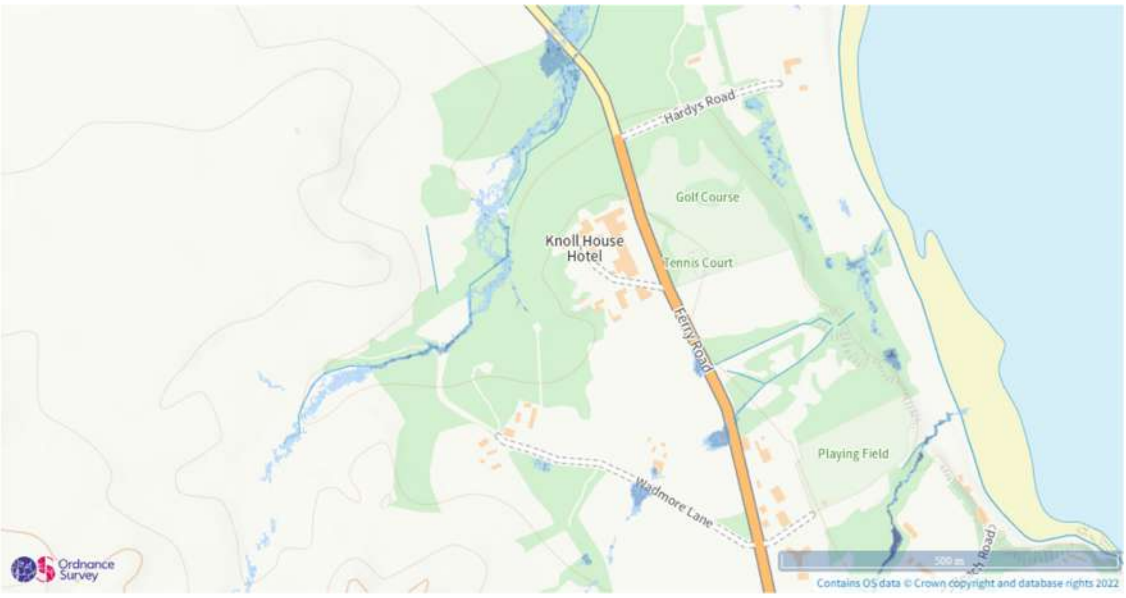


Figure 3 EA Surface Water Flood Map

6.11 **Route of Escape**

6.11.1 In an extreme storm event, there is not likely to be flood water on site and safe escape can be achieved via the main access.

6.11.2 It is not envisaged that there would be any problem for access of emergency vehicles in an extreme storm event as there is no flood depth unless the extreme storm scenario occurs. Emergency vehicles may operate in depths of 0.5m with velocity of 5 metres per second (with some operating at depths of 1m).

6.11.3 The Planning Authority must be in consultation with the emergency services as to the appropriate access and safe routes for the site during an extreme storm event, in accordance with Section 13.S3.3 of the FRA Guidance for New Developments. Emergency Response Plans for the local area are available on the council website. It is not envisaged that there will be any additional burden on emergency services during a flood event.

6.11.4 General Evacuation Advice:

- Avoid walking or driving through flood water, as only 150mm of fast flowing flood water is able to knock a person over and 600mm is able to float a car. Flooding can cause manhole covers to come off, leaving hidden dangers.
- Do not walk on sea defences or riverbanks.
- Take care or avoid crossing bridges when water levels are high.
- Take care crossing culverts as they are dangerous when flooded.
- Look out for other hazards such as fallen power lines and trees.
- Keep Children away from flood water.
- Wash hands thoroughly if you come into contact with flood water as it may be contaminated with sewage.
- Always follow the advice provided at the time by the Emergency Services. The Emergency Services may direct you to a Local Authority Evacuation Centre, which has been specially prepared for people being evacuated from their homes. Free food and bedding are provided, however spare clothing should be taken, essential medication and any baby care products should an infant be involved in the evacuation.

6.12 **Flood Compensation**

The site is not within a Flood Zone for planning so there is no statutory requirement to assess the requirement for flood compensation.

7.0 Existing Drainage

7.1 The topographical survey of the site indicates various manholes and gullies around the site however confirmed drainage runs and connections points have not yet been established and is subject to a CCTV survey at a later stage. It is assumed that the existing private foul drainage drains to the Wessex Water owned pumping station located to the southwest outside of the site via a 150mm diameter pipe. The existing foul connection is subject to a CCTV survey to confirm the connection to the pumping station and confirm the condition of any runs to be reused.

7.2 Asset plans for Studland were previously obtained from Wessex Water to establish the closest sewers to the site. It was identified that there are no surface water sewers located in proximity to the site. It is unclear exactly how the surface water runoff drains from the site however it is assumed that the majority of the site drains into soft landscaping areas and some networks may even drain into the foul network.

7.3 Pre-Development Runoff Rates

The pre-development site comprises of a hotel resort with various ancillary buildings and facilities which serve the hotel and leisure resort with predominantly hardstanding areas surround the buildings. Approximately 1.23 hectares (72% of the site area) is currently impervious and contributes towards the positive surface water runoff. Drawing KHS-PPC-XX-XX-DR-C-0203 at **Appendix E** shows the extent of existing impermeable areas.

Pre-development run-off rates for the existing site have been calculated based on Modified Rational Method using the FSR rainfall intensities from Micro Drainage design software.

$$Q_b = 3.61 \times C_v \times i \times A_i$$

where,

C_v = Volumetric run-off coefficient (0.75)
A_i = Impermeable area (ha)
i = Average rainfall intensity (mm/hr)

The detailed brownfield runoff calculations are shown on drawing KHS-PPC-XX-XX-DR-C-0203 at **Appendix E** and the results are summarised in Table 3 below:

Table 3 Existing brownfield run-off rates

Return Period (Years)	Annual Exceedance Probability (AEP)	Intensity (mm/hr)	Brownfield Runoff Rate (l/s)
1	100%	65	216
2	50%	84	280
30	3.33%	158	526
100	1%	204	679

8.0 Design Criteria

8.1 As of April 2015, the Lead Local Flood Authority (LLFA) has become a statutory consultee on planning applications for surface water management. As the LLFA, Dorset County Council are therefore responsible for the approval of surface water drainage systems for new developments.

8.2 The NPPF recognises that flood risk and other environmental damage can be managed by minimising the changes in the volume and rate of surface water runoff from development sites and recommends that priority is given to the use of SuDS in new development.

8.3 The Non-Statutory Technical Standards for Sustainable Drainage Systems set out general recommendations to control of development runoff, including the requirement to ensure that runoff from the site is not increased by development, and the requirement to manage surface water runoff for events up to the 1 in 100 (1%) Annual Exceedance Probability event (including an additional allowance for the projected impacts of climate change).

8.4 Planning Policy Guidance (PPG) advises that climate change allowances should be determined with reference to the guidance provided in the EA document ‘Flood Risk Assessments: Climate Change Allowances’ (first published in February 2016 and recently updated May 2022). As the site is proposed for uses which have a design life of 100 years an additional allowance on rainfall intensity has been incorporated into the surface water management strategy i.e., a 40% increase in rainfall intensity which is also in line with the requirements for small and urban catchments in River Thames Basin District as per Environmental Agency Climate Change Guidance 24.

9.0 Proposed Drainage Strategy

9.1 Discharge Hierarchy for SuDS

9.1.1 Purbeck Local Plan Policy FR states:

"Where appropriate, sustainable drainage systems (SuDS) should be incorporated into the design of the development"

9.1.2 Options for the destination for the run-off generated on site have been assessed in line with the prioritisation set out in the Building Regulations Part H and DEFRA's Draft National Standards for SuDS as follows:

Table 4 Discharge Hierarchy

Rainwater Harvesting	To reuse surface water runoff for the development, rainwater harvesting was also taken into consideration. To collect and distribute rainwater in these systems, a distinct internal network of pipes, tanks, and pumps are needed. Due to the proposed use of green roofs, it was thought to be unnecessary to implement a rainwater harvesting system on the site.
Discharge to Ground	Records of the local geology indicated that Parkstone Sand Member makes up the bedrock beneath the site. It also showed the site is bounded by Broadstone Clay Formation. In addition to this, soakaway testing was undertaken on site in May 2019 which established poor infiltration rates. Therefore, it has been considered that infiltration methods will not be appropriate for the discharge of surface water for the proposed development.
Green Roofs	The majority of the proposed buildings will comprise of flat roofs therefore it is proposed to implement green roofs for majority of the buildings to reduce the flow into the drainage system from the roofs.
Discharge to Watercourse	There is a watercourse located within proximity of the site however this will require entering third party land and therefore has been discounted as a method of discharge.
Discharge to surface water sewer, highway drain, or another drainage system	An existing surface water sewer is located to the southeast which currently serves the site and therefore it is proposed to connect into this, subject to further investigation and surveys.
Discharge to Combined Sewer	Not selected as discharging into surface water sewer.

9.2 Proposed Discharge Rates

9.2.1 A summary of the greenfield runoff rates for different storm events calculated using the Interim Code of Practice (ICP) SuDS method is provided in Table 5 below and the complete Microdrainage Calculation attached at **Appendix F**.

Table 5 Greenfield Discharge Rates

Return Period	Greenfield Runoff Runoff Rate ICP SuDS Mean Annual Flood (l/s)
Q_{BAR}	9.7
$Q_{1in\ 1Y}$	8.2
$Q_{1\ in\ 30Y}$	22.0
$Q_{1\ in\ 100Y}$	31.0

9.2.2 The drainage strategy for a previous planning application made for the site in 2018 for similar proposals (planning reference: 6/2018/0566) was approved by Dorset County Council (DCC) as the Lead Local Flood Authority (LLFA). The consultation response from DCC stated that it would not be appropriate to rely on infiltration systems due to the existing ground conditions. This was established following the results from the soakaway testing hence the strategy comprised of discharging surface water to the local watercourse to the northwest of the site at a restricted rate. Despite this, an alternative discharge route is proposed for surface water to the existing sewer in the southeast that currently serves the site.

9.2.3 The maximum discharge rates from the proposed development will be restricted to the existing Q_{BAR} rate of 9.7 l/s. The on-site storage will consider a 40% allowance for climate change when calculating the storage volumes.

9.2.4 The proposed roofs will drain into the tanked permeable paving sub-base within the road build-up and has been split into five areas with five separate flow control units by the way of Contraflow chambers restricting the total discharge to 9.7 l/s. This flow rate maintains the existing Q_{BAR} which is considered acceptable.

Table 6 Assessment of pre and post development discharge rates

Return period	Pre-development run-off rates (l/s)	Equivalent greenfield run-off rates (l/s)	Proposed discharge rate	Betterment
1 in 1 Year	216	9.7	9.7	95.5%
1 in 2 Year	280	8.2	9.7	96.5%
1 in 30 Year	526	22.0	9.7	98.2%
1 in 100 Year	679	31.0	9.7	98.6%
1 in 100 + 40%CC	-	-	9.7	-

9.3 Proposed SuDS Hierarchy

9.3.1 To maximise the potential use of SuDS at the site, a review has been undertaken in accordance with the local policy and other non-statutory guidance documents.

9.3.2 Table 7 indicates the potential setting for SuDS elements:

Table 7 Assessment of SuDS

SuDS	Description	Setting	Required Area
Green Roof	A planted soil layer is constructed on the roof of a building to create a living surface. Water is stored in the soil layer and absorbed by vegetation.	Building	Building integrated
Rainwater Harvesting	Rainwater is collected from the roof of a building or from other paved surfaces and stored in an over ground or underground tank for treatment and reuse locally. Water could be used for toilet flushing and irrigation.	Building	Water storage
Soakaway	A soakaway is designed to allow water to quickly soak into permeable layers of soil. Constructed like a dry well, an underground pit is dug filled with gravel or rubble. Water can be piped to a soakaway where it will be stored and allowed to gradually seep into the ground.	Open Space	Dependant on Run-off volumes and soils
Filter Strip	Filter strips are grassed or planted areas that runoff can run across to promote infiltration and cleansing.	Open Space	Maximum length 5 metres
Permeable Paving	Paving which allows water to soak through. Can be in the form of paving blocks with gaps between solid blocks or porous paving where water filters through the block itself. Water can be stored in the sub-base beneath or allowed to infiltrate into ground below.	Street / Open Space	Can typically drain double its area
Bioretention Area	A vegetated area with gravel and sand layers below designed to channel, filter and cleanse water vertically. Water can infiltrate into the ground below or drain to a perforated pipe and be conveyed elsewhere. Bioretention systems can be integrated with tree-pits or gardens.	Street / Open Space	Typically, surface area is 5-10% of drained area with storage below.
Swale	Swales are vegetated shallow depressions designed to convey and filter water. These can be 'wet' where water gathers above the surface, or 'dry' where water gathers in a gravel layer	Street / Open Space	Account for width to allow safe maintenance typically 2-3 metres wide.

	beneath. Can be lined or unlined to allow infiltration.		
Hardscape Storage	Hardscape water features can be used to store run-off above ground within a constructed container. Storage features can be integrated into public realm areas with a more urban character.	Open Space	Could be above or below ground and sized to storage need.
Pond / Basin	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.	Open Space	Dependant on runoff volumes and soils.
Wetland	Wetlands are shallow vegetated water bodies with a varying water level. Specially selected plant species are used to filter water. Water flows horizontally and is gradually treated before being discharged. Wetlands can be integrated with a natural or hardscape environment.	Open Space	Typically, 5-15% of drainage area to provide good treatment.
Underground Storage	Water can be stored in tanks, gravel, or plastic crates beneath the ground to provide attenuation.	Open Space	Dependant on runoff volumes and soils.

9.4 **Sustainable Drainage Systems (SuDS)**

9.4.1 The NPPF stipulates the requirement to incorporate SuDS in all major and minor developments, if feasible.

9.4.2 Various types of SuDS and their benefit/limitations are reported in CIRIA guidance document C753 'The SuDS Manual'. Not all SuDS components/methods are feasible or appropriate for all developments, factors such as available space, ground conditions and site gradient will influence the feasibility of different methods for a particular development.

9.4.3 The use of SuDS techniques within the proposed development has been assessed using the SuDS hierarchy and detailed in the Table 8.

Table 8 SuDS Assessment

SuDS Feature	Environ-mental benefits	Water quality improvement	Suitability for low permeability soils ($k<10^{-6}$)	Ground-water recharge	Suitable for small / confined sites?	Site specific restrictions	Appropriate for subject site?
Wetlands	P	P	P	X	X	There are no large areas suitable to incorporate these features.	No
Retention ponds	P	P	P	X	X	There are no large areas suitable to incorporate these features.	No
Detention basins	P	P	P	X	X	There are no large areas suitable to incorporate these features.	No
Infiltration basins	**P**	**P**	**X**	**P**	**X**	No infiltration allowable on the site	No
Soakaways	**X**	**P**	**X**	**P**	**P**	No infiltration allowable on the site	No
Underground storage	X	X	P	X	P	None	Yes (Not required)
Swales	P	P	P	P	X	No infiltration allowable on the site	No
Filter strips	P	P	P	P	X	No infiltration allowable on the site	No
Rainwater harvesting	X	P	P	P	P	None	Yes, but green roof option chosen
Permeable paving	X	P	P	P	P	None	Yes
Green roofs	P	P	P	X	P	None	Yes
Rain Garden (external)	P	P	P	X	X	No infiltration allowable on the site	No
Rain Garden (planter)	P	P	P	X	X	None	Yes.

9.5 **Proposed Surface Water Strategy**

9.5.1 Drawing KHS-PPC-XX-XX-DR-C-0201 contained within **Appendix G** shows the proposed surface water strategy for the site.

9.5.2 The roof area of the proposed buildings will drain to the tanked permeable paving sub-base within the road, the shared surface will also drain via rainwater pipes and permeable paving respectively to a series of manholes and pipes, before discharging to the existing surface water sewer to the southeast at a total restricted rate of 9.7 l/s. The permeable paving structures will be controlled by five separate flow control chambers at varied rates giving a total discharge rate of 9.7 l/s.

9.5.3 Rainwater gardens / planters will be considered for use for water filtering from a selection of rainwater downpipes which will then drain into the surface water network. Permeable paving has also been considered for the proposed roads and parking areas with a tanked sub-base which will be collected from various perforated pipes within the sub-base and discharge into the surface water network. The permeable paving structures have been designed to cater for all storm return periods up to and including a 1 in 100 year plus 40% climate change allowance.

9.5.4 All surface water runoff from the site will be discharged to the existing surface water ditch adjacent to the south of the site at a restricted rate of 9.7 l/s. A new small headwall will be constructed within the ditch, either concrete or built from vegetated walls.

9.5.5 This can be considered a discharge to a watercourse, as per the SUDS Hierarchy.

9.5.6 Drainage calculations for the proposed layout are contained within **Appendix G** and show that no flooding will occur during a 1 in 100 year plus 40% climate change storm. A MicroDrainage Schematic layout has also been prepared and is enclosed within **Appendix H** as Drawing KHS-PPC-XX-XX-DR-C-0204.

9.6 **Proposed Foul Water Strategy**

9.6.1 Drawing KHS-PPC-XX-XX-DR-C-0201 contained within **Appendix G** shows the proposed foul water strategy for the site.

9.6.2 Foul water from the proposed buildings will discharge to the existing 150mm diameter pipe which discharges to the off-site Wessex Water owned pumping station. A CCTV survey of the existing drainage network will be required to establish the condition of the sewers as well as the invert levels prior to construction.

10.0 Pollution Control

10.1 Appropriate pollution control measures will be included in the surface water drainage system to minimise the risk of contamination or pollution entering the ground from surface water runoff from the development.

10.2 The proposed surface water sewer arrangement will incorporate suitable pollution control measures such as catchpit manholes to manage sediment control and water quality.

10.3 The drainage system will be designed to comply with the requirements of the SuDS treatment sequence as laid out in CIRIA C753 'The SuDS Manual'.

10.4 The final strategy for pollution control will be confirmed as part of the detailed design however, at this stage of the assessment, an appropriate SuDS treatment train has been incorporated into the design prior to discharge to the surface water sewer. As such it has been included into the design of permeable paving and raingardens which will contribute to the pollution control of the site.

10.5 The proposed drainage system has been designed with rainwater gardens and tanked permeable paving which can all play an important part in contributing to a development's SuDS treatment train, providing benefits to each of the four pillars of SuDS design: water quantity, water quality, amenity and biodiversity.

10.6 In accordance with Table 26.2 of the SuDS Manual, the proposed development will have the pollution hazard indices as shown in Table 9 below:

Table 9 Summary of pollution indices for residential developments

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Individual property highways, carparks, low traffic roads and non-residential car parking with infrequent change	Low	0.5	0.4	0.4

10.7 Table 10 presents the mitigation indices provided by each SuDS method proposed as part of the drainage strategy.

Table 10 SuDS mitigation indices for discharge to surface waters

SuDS Measure	TSS	Metals	Hydrocarbons
Rainwater gardens/Bioretention areas/Green Roofs	0.8	0.8	0.8
Permeable Paving	0.7	0.6	0.7

11.0 Maintenance Plan

11.1 The maintenance regime for the proposed development will be split into two main categories, SuDS drainage and regular private drainage. Both elements will be the responsibility of the commissioned maintenance and management company.

11.2 Maintenance operations can be divided into the following categories:

- Regular (or routine frequent) - this covers items that are carried out typically with a frequency from monthly to annually. It includes items such as inspection and monitoring, litter removal, grass cutting or other vegetation management, sweeping permeable pavements.

- Infrequent (or routine infrequent) - this covers items that are required typically with a frequency from annually up to 25 years (or possibly greater). It includes items such as wetland vegetation management, silt removal from swales, ponds or wetlands, scarifying and spiking infiltration basins and gravel replacement to filter drains.

- Remedial (or reactive) - this covers maintenance that is not usually required, but may be necessary as a result of vandalism, accidental damage, rainfall that exceeds the design capacity or similar events. Examples include repair of erosion in a swale or repair of permeable surfaces blocked for example by mixing concrete on them.

11.3 *Riparian Responsibility*

If a resident owns land adjoining, above or with a portion of the drainage system running through it, they have certain rights and responsibilities. In legal terms they are a 'riparian owner'. If they rent the land, they should agree with the owner who will manage these rights and responsibilities.

It is recommended that the owner's appointed Management Company handle the maintenance of all underground drainage and all SuDS devices, with the following exceptions:

- Inspecting and cleaning out any surface mounted hard drainage systems (such as channel drains);

- Inspecting and cleaning out (or reporting) SuDS systems on a small scale (such as garden ditches and swales).

11.4 *Allowing for Replacement*

The design life of some SuDS elements and drainage elements of the proposed system is shorter than the predicted design life of the development. Therefore, the design and maintenance regime considers any potential replacement works (such as replacing permeable paving).

Table 11 Operation and Maintenance Requirements for Surface Water Systems

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in catchpit manholes and gullies. Clean out as required	Twice Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris from catchpits, gullies, attenuation devices and inside of concrete manhole rings	As required, based on inspections
Remedial Actions	Reconstruct and/or replace components if performance deteriorates or failure/blockage occurs	As required
	Replacement of clogged components (flow restriction)	As required
Monitoring	Inspect silt traps/gullies/catchpits and note rate of sediment accumulation	Monthly in the first year and then annually
	Check flow control chamber and attenuation devices	Annually

Table 12 Operation and Maintenance Requirements for Attenuated Flow Controls

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect and identify any areas that are not operating correctly.	Immediately following construction then every 3 months for the first year then every 6 months.
	Hose down unit	Six monthly, or as required
	Clear blockages	As required
Remedial Actions	Replace flow control unit with specified or similar approved	As required

Table 13 Operation and Maintenance Requirements for Inlets and Outlets

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect and identify any areas that are not operating correctly and remove any debris from the inlet/outlet that could restrict flow.	Immediately following construction then every 3 months for the first year then every 6 months.
Infrequent maintenance	Clear Blockages	As required
Remedial Actions	Replace inlet/outlet unit with specified or similar	As required

Table 14 Operation and Maintenance Requirements for Permeable Paving

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weed	As required
Remedial Actions	Remediate any landscaping which through vegetation maintenance or soil slip, has been raised to within 50mm of the level of paving	As required
	Remedial works to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and weed growth	Three monthly, 48 hours after large storm in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 15 Operation and Maintenance Requirements for Green Roofs

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (i.e. year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% coverage)	Annually (in Autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove Nuisance and invasive vegetation, including weeds	Six monthly or as required
	Move grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial Actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate.	As required

12.0 Conclusion

12.1 This report has been a summary of the drainage strategy for the proposed Knoll House Hotel redevelopment.

12.2 The existing site was discussed. The underlying bedrock geology classification is Parkstone Sand Member and previous soakage tests established poor infiltration rates on site.

12.3 The sites existing surface water and foul water drainage were reviewed, and the sites brownfield and greenfield runoff rates were calculated. The discharge rate for the development was set to the existing Q_{BAR} rate of **9.7 l/s.**

12.4 A Sustainable Drainage Assessment for the proposed development was done (Chapter 9)**.**

12.5 A Surface Water Strategy was carried out (Chapter 9), the Drainage Strategy drawing can be found in **Appendix D** and the calculations can be found in **Appendix G**.

12.6 Surface water will discharge to an adjacent ditch which links to the sea.

12.7 A Foul Water Strategy was carried out (Chapter 9), the Drainage Strategy drawing can be found in **Appendix G.**

12.8 Foul water will discharge via a pumping station to Wessex Waters public foul sewer.

12.9 Maintenance measures to keep the proposed drainage networks at an adequate operational level have been outlined in Chapter 11.

APPENDIX A – TOPOGRAPHICAL SURVEY

Notes

- Datum : Ordnance Survey Level datum via OS Active GPS Network
- Survey Grid : Ordnance Survey National Grid Co-ordinates derived via OS Active GPS Network.
- Survey contents correct as of date of survey and survey undertaken to agreed specification
- All critical dimensions to be checked prior to site works
- All kerb levels shown are channel levels
- Drainage and Service covers :
  Covers buried or obscured at the time of the survey are not shown. Manholes have not been entered for safety reasons and all pipe diameters are estimated from the surface. Drainage pipe diameters are in millimetres, eg. D100 means a 100mm diameter pipe. The flow type stated is based on visual evidence seen from the surface at the time of the survey. All internal manhole details should be confirmed by the contractor on site prior to site works.
- Trees :
  For concentric spread trees the spread plotted is an average value drawn to scale to the nearest metre. The minimum individual diameter surveyed is 0.15m at 1m up the trunk from the ground. Trunk diameters are not plotted to size. General species are only stated where noted. A qualified arboriculturalist should be consulted for species type and condition. Heights (when requested) are approximate to the nearest metre.

Legend of Abbreviations

AV	Air Valve
BEDS	Flower Beds
BK/W	Brick Wall
BLK/W	Block Wall
BOL	Bollard
BS	Brick Setts
BT	British Telecom
BW	Barbed Wire Fence
CB	Close Board Fence
CCTV	Closed Circuit Television Camera
CELL	Cellar Cover
CGI	Corrugated Iron Fence
CL	Cover Level
C/L	Chain Link Fence
CONC	Concrete Surface
CONC/P	Concrete Panel Fence
CP	Chestnut Paling Fence
CRB	Crash Barrier
D	Diameter (trees in metres / drainage pipes in millimetres)
DK	Drop Kerb
E	Electricity Cover
EP	Electricity Pole
ER	Earth Rod
FFL	Finished Floor Level
FH	Fire Hydrant
FLAG	Flag Pole
FLP	Floodlight Post
FP	Footpath
G	Gully
GV	Gas Valve
HW	Head Wall
IC	Inspection Cover
IL	Invert Level
IR	Iron Railing
LL	Larch-lap Fence
LP	Lamp Post
MB	Multibole Tree
MH	Manhole
MP	Marker Post
MP-E	Marker Post - Electric
MP-G	Marker Post - Gas
MP-T	Marker Post - Telephone
MP-W	Marker Post - Water
NAME	Road Nameplate
PAL	Palisade Fence
POK	Top of Kerb Level
PR	Post and Rail Fence
PW	Post and Wire Fence
RE	Rodding Eye
RET	Retaining
RS	Road Sign
RWP	Rainwater Pipe
SCK	Stop Cock
SOF	Soffit Level
ST/W	Stone Wall
SV	Sluice Valve
SVP	Soil Vent Pipe
TEL	Call Box (telephone)
TH	Threshold Level
TL	Traffic Light
TP	Telegraph Pole
TV	Cable Television
UTL	Unable to Lift (Cover)
V	Valve (Unknown Type)
VP	Vent Pipe
W-HT	Top of Wall Level
WL	Water Level
WM	Water Meter
W/M	Wire Mesh Fence
WO	Washout Valve
WV	Water Valve

Tree Abbreviations

ALD	Alder
BCH	Beech
CED	Cedar
CHE	Cherry
CYP	Cypress
EUC	Eucalyptus
FAC	False Acacia
FRT	Fruit
HAW	Hawthorn
HOL	Holly
HOAK	Holm Oak
HORN	Hornbeam
HCH	Horse Chestnut
LAR	Larch
LAU	Laurel
MAP	Maple
PLN	London Plane
POP	Poplar
RHO	Rhododendron
ROW	Rowan
SAL	Sallow
SB	Silver Birch
SPR	Spruce
SCH	Sweet Chestnut
WBM	Whitebeam
WIL	Willow

A D Horner Limited

Land and Measured Building Surveyors

51 Bridge Street
Pershore
Worcestershire
WR10 1AL
~~~~~
Telephone: 01386-555486

1 Folly House
Venton
Plymouth, Devon
PL7 5DS
~~~~~
Telephone: 01752-837382

Website: www.adhorner.co.uk
E-mail: enquiries@adhorner.co.uk

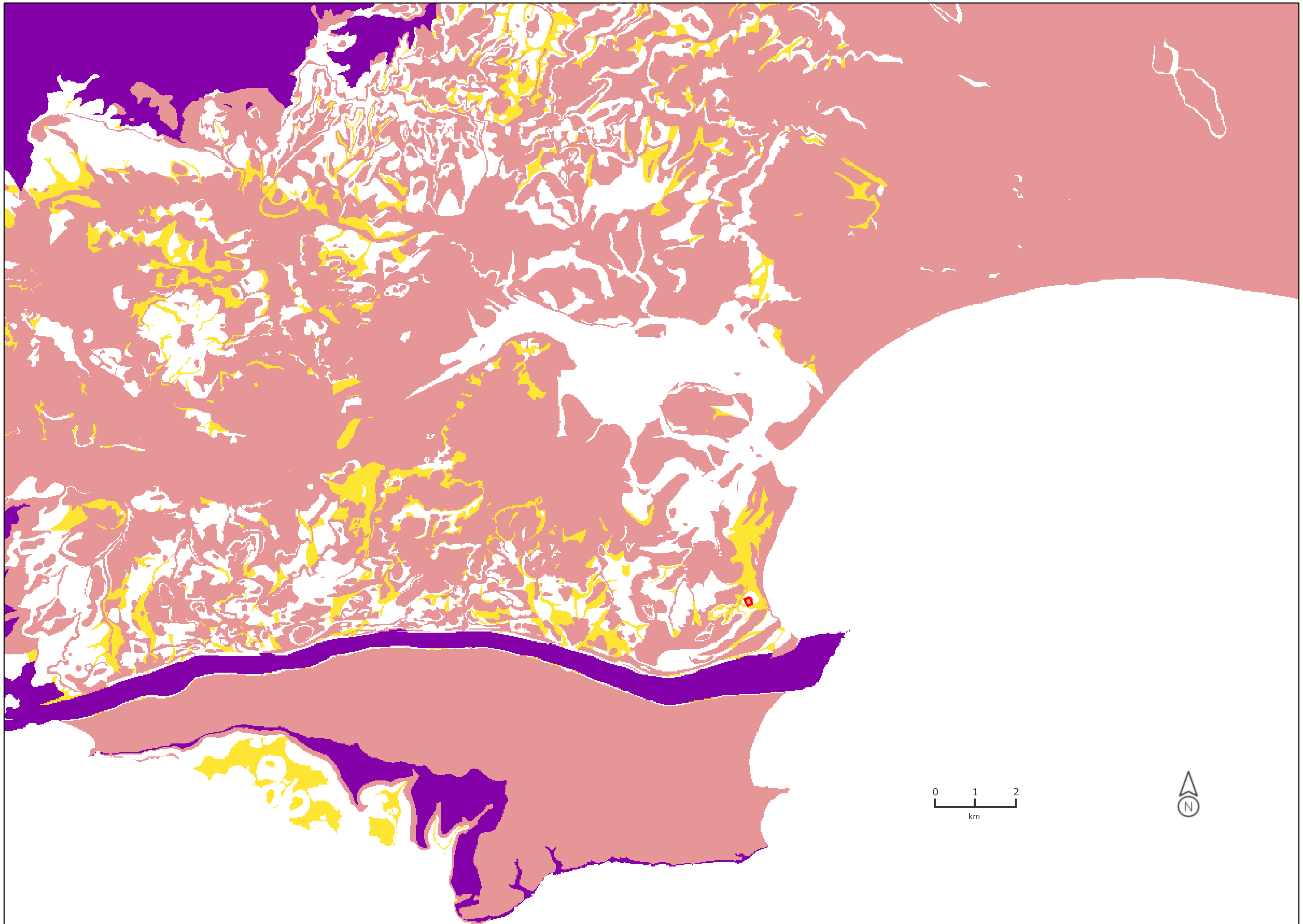
Title	Knoll House Hotel, Ferry Road, Studland, Dorset BH19 3AH Topographic Survey
Client	Knoll House Hotel
Date	December 2017
Drawing No.	-
Plot scale	1 : 250 on A0 Sheet
Digital scale	-
Revision	
Surveyed	SJG/LBM
Checked	JKW

0 metres 5

N
Ordnance Survey Grid North

APPENDIX B – MAGIC MAP GEOLOGY INFORMATION

Aquifer Designation Map



Legend

Aquifer Designation Map (Bedrock) (England)

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unproductive

Aquifer Designation Map (Superficial Drift) (England)

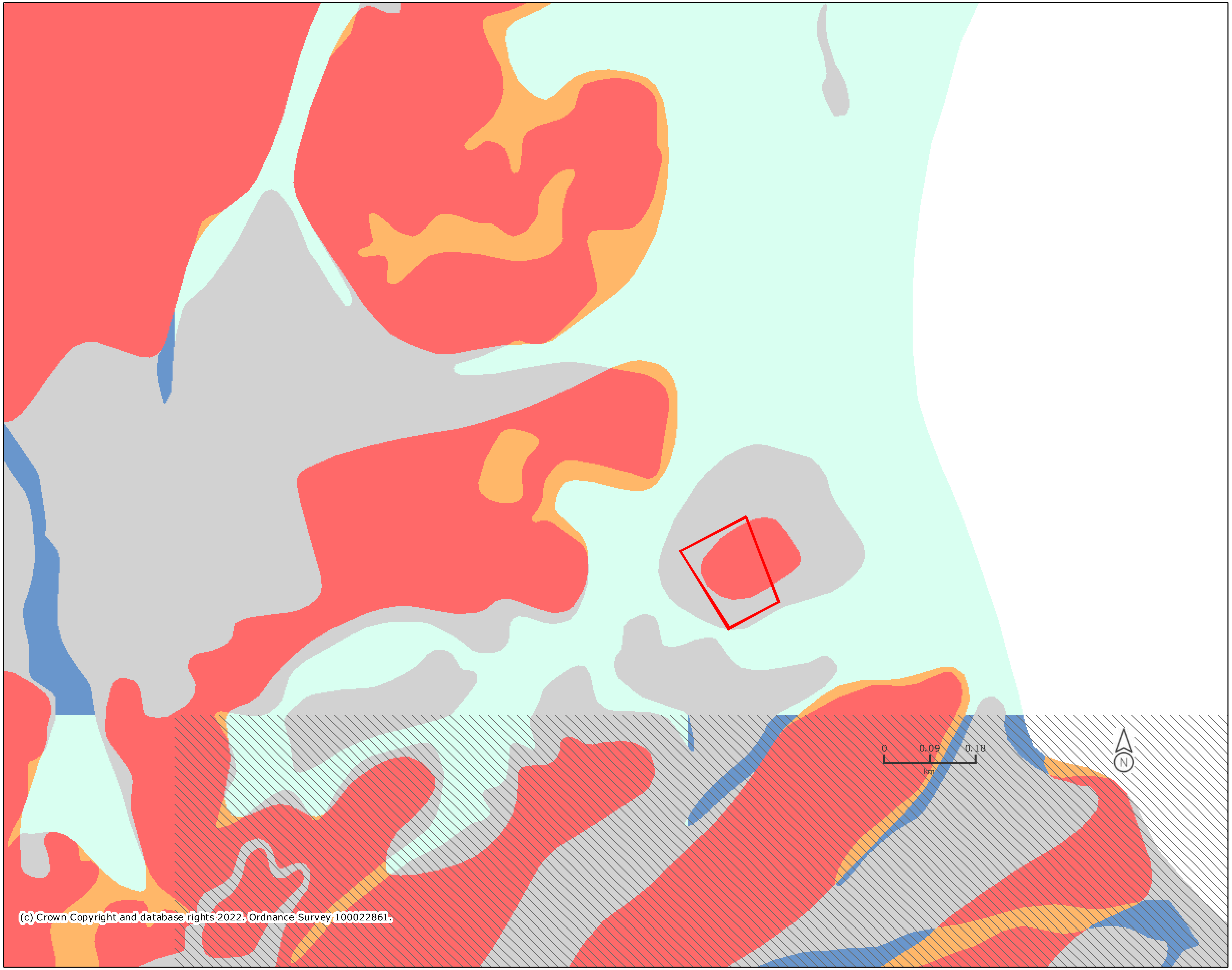
- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes+landslip)
- Unproductive

Projection = OSGB36
xmin = 375500
ymin = 73040
xmax = 425900
ymax = 97830

0 2 4
km

Map produced by MAGIC on 5 October, 2022.

Groundwater Vulnerability Map



Legend

Groundwater Vulnerability Map (England)

- Local Information
- Soluble Rock Risk
- High
- Medium - High
- Medium
- Medium - Low
- Low
- Unproductive

Projection = OSGB36
xmin = 401000
ymin = 82520
xmax = 404700
ymax = 84380

0 0.1 0.2
km

Map produced by MAGIC on 5 October, 2022.

APPENDIX C – PROPOSED BLOCK PLAN

DRAWING 4561-AWW-SI-ZZ-DR-A-20004

Notes

Do not scale from this document, unless for the purposes of planning applications where a scale bar is provided. Refer to figured dimensions only. All dimensions to be verified on site prior to construction. Report all discrepancies or ambiguities to the Document Originator immediately. This document is to be read in conjunction with relevant documents, drawings and standards.

Rev	Date	Notes	Drn	Chk'd
P02	06/10/22	Planning Issue	KM	MAS

5 0 5 10 15 20 25
SCALE 1:500 m

Document Originator

AWW

London 106 Weston Street, SE1 3QB 020 7188 6008
Plymouth East Quay House, PL4 0HX 01752 261 282
Bristol pivot + mark, 48-52 Baldwin Street, BS1 1QB 0117 923 2535

RIBA Chartered Practice www.aww-uk.com

Client
Kingfisher Resorts Studland Ltd

AWW Project Number
4561

Project Stage
STAGE 2

Project Title
Knoll House
Studland

Title
Proposed Block Plan

Scale @ A1
1 : 500

Document Status
PLANNING

Project	Origin.	Volume	Level	Type	Role	Number	Rev
4561	AWW	SI	ZZ	DR	A	20004	P02

APPENDIX D – ENVIRONMENT AGENCY FLOOD MAP FOR PLANNING

Flood map for planning

Your reference	Location (easting/northing)	Created
EA Flood Map	**403085/83275**	**6 Oct 2022 10:21**

Your selected location is in flood zone 1, an area with a low probability of flooding.

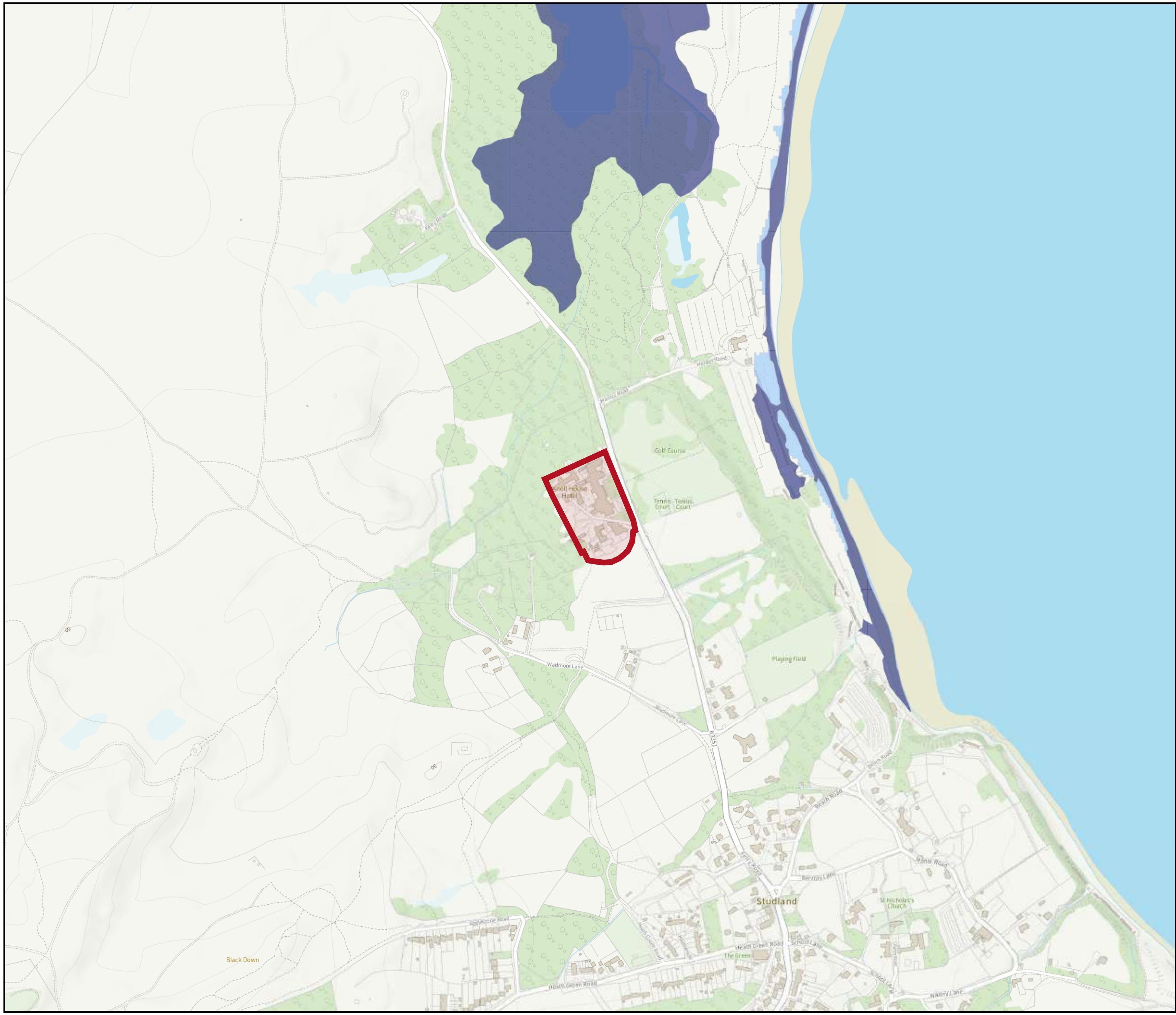
You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
EA Flood Map

Location (easting/northing)
403085/83275

Scale
1:10000

Created
6 Oct 2022 10:21

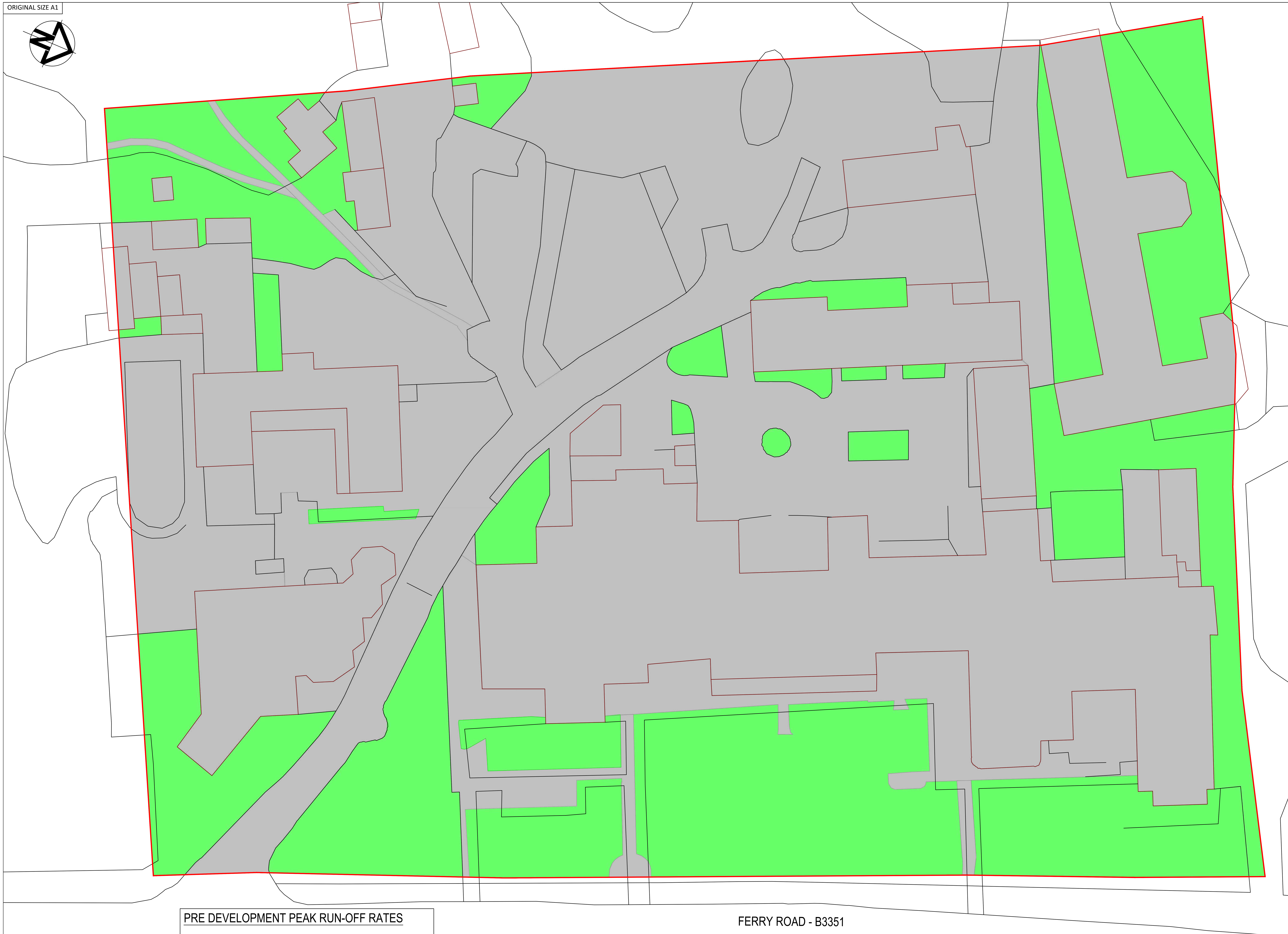
- Selected area
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 100 200 300m

APPENDIX E – EXISTING RUNOFF RATES

DRAWING KHS-PPC-XX-XX-DR-C-0203

ORIGINAL SIZE A1



PRE DEVELOPMENT AREAS

TOTAL SITE AREA = 1.72 Ha
PERMEABLE AREA = 0.49 Ha
IMPERMEABLE AREA = 1.23 Ha

PRE DEVELOPMENT PEAK RUN-OFF RATES

Qp = 3.61 x Cv x i x Ai

Cv = VOLUMETRIC RUN-OFF COEFFICIENT = 0.75
Ai = IMPERMEABLE AREA = 1.23 ha
i = RAINFALL INTENSITY

i (1 in 1Y) = 65 mm/hr
i (1 in 2 Y) = 84 mm/hr
i (1 in 30 Y) = 158 mm/hr
i (1 in 100 Y) = 204 mm/hr

Qp (1 in 1Y) = 3.61 x 0.75 x 32 x 1.23 = 216 l/s
Qp (1 in 2 Y) = 3.61 x 0.75 x 41 x 1.23 = 280 l/s
Qp (1 in 30 Y) = 3.61 x 0.75 x 78 x 1.23 = 526 l/s
Qp (1 in 100 Y) = 3.61 x 0.75 x 100 x 1.23 = 679 l/s

1:250 0 12.5m 25m

GENERAL NOTES

1.2 DO NOT SCALE FROM THIS DRAWING.
1.3. ALL DIMENSIONS TO BE CHECKED ON SITE AND CO-ORDINATE WITH RELEVANT ARCHITECT'S DRAWINGS. ANY DISCREPANCIES TO BE REPORTED TO ENGINEER PRIOR TO CONSTRUCTION.
1.4. ALL DIMENSIONS IN mm UNLESS NOTED OTHERWISE.
1.5. ALL LEVELS IN METERS.
1.6. STRUCTURAL SIZES HEREON SHALL NOT BE MODIFIED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
1.7. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS DRAWINGS & SPECIFICATIONS.

LEGEND

SITE BOUNDARY
PERMEABLE AREA
IMPERMEABLE AREA

REV.	REVISION NOTE/COMMENT					
	DRW BY	DATE	CCK BY	DATE	APP BY	DATE
P2	ISSUED FOR INFORMATION.					
	OT	21.10.22	MK	21.10.22	AD	21.10.22
P1	ISSUED FOR INFORMATION.					
	BF	10.10.22	MK	10.10.22	AD	10.10.22

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Client
KINGFISHER RESORTS STUDLAND LTD

Project
KNOLL HOUSE, SWANAGE

Drawing
EXISTING RUNOFF RATES

Drawn	Date
BF	OCT 2022
Patrick Parsons Project No.	Scale @ A1
11088	1:250

Status Description	Status
INFORMATION	S2
Drawing No. (project-originator-volume-level-type-role-number)	Revision
KHS-PPC-XX-XX-DR-C-0203	P2

APPENDIX F – MICRODRAINAGE CALCULATIONS

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.450
Area (ha)	1.720	Urban	0.000
SAAR (mm)	867	Region Number	Region 7

Results	**l/s**
QBAR Rural	9.7
QBAR Urban	9.7
Q2 years	8.6
Q1 year	8.2
Q30 years	22.0
Q100 years	31.0

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	PIMP (%)	100
M5-60 (mm)	17.900	Add Flow / Climate Change (%)	0
Ratio R	0.337	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.333	4-8	0.177

Total Area Contributing (ha) = 0.510

Total Pipe Volume (m³) = 5.492

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	5.707	0.057	100.1	0.120	4.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	8.496	0.085	100.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
2.000	5.904	0.059	100.1	0.080	4.00	0.0	0.600	o	100	Pipe/Conduit	
2.001	5.403	0.054	100.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.12	23.900	0.120	0.0	0.0	0.0	0.77	6.0«	16.2
1.001	50.00	4.31	23.800	0.120	0.0	0.0	0.0	0.77	6.0«	16.2
2.000	50.00	4.13	23.900	0.080	0.0	0.0	0.0	0.77	6.0«	10.8
2.001	50.00	4.25	23.800	0.080	0.0	0.0	0.0	0.77	6.0«	10.8

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.002	26.476	0.118	225.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
3.000	4.688	0.047	99.7	0.074	4.00	0.0	0.600	o	100	Pipe/Conduit	🔒
3.001	4.688	0.047	100.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	🔒
1.003	25.371	0.113	224.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
4.000	5.213	0.052	100.3	0.196	4.00	0.0	0.600	o	100	Pipe/Conduit	🔒
4.001	5.213	0.052	100.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	🔒
1.004	21.262	0.094	226.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
5.000	4.054	0.041	98.9	0.040	4.00	0.0	0.600	o	100	Pipe/Conduit	🔒
5.001	4.054	0.041	100.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	🔒
1.005	32.825	1.641	20.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
1.006	21.635	1.082	20.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.002	50.00	4.82	23.715	0.200	0.0	0.0	0.0	0.87	34.5	27.1
3.000	50.00	4.10	23.900	0.074	0.0	0.0	0.0	0.77	6.0«	10.0
3.001	50.00	4.20	23.800	0.074	0.0	0.0	0.0	0.77	6.0«	10.0
1.003	50.00	5.30	23.597	0.274	0.0	0.0	0.0	0.87	34.5«	37.1
4.000	50.00	4.11	23.400	0.196	0.0	0.0	0.0	0.77	6.0«	26.5
4.001	50.00	4.23	23.670	0.196	0.0	0.0	0.0	0.77	6.0«	26.5
1.004	50.00	5.71	23.484	0.470	0.0	0.0	0.0	0.87	34.4«	63.6
5.000	50.00	4.09	23.400	0.040	0.0	0.0	0.0	0.77	6.1	5.4
5.001	50.00	4.18	23.300	0.040	0.0	0.0	0.0	0.77	6.0	5.4
1.005	50.00	5.90	23.390	0.510	0.0	0.0	0.0	2.94	116.9	69.1
1.006	50.00	6.02	21.749	0.510	0.0	0.0	0.0	2.94	116.9	69.1

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.120	0.120	0.120
1.001	-	-	100	0.000	0.000	0.000
2.000	-	-	100	0.080	0.080	0.080
2.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.074	0.074	0.074
3.001	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.196	0.196	0.196
4.001	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.040	0.040	0.040
5.001	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.510	0.510	0.510

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006	EX SW	21.750	20.667	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	5
Number of Online Controls	5	Number of Time/Area Diagrams	3
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.900	Storm Duration (mins)	30
Ratio R	0.337		

Online Controls for Storm

Orifice Manhole: 1, DS/PN: 1.001, Volume (m^3): 1.4

Diameter (m) 0.031 Discharge Coefficient 0.600 Invert Level (m) 23.800

Orifice Manhole: 2, DS/PN: 2.001, Volume (m^3): 1.4

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 23.800

Orifice Manhole: 4, DS/PN: 3.001, Volume (m^3): 1.4

Diameter (m) 0.013 Discharge Coefficient 0.600 Invert Level (m) 23.800

Orifice Manhole: 6, DS/PN: 4.001, Volume (m^3): 1.4

Diameter (m) 0.051 Discharge Coefficient 0.600 Invert Level (m) 23.670

Orifice Manhole: 8, DS/PN: 5.001, Volume (m^3): 1.4

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 23.300

Storage Structures for Storm

Porous Car Park Manhole: PP1, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.5
Membrane Percolation (mm/hr)	1000	Length (m)	115.0
Max Percolation (l/s)	111.8	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	23.530	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: PP2, DS/PN: 2.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	22.8
Max Percolation (l/s)	126.7	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	23.100	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: PP3, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	15.0
Membrane Percolation (mm/hr)	1000	Length (m)	36.0
Max Percolation (l/s)	150.0	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	23.000	Cap Volume Depth (m)	0.400

Porous Car Park Manhole: PP4, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	42.5
Max Percolation (l/s)	118.1	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	23.000	Cap Volume Depth (m)	0.500

Porous Car Park Manhole: PP5, DS/PN: 5.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.5
Membrane Percolation (mm/hr)	1000	Length (m)	73.0
Max Percolation (l/s)	111.5	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	23.100	Cap Volume Depth (m)	0.400

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	5
Number of Online Controls	5	Number of Time/Area Diagrams	3
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.344
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	PP1	1440 minute 1 year Winter I+0%	25.000	23.868	-0.132	0.000	0.00
1.001	1	1440 minute 1 year Winter I+0%	25.000	23.800	-0.100	0.000	0.00
2.000	PP2	1440 minute 1 year Winter I+0%	25.000	23.353	-0.647	0.000	0.00
2.001	2	360 minute 1 year Winter I+0%	25.000	23.800	-0.100	0.000	0.00
1.002	3	15 minute 1 year Summer I+0%	25.000	23.715	-0.225	0.000	0.00
3.000	PP3	1440 minute 1 year Winter I+0%	25.000	23.274	-0.726	0.000	0.00
3.001	4	1440 minute 1 year Winter I+0%	25.000	23.801	-0.099	0.000	0.00
1.003	5	15 minute 1 year Summer I+0%	25.000	23.597	-0.225	0.000	0.00
4.000	PP4	1440 minute 1 year Winter I+0%	24.500	23.415	-0.085	0.000	0.01
4.001	6	1440 minute 1 year Winter I+0%	24.870	23.415	-0.355	0.000	0.00
1.004	7	15 minute 1 year Summer I+0%	24.870	23.484	-0.225	0.000	0.00
5.000	PP5	1440 minute 1 year Winter I+0%	24.500	23.456	-0.044	0.000	0.05
5.001	8	1440 minute 1 year Winter I+0%	24.500	23.457	0.057	0.000	0.03
1.005	9	1440 minute 1 year Winter I+0%	24.500	23.391	-0.224	0.000	0.00
1.006	10	1440 minute 1 year Winter I+0%	22.640	21.750	-0.224	0.000	0.00

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	PP1		0.0	OK
1.001	1		0.0	OK
2.000	PP2		0.0	OK
2.001	2		0.0	OK
1.002	3		0.0	OK
3.000	PP3		0.0	OK
3.001	4		0.0	OK
1.003	5		0.0	OK
4.000	PP4		0.0	OK
4.001	6		0.0	OK
1.004	7		0.0	OK
5.000	PP5		0.3	OK
5.001	8		0.1	SURCHARGED
1.005	9		0.1	OK
1.006	10		0.1	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	5
Number of Online Controls	5	Number of Time/Area Diagrams	3
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.344
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	PP1	480 minute 30 year Winter I+0%	25.000	23.935	-0.065	0.000	0.14
1.001	1	480 minute 30 year Winter I+0%	25.000	23.930	0.030	0.000	0.12
2.000	PP2	1440 minute 30 year Winter I+0%	25.000	23.518	-0.482	0.000	0.00
2.001	2	1440 minute 30 year Summer I+0%	25.000	23.801	-0.099	0.000	0.00
1.002	3	480 minute 30 year Winter I+0%	25.000	23.738	-0.202	0.000	0.02
3.000	PP3	1440 minute 30 year Winter I+0%	25.000	23.413	-0.587	0.000	0.00
3.001	4	1440 minute 30 year Summer I+0%	25.000	23.801	-0.099	0.000	0.00
1.003	5	480 minute 30 year Winter I+0%	25.000	23.620	-0.202	0.000	0.02
4.000	PP4	1440 minute 30 year Winter I+0%	24.500	23.719	0.219	0.000	0.11
4.001	6	1440 minute 30 year Winter I+0%	24.870	23.716	-0.054	0.000	0.11
1.004	7	1440 minute 30 year Winter I+0%	24.870	23.508	-0.201	0.000	0.03
5.000	PP5	960 minute 30 year Winter I+0%	24.500	23.684	0.184	0.000	0.11
5.001	8	1440 minute 30 year Winter I+0%	24.500	23.689	0.289	0.000	0.09
1.005	9	1440 minute 30 year Winter I+0%	24.500	23.402	-0.213	0.000	0.01
1.006	10	1440 minute 30 year Winter I+0%	22.640	21.761	-0.213	0.000	0.01

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	PP1		0.8	OK
1.001	1		0.7	SURCHARGED
2.000	PP2		0.0	OK
2.001	2		0.0	OK
1.002	3		0.7	OK
3.000	PP3		0.0	OK
3.001	4		0.0	OK
1.003	5		0.7	OK
4.000	PP4		0.6	SURCHARGED
4.001	6		0.6	OK
1.004	7		0.8	OK
5.000	PP5		0.6	SURCHARGED
5.001	8		0.4	SURCHARGED
1.005	9		1.2	OK
1.006	10		1.2	OK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 5
Number of Online Controls 5 Number of Time/Area Diagrams 3
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.344
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	PP1	360 minute 100 year Winter I+40%	25.000	24.119	0.119	0.000	0.21
1.001	1	360 minute 100 year Winter I+40%	25.000	24.113	0.213	0.000	0.20
2.000	PP2	1440 minute 100 year Winter I+40%	25.000	24.939	0.939	0.000	0.28
2.001	2	1440 minute 100 year Winter I+40%	25.000	24.933	1.033	0.000	0.17
1.002	3	1440 minute 100 year Winter I+40%	25.000	23.749	-0.191	0.000	0.06
3.000	PP3	1440 minute 100 year Winter I+40%	25.000	24.324	0.324	0.000	0.07
3.001	4	1440 minute 100 year Winter I+40%	25.000	24.323	0.423	0.000	0.05
1.003	5	1440 minute 100 year Winter I+40%	25.000	23.631	-0.191	0.000	0.06
4.000	PP4	480 minute 100 year Winter I+40%	24.500	24.502	1.002	1.755	0.98
4.001	6	480 minute 100 year Winter I+40%	24.870	24.460	0.690	0.000	0.89
1.004	7	480 minute 100 year Winter I+40%	24.870	23.549	-0.160	0.000	0.19
5.000	PP5	960 minute 100 year Winter I+40%	24.500	24.426	0.926	0.000	0.18
5.001	8	960 minute 100 year Winter I+40%	24.500	24.422	1.022	0.000	0.16
1.005	9	480 minute 100 year Winter I+40%	24.500	23.425	-0.190	0.000	0.06
1.006	10	480 minute 100 year Winter I+40%	22.640	21.785	-0.189	0.000	0.06

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	PP1		1.1	SURCHARGED
1.001	1		1.1	SURCHARGED
2.000	PP2		1.5	FLOOD RISK
2.001	2		0.9	FLOOD RISK
1.002	3		1.8	OK
3.000	PP3		0.4	SURCHARGED
3.001	4		0.3	SURCHARGED
1.003	5		1.8	OK
4.000	PP4		5.2	FLOOD
4.001	6		4.7	SURCHARGED
1.004	7		5.8	OK
5.000	PP5		0.9	FLOOD RISK
5.001	8		0.8	FLOOD RISK
1.005	9		6.5	OK
1.006	10		6.5	OK

APPENDIX G – PROPOSED DRAINAGE STRATEGY LAYOUT

DRAWING KHS-PPC-XX-XX-DR-C-0201

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LEGEND

SITE BOUNDARY
GREEN ROOF
SURFACE WATER MANHOLE
SURFACE WATER SEWER
FOUL WATER MANHOLE
FOUL WATER SEWER
PERMEABLE PAVING
100mmØ PERFORATED SW PIPE RUNNING ABOVE MAIN SW SEWER

REV.	REVISION NOTE/COMMENT					
	DRW BY	DATE	CCK BY	DATE	APP BY	DATE
P4	AMENDMENTS TO FOUL AND UPDATES TO NOTES NEW STORM OUTFALL TO DITCHCOURSE VIA HEADWALL					
	RGM	05.01.24			AD	05.01.24
P3	SURFACE WATER OUTFALL POINT CHANGED					
	MK	25.08.23	MG	25.08.23	AD	25.08.23
P2	ISSUED FOR INFORMATION.					
	OT	21.10.22	MK	21.10.22	AD	21.10.22
P1	ISSUED FOR INFORMATION.					
	BF	10.10.22	MK	10.10.22	AD	10.10.22

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Client
KINGFISHER RESORTS STUDLAND LTD

Project
KNOLL HOUSE, SWANAGE

Drawing
DRAINAGE STRATEGY

Drawn	Date
BF	OCT 2022
Patrick Parsons Project No. 11088	Scale @ A1 1:250

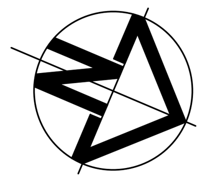
Status Description	Status
INFORMATION	S2

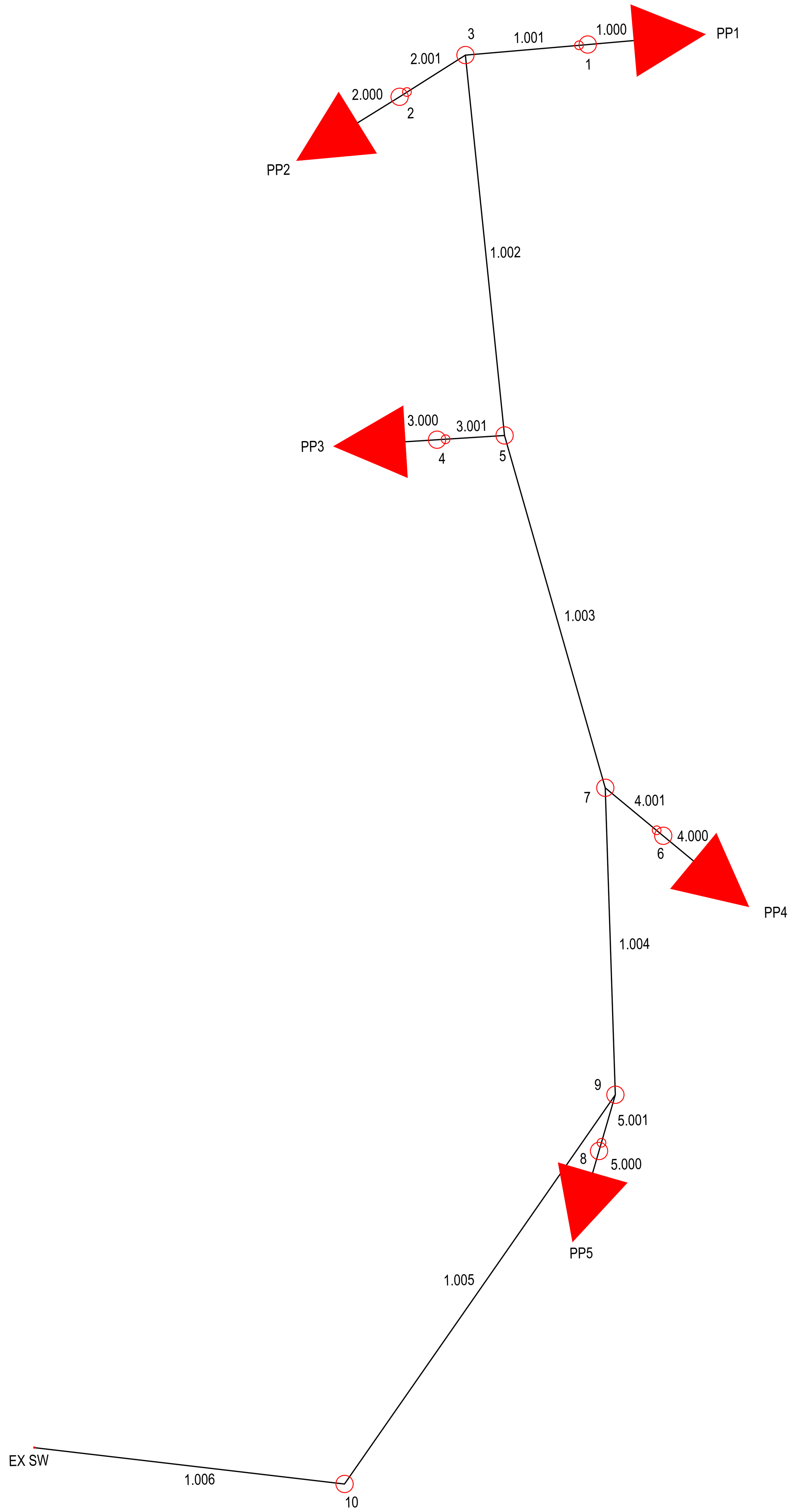
Drawing No. (project-originator-volume-level-type-role-number)	Revision
KHS-PPC-XX-XX-DR-C-0201	P4

APPENDIX H – MICRODRAINGE SCHEMATIC LAYOUT

DRAWING KHS-PPC-XX-XX-DR-C-0204

ORIGINAL SIZE A1





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REV.	REVISION NOTE/COMMENT					
	DRW BY	DATE	CCK BY	DATE	APP BY	DATE
P3	SURFACE WATER OUTFALL POINT CHANGED					
	MK	25.08.23	MG	25.08.23	AD	25.08.23
P2	ISSUED FOR INFORMATION.					
	OT	21.10.22	MK	21.10.22	AD	21.10.22
P1	ISSUED FOR INFORMATION.					
	BF	10.10.22	MK	10.10.22	AD	10.10.22

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Project
KNOLL HOUSE, SWANAGE

Drawing
MICRODRAINAGE SCHEMATIC

Drawn: BF	Date: OCT 2022
Patrick Parsons Project No.: 11088	Scale @ A1: N/A
Status Description: INFORMATION	Status: S2
Drawing No. (project-originator-volume-level-type-role-number): KHS-PPC-XX-XX-DR-C-0204	Revision: P3

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