**MJA CONSULTING**
Civil & Structural Engineers

PROPOSED DEVELOPMENT
LAND WEST OF LYMINGTON BOTTOM ROAD
MEDSTEAD
ALTON
HAMPSHIRE
GU34 5JN

# FLOOD RISK ASSESSMENT & DEVELOPMENT DRAINAGE STRATEGY

BEWLEY HOMES

MARCH 2024
REF: SS/23/0458/6958

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# DOCUMENT CONTROL RECORD

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# Contents

# Appendices

# References

Environment Agency Flood Map Information © and database right www.environment_agency.gov.uk

Contains British Geological Survey materials © NERC (2018)

National Planning Policy Framework (Department for Communities and Local Government, March 2012)

PPG Flood risk and coastal change (Department for Communities and Local Government, March 2014)

East Hampshire District Council Level 1 Strategic Flood Risk Assessment (SFRA) (May 2022)

Hampshire County Council Preliminary Flood Risk Assessment (PFRA) (HCC, April 2011)

# 1 Executive Summary

| | | |
|---|---|---|
| SITE INFORMATION | CLIENT | Bewley Homes PLC |
| | SITE NAME | Land west of Lymington Bottom Road |
| | SITE LOCATION | SU 66127 35290<br>Lymington Bottom Road, South Medstead, Alton<br>GU34 5JN |
| | SITE AREA<br>CURRENT LAND USE | 2.1 ha<br>Mixed - Greenfield Arable & Residential |
| | PROPOSED LAND USE | No. 53 Units Residential |
| | SITE GEOLOGY – Superficial<br>SITE GEOLOGY - Bedrock | Clay-with-flints Formation – Clay, Silt, Sand and Gravel<br>Seaford Chalk Formation – Chalk |
| | SOIL INFILTRATION RATE | 3.0x10$^{-5}$ m/s (BRE365) |
| | GROUNDWATER LEVELS | >3.0 m BGL |
| | GROUNDWATER SPZ / AQUIFER | Not in an SPZ.<br>Bedrock: Principle. Superficial: Secondary Unproductive |
| | GROUND CONTAMINATION | Low Risk |
| | | |
| FLOOD RISK | ENVIRONMENT AGENCY FLOOD ZONE | Flood Zone 1 - Lowest Risk < 0.1% (<1:1000) |
| | FLUVIAL (RIVERS & WATERCOURSES) | Not a risk |
| | PLUVIAL (SURFACE WATER) | Not a risk |
| | GROUNDWATER | Not a risk |
| | EXISTING/PROPOSED SEWERS & MAINS | Not a risk |
| | ARTIFICIAL | Not a risk |
| | TIDAL | Not a risk |
| | | |
| FOUL & SURFACE | PROPOSED SURFACE WATER STRATEGY | Infiltration |
| | PROPOSED SUDS TYPE | Permeable Paving, Cellular Crate Soakaway and Deep Borehole Soakaway |
| | EXISTING SW PEAK FLOW RATE | Greenfield |
| | PROPOSED SW PEAK FLOW RATE | N/A |
| | FOUL WATER STRATEGY | Connection to Thames Water Foul Sewer |
| | EXISTING FW PEAK FLOW RATE | > 0.1 l/s |
| | PROPOSED FW PEAK FLOW RATE | 2.45 l/s Thames Water capacity confirmed |
| | | |

# 2 Introduction

## Scope

2.1 Bewley Homes PLC is seeking full planning permission for the erection of no. 53 dwellings with vehicular access from Lymington Bottom Road, and the provision of public open space, landscaping and other associated works.

2.2 The 2.1 ha site is located at land west of Lymington Bottom Road, South Medstead, Alton Hampshire. Refer to Appendix A for site layout.

2.3 MJA Consulting has been appointed to provide a Flood Risk Assessment & Drainage Strategy suitable to submit as part of the planning application for the disposal of foul and surface water from the proposed development.

## Report Structure

2.4 The National Planning Policy Framework (NPPF) and the Flood Risk and Coastal Planning Practice Guidance (PPG) is the current guidance on development and flood risk in England and Wales. The Flood Risk technical guidance for the National Planning Policy Framework requires a Flood Risk Assessment (FRA) to be carried out on sites over 1ha to consider all potential forms of flooding including that from river, sea, estuarial, land drainage, groundwater, overland flow, surface water run-off, sewer systems, and artificial water bodies (lakes, reservoirs, canals etc.) to both the development site and to offsite parties and land.

2.5 This report will take the structure of a 'Flood Risk Assessment' in accordance with the National Planning Policy Framework, the Flood Risk and Coastal Planning Practice Guidance, Environment Agency's Flood Risk Assessment Guidance and CIRIA Report 624 'Development and Flood Risk.

2.6 The objectives of this report are:

To confirm whether the proposed development site is affected by current or anticipated future flooding from all sources for the lifetime of the site.
To confirm that this development will not increase the risk of flooding to any offsite properties and land or increase the population within a floodplain.
To undertake calculations to establish the foul and surface water runoff rates from the existing site and to assess the potential foul and surface water runoff from the proposed development.
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 approving 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 & PPG).

# 3 The Development Site

Figure 1: Site location

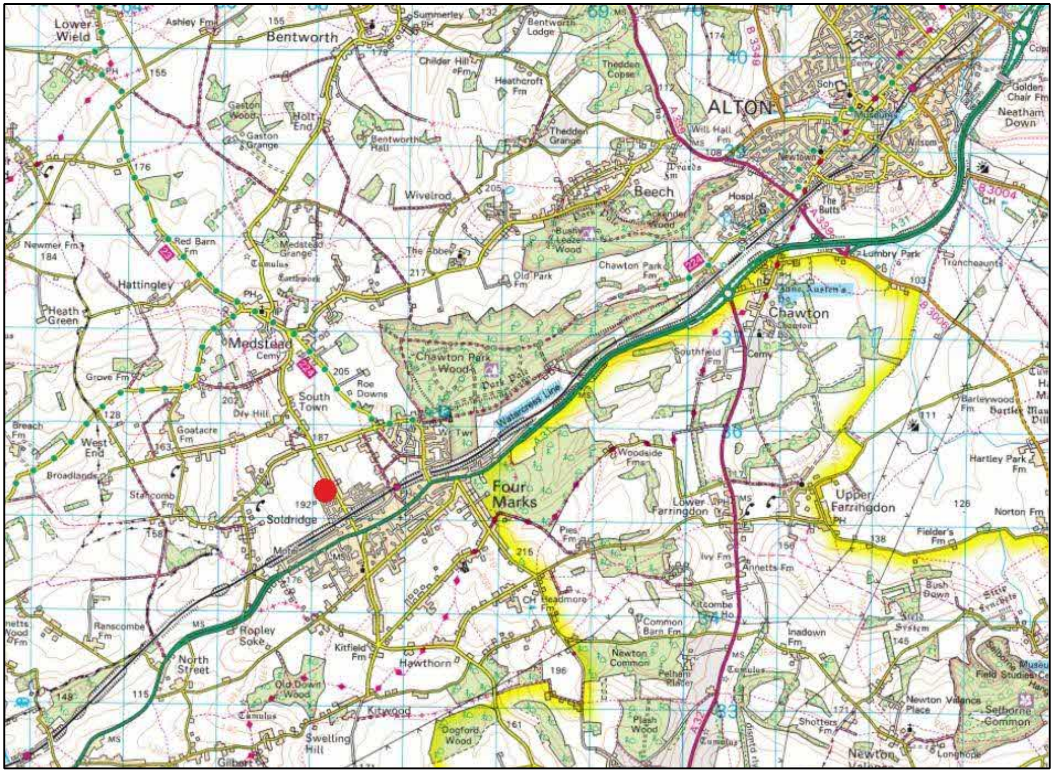


Image courtesy of Bing Maps, 2024 Microsoft Corporation Image courtesy of Ordnance Survey

Figure 2: Development site

Image courtesy of Google Maps, 2024 Microsoft Corporation

## Site Location and Description

3.1 The application site is located at land to the west of Lymington Bottom Road, South Medstead, in Alton, Hampshire. The site is centred on National Grid Reference SU 66127 35290 and is bound by Rosings Grove to the south and residential dwellings to the east and west. The site comprises greenfield land and a residential dwelling along Lymington Bottom Road.

## Topography

3.2 A topographical survey of the site indicates the site falls from west-to-east and west-to-southeast with levels ranging from 191.00 mAOD (metres above Ordnance Datum) to 182.50 mAOD. Refer to Appendix B for a Topographical Survey of the existing site.

## Geology

3.3 Information published by the British Geological Survey (BGS) indicates the underlying geology at the site as Seaford Chalk Formation (Chalk), with superficial Clay-with-flints Formation (Clay, silt, sand and gravel).

3.4 Site ground investigations carried out by LEAP Environmental Consultants revealed the site geology consists of silty, slightly gravelly and cobbly clays, to cobbly clays, from 1.0m to 5.0m bgl. This stratum was underlain by structureless white chalk, composed of gravelly to very gravelly silt and a few variations of silty gravel.

## Soil Permeability

3.5 Soil infiltration testing was carried out eight times across three locations across the site at various depths down to 2 m BGL in accordance with the principles of BRE365. Infiltration was found to range from $5.15\times 10^{-5}$ m/s to $1.88\times 10^{-6}$ m/s.

## Groundwater, Hydrogeology and Hydrology

3.6 Groundwater egress was not encountered during any of the soakage testing. Only one monitoring well in the southeast of the site encountered groundwater at 4.29mbgl.

3.7 The Environment Agency has classified the site as not being within or near a Source Protection Zone. However, it is classified as being within a Nitrate Vulnerable Zone.

3.8 Under the Environment Agency’s classification system, the bedrock (Seaford Chalk Formation) is classified as a ‘Principle’ aquifer. These are layers of rock that have high intergranular and/or fracture permeability, meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

3.9 The superficial soils (Clay-with-flints) are classified as ‘unproductive’. These are strata that are largely unable to provide usable water supplies and unlikely to have surface water and wetland ecosystems dependent on them.

3.10 There are no main rivers within 2km of the site. There no watercourses present in the form of ditches within the site boundary, nor along the perimeter of the site.

### Existing Site Drainage Characteristics

3.11 In its greenfield state the site primarily comprises grassed field and as such the majority of surface runoff is able to drain into the underlying soils due to the permeability of the underlying chalk strata. There is a brick-built bungalow with driveway as well as a small garage in the north-east of the site over the proposed access.

# 4 Flood Risk

4.1 The assessment of flood risk to the site requires that all potential forms of flooding are considered. In accordance with the Environment Agency's Flood Risk Assessment Guidance, NPPF, PPG and CIRIA Report 624, sources of flooding to be assessed include tidal, fluvial (rivers, streams and watercourses), pluvial (overland rainfall runoff), groundwater, artificial sources (canals and reservoirs) and existing/proposed sewerage and water mains infrastructure.

## History of Flooding

4.2 During the data collection process, it is important to consider the information which already exists for the site location with respect to flood risk. The main sources of data for flood risk and recorded incidents of flooding for this site has been the East Hampshire District Council Strategic Flood Risk Assessment (SFRA) (May 2022) and the Hampshire County Council Preliminary Flood Risk Assessment (PFRA) (HCC, April 2011). Additional information has been obtained from The Environment Agency and British Society Chronology of Extreme Hydrological Events.

4.3 Within the SFRA/PRFA studies, consultation was carried out with all appropriate authorities and organisations including the Environment Agency, Thames Water, local councils and local community stakeholders to identify known or perceived problem areas with respect to flooding.

4.4 With reference to the above, and in the context of the proposed development, there are no historic issues of flooding from the following potential sources including:

Fluvial (Rivers and Sea).
Tidal.
Groundwater.
Pluvial (Surface water runoff).
Existing foul, storm and combined sewers or potable water main infrastructure.
Artificial infrastructure.

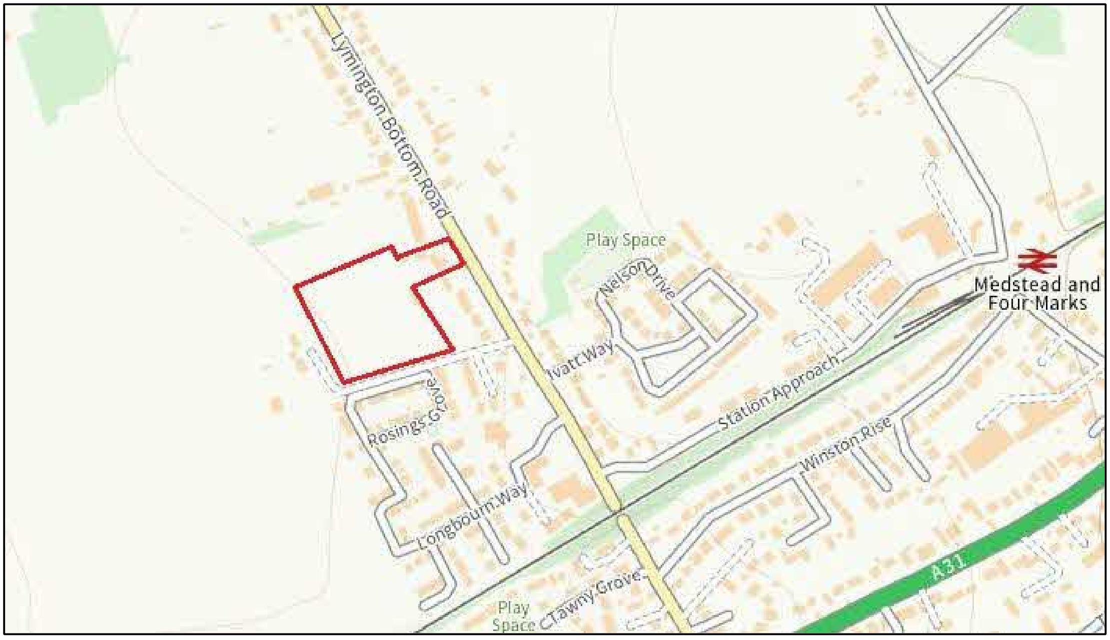
4.5 Nevertheless, the new development must not create or exacerbate any existing flood risk within the local area. During the design of the proposed development, careful consideration will be given to the most appropriate and sustainable method of foul and surface water disposal.

## Fluvial

4.6 There are no watercourses within 500m of the site, with the closest main river, Caker Stream, 14km east of the site near Alton. The Environment Agency confirms that no incidents of flooding from main rivers or ordinary watercourses have been recorded at the site.

4.7 The Environment Agency (EA) is the principal flood risk management operating authority in England. The EA has carried out a national flood risk assessment (NaFRA) which assesses the probability of flooding to land from all main rivers in England. The results of this modelling are combined and calibrated against data from recorded flood events to produce the Environment Agency's Flood Zone Map (Figure 3).

Figure 3: Extract from Environment Agency River and Sea Water Flood Map (December 2023)



Contains Environment Agency information © Environment Agency 2023

Key:

╱ Main Rivers

Dark Blue ■: (Flood Zone 3)
Shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded: from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year, or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light Blue □: (Flood Zone 2)
Shows the additional extent of an extreme flood from rivers or the sea.
These outlying areas are likely to be affected by a major flood, with up to a 0.1% (1 in 1000) chance of occurring each year. These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements.

Clear □: (Flood Zone 1)
Shows the area where flooding from rivers and the sea is very unlikely.
There is less than a 0.1% (1 in 1000) chance of flooding occurring each year.

4.8 The latest Environment Agency 'Flood Zone Map' (December 2023) indicates the entire site is located within the lowest risk category - Flood Zone 1. 'Flood Zone 1' is land assessed as having a less than 1 in 1000 (<0.1%) annual probability of flooding from a main river in each year and is not within an area of recorded river flooding.

4.9 Hampshire County Council as the Lead Local Flood Authority (LLFA) are responsible for assessing the flood risk from all other ordinary watercourses (non-main rivers) in the Blackwater area, with this information detailed in the SFRA. This study has concluded that the site is not at risk of flooding from all ordinary watercourses within the locality of the development.

4.10 It is demonstrated that safe and dry access and egress at the site is achievable to a publicly accessible location outside the 1:100 year (plus climate change) flood event extent, in accordance with DEFRA Report FD2320/TR2 - 'Flood Risk Assessment Guidance for New Developments'. All site entrances provide safe egress.

### Tidal

4.11 Medstead and its local river networks do not encounter a risk from tidal flooding as confirmed by the SFRA, PFRA and the Environment Agency.

### Surface Water

4.12 The 'FMfSWF' (Flood Map for Surface Water Flooding) presented within the SFRA confirms that no incidents of flooding from surface water runoff have been recorded at the site. Since the SFRA/PFRA reports were produced, no further evidence of surface water flooding at the site has been identified.

4.13 The Environment Agency's 'uFMfSW' (updated Flood Map for Surface Water) (Figure 4) is a theoretical assessment of potential overland flow paths, ground levels and drainage systems using information from Hampshire County Council as the LLFA to indicate areas that may be susceptible to surface water flooding.

Figure 4: Extract from Environment Agency Surface Water Flood Map (December 2023)

Contains Environment Agency information © Environment Agency 2023

Key:

🟦 High (Greater than 1:30(3.3%) chance of flooding)

🟦 Medium (Between 1:100(1%) and 1:30(3.3%) chance of flooding)

🟦 Low (Between 1:1000 (0.1%) and 1:100 (1%) chance of flooding)

☐ Very Low (Less than 1:1000 (0.1%) chance of flooding)

4.14 The latest Environment Agency ‘Flood Zone Map’ (July 2022) indicates that the existing site has a ‘very low’ (less than a 1:1000 or 0.1%) risk of flooding from surface water runoff.

4.15 The implementation of a robust drainage scheme to collect, attenuate and convey the surface water runoff from the proposed development will mitigate any residual risk of surface water flooding to the site in its redeveloped state.

### Groundwater

4.16 The PFRA, SFRA and the Environment Agency confirm that no recorded events of groundwater flooding have been identified at or within the vicinity of the site.

4.17 Groundwater was encountered at only one water monitoring well in the southeast of the site encountered groundwater at 4.29mbgl.

### Artificial Sources

4.18 With reference to the SFRA/PRFA there have been no recorded incidents of flooding to the site or surrounding areas from artificial sources.

4.19 There are no additional artificial sources of flooding, such as from canals, reservoirs and sewage treatment works within a 1 km radius of the site.

### Existing Sewers & Water Mains

4.20 The SFRA confirms that for the area in which the site lies, there have been no incidents of flooding from sewers in the last 10 years.

4.21 There have been no recorded incidents of flooding from the existing foul and surface water sewers or potable water mains within the vicinity of the development.

### Proposed Site Drainage

4.22 A Flood Risk Assessment requires that an evaluation of all proposed artificial drainage systems and infrastructure within, or in proximity to the site is carried out. In the context of this development, the following systems are to be installed which need to be assessed in terms of potential flooding through the capacity of the systems being exceeded or the structural, hydraulic, mechanical or operational failure of the system occurring during the lifetime of the development:

Piped foul water sewers, manholes and potable water mains.
SuDS for the temporary conveyance and attenuation of surface water.

4.23 All drainage is to remain private and will be constructed in accordance with The Building Regulations Part H, BS EN 752 or BS EN 12056-2 as appropriate, ensuring adequate design capacity and robust structural integrity for the lifetime of the development. This will prevent the risk of flooding to both the development and offsite parties.

4.24 All SuDS within the drainage system will be sized to manage the runoff from the exceptionally rare 1 in 100 storm event (1% AEP), plus an additional 45% allowance for predicted future climate change effects (in accordance with EA recommendations up to the year 2115).

4.25 The new development must not create or exacerbate existing flood risk elsewhere and in particular to properties, land and highways downstream of the site. During the design of the proposed development, careful consideration has been given to the most sustainable method of surface water disposal and strict controls have been imposed to limit the peak rate and volume of runoff generated from the developed site.

4.26 All surface water runoff from impermeable areas on the proposed development will be attenuated and safely disposed of at a controlled rate to replicate the natural runoff regime for the site as if it were greenfield. This will ensure that the risk of flooding to properties and land downstream of the site will not increase as a result of this proposed development.

### Sequential Test

4.27 The flood risk technical guidance to the National Planning Policy Framework (NPPF) categorises residential developments such as dwellings and hotels as ‘More Vulnerable’ within the risk classification. ‘More vulnerable’ developments located within Flood Zone 1 are considered appropriate under the NPPF.

4.28 The NPPF guidance states that planning authorities should complete a risk-based ‘Sequential Test’ at all stages of the planning process, to steer new development to areas with the lowest probability of flooding. Under the requirements of the ‘Sequential Test’ and as the proposed development is already located within Flood Zone 1 (lowest risk), there are no more suitable, developable and deliverable alternative sites, better located from a flood risk perspective which could accommodate the proposed development.

# 5 Existing and Proposed Site Runoff

5.1 This section aims to calculate the estimated peak rate and volume of surface water runoff from the existing site. These discharge figures are then used to establish the post-development constraints to inform the preliminary design of the site surface water drainage strategy.

## Catchment Areas

5.2 The existing and proposed permeable and impermeable areas are listed in the table below.

| Site Catchment | Impermeable | Permeable | Total |
|---|---|---|---|
| Existing Site Area | 958 m² | 20,022 m² | 20,980 m² |
| Proposed Site Area | 10,015 m² | 10,965 m² | 20,980 m² |

5.3 This development represents an overall approximate increase of 9,057 m² in impermeable area post-development.

## Surface Water Runoff Peak Runoff Rate & Volume (Greenfield)

5.4 An assessment of the estimated current greenfield runoff rate has been carried out using the Institute of Hydrology Report 124 (QBar) methodology. Refer to Appendix D for a summary of Microdrainage results.

Catchment: 1.002 ha (FSR)

| | |
|---|---|
| 1 Year | 0.5 l/s |
| QBar | 0.5 l/s |
| 30 Year | 1.2 l/s |
| 100 Year | 1.7 l/s |
| Volume 100y 6hr | 89.89 m³ |

## Post Development Surface Water Runoff Peak Runoff Rate & Volume

5.5 The procedure for surface water management in accordance with 'Rainfall runoff management for developments' (DEFRA/EA Report – SC030219 E, 2013) states; *"For the range of annual flow rate probabilities up to and including the 1% (1 in 100 year) annual exceedance probability event including an appropriate allowance for climate change, the post-developed rate of run-off into a watercourse, sewer, or other receiving water body, should be no greater than the existing pre-developed rate of run-off for the same event"*.

5.6 The National Planning Policy Framework requires that consideration is given to the effect of climate change on the surface water flows generated by any new development. Table 2 of the NPPF - Flood Risk Assessments: Climate Change Allowances – Detailed Guidance (Feb 2016), specifies that an assessment of a 45% increase in rainfall intensity allowance is made when calculating post-development runoff rates for residential developments.

5.7 The additional volume of runoff generated from a site should also be limited to the greenfield runoff volume where possible. Where infiltration cannot be utilised to dispose of the additional volume; *"The limiting discharge for any return period up to the 1% AEP (1 in 100 year) event including climate change, shall not be greater than the mean annual peak rate of runoff for the greenfield site – QBar or 2 l/s/ha, whichever is the greatest"*.

# 6 Surface Water Drainage Strategy

6.1 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.

6.2 Environment Agency guidance and government legislation such as the Flood and Water Management Act (Defra 2010) requires 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).

6.3 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 by reducing peak runoff rates and volumes to sewer networks and watercourses, reducing the risk of downstream flooding.

6.4 The Building Regulations Document H (2015) details the appropriate hierarchy of potential methods for disposing of surface water from a development:

1. A soakaway or some other adequate infiltration system, or where that is not practicable;
2. A watercourse, or where that is not possible;
3. A sewer.

6.5 Soil infiltration testing was carried out at three locations across the site at various depths down to 2 m BGL in accordance with the principles of BRE365. Infiltration was found to range from $5.15 \times 10^{-5}$ m/s to $1.88\times 10^{-6}$ m/s. Therefore, infiltration as a method of disposing the surface water runoff generated from the proposed development is feasible.

6.6 There are no surface water sewers within the vicinity of the site.

6.7 It is therefore proposed to discharge all surface water runoff generated from the proposed development's hard standing areas including roofs, driveways and roads to two cellular crate soakaways. Due to a high-point located in the middle of the site, each soakaway is located in the two low points on either side of the site. One soakaway is located to the south-east, taking runoff from the most southern 3rd of the site, the other is located in the north-east to attenuate the remaining surface runoff.

6.8 The soakaways are sized to attenuate runoff for all storm events up to and including the 1 in 100 year +45% for climate change. See Appendix C for drainage strategy.

6.9 Permeable paving is proposed for private shared parking and shared driveways, with all new permeable paving having 300mm of (4/20) Open Graded Crushed Rock type 3 sub-base. See Appendix C for drainage strategy.

6.10 A 10% allowance for urban creep has also been included in the calculations.

6.11 The occurrence of overland flooding at the site due to an extreme rainfall event exceeding the design capacity of the drainage system and SuDS have been considered both during the construction and operational phase of the development.

6.12 Any residual risk of overland flooding to buildings is to be mitigated by the provision of raised slab levels a minimum of 150 mm above surrounding ground level.

6.13 All drains and manholes/inspection chambers will be designed and constructed in accordance with the Building Regulations Part H and BS EN 752, ensuring adequate capacity and robust structural integrity for the lifetime of the development. This will ensure that no polluted discharge from the drainage system to ground will take place.

### Water Quality and Pollution Prevention

6.14 As the site is located within a nitrate vulnerable zone, the proposed SuDS scheme has been designed to mitigate against the contamination of the surface and groundwater. The CIRIA SuDS Manual 2015 details an approach for establishing the hazard posed by the intended land use activates and the extent to which the proposed SuDS components can reduce and mitigate the contamination risk to the receiving waterbody.

6.15 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 1 - Table 26.2 – 'Pollution hazard indices for different land use classifications' CIRIA C753, 2015

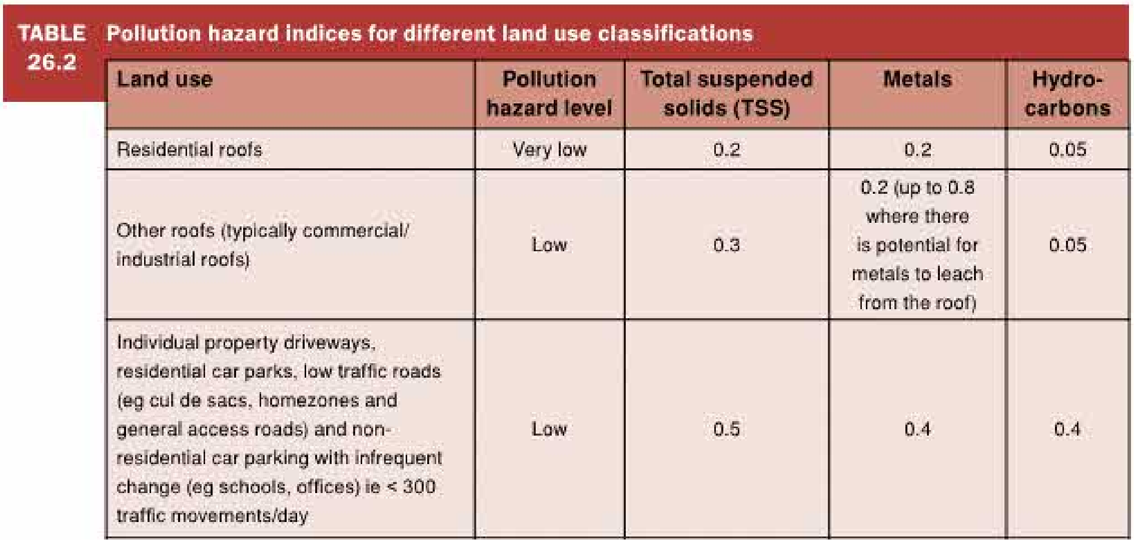


**TABLE 26.2 Pollution hazard indices for different land use classifications**

| Land use | Pollution hazard level | Total suspended solids (TSS) | Metals | Hydro-carbons |
|---|---|---|---|---|
| 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 |

6.16 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type):

<u>Driveway / Parking / Road Runoff</u>:

Total SuDS mitigation index ≥ pollution hazard index (for each contaminant type)

For the development site: TSS = 0.5, Metals = 0.4, Hydrocarbons = 0.4

Table 2 - Table 26.4 – 'Indicative SuDS mitigation indices for discharges to groundwater' CIRIA C753, 2015

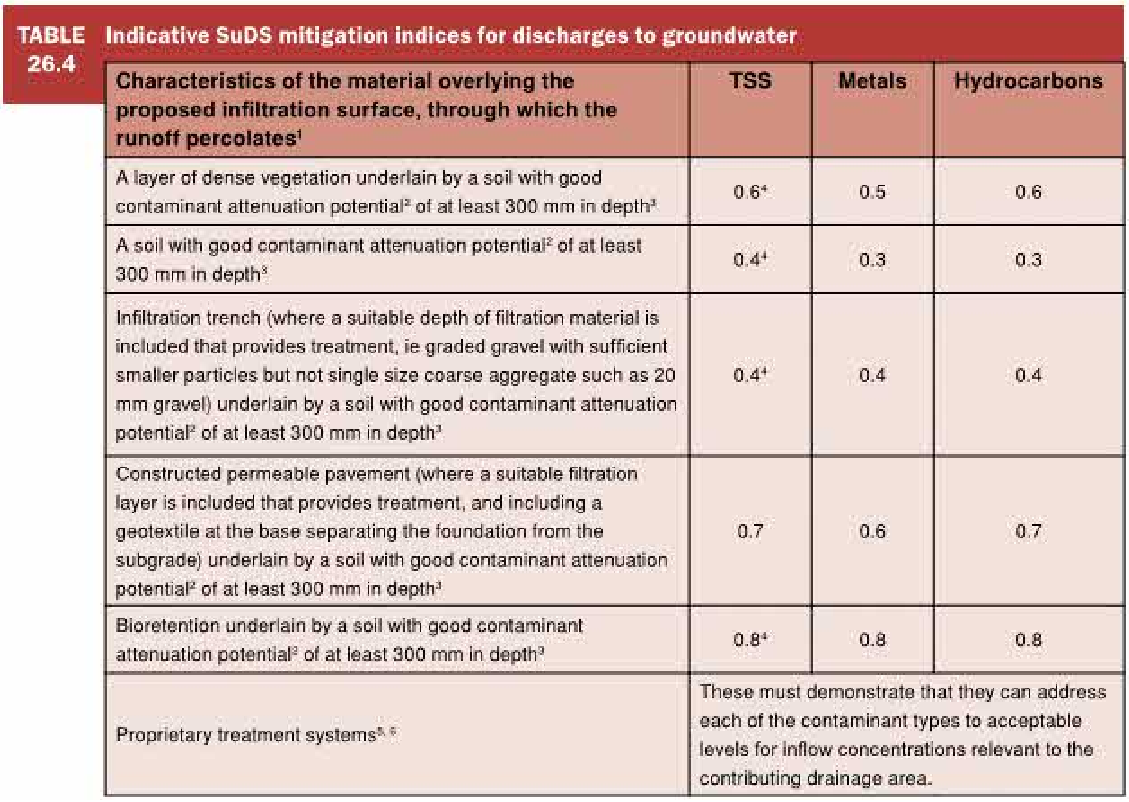


**TABLE 26.4** **Indicative SuDS mitigation indices for discharges to groundwater**

| 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. | | |

6.17 The proposed development surface water drainage system consists of the following SuDS component:

Driveway / Parking / Road Runoff:

Primary Treatment – Permeable Paving

Using table 26.3 – 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.

6.18 The addition of a proprietary device such as a downstream defender which can clean flows not passing through permeable paving can mitigate the remaining risk of contamination of groundwater.

6.19 The proposed SuDs features are adequate to treat all run-off from the development. The use permeable paving and proprietary devices removes the majority of sediments, nutrients and hydrocarbons improving the quality of surface water runoff.

### SuDS Management and Maintenance

6.20 It is envisaged that on site staff will be responsible for the management and maintenance of all SuDS on site. Please see SuDS Management and Maintenance plan in Appendix F for further details.

# 7 Foul Water Drainage Strategy

7.1 The foul water flows generated from the development will discharge via gravity to an existing Thames Water sewer, south of the site, within Lymmington Bottom Road.

7.2 The predicted peak foul sewer discharge from the 53 units based on the Sewers for Adoption guidance of 4000 l/dwelling/day will be 2.45 l/s.

7.3 A package pumping station will not be required.

7.4 Thames Water have been contacted to confirm that there is adequate capacity for the proposed development flows. The proposed development will have a ‘no detriment’ impact on the local foul sewer system and does not create an increase in flood risk.

# APPENDIX A

## SITE LAYOUT

Notes:
This drawing and the works depicted are the copyright of Boyer.
This drawing is for planning purposes only. It is not intended to be used for construction purposes. Whilst all reasonable efforts are used to ensure drawings are accurate, Boyer accept no responsibility or liability for any reliance placed on, or use made of, this plan by anyone for purposes other than those stated above.

All contractors must visit the site and be responsible for taking and checking Dimensions.

Key:
🟥 Application boundary

| Rev | Date | Description | Drawn | Chkd |
|---|---|---|---|---|
| Z | 21.12.23 | Minor updates | MR | NB |
| Y | 19.12.23 | Highway comments incorporated | MR | NB |
| X | 15.12.23 | Highway comments incorporated | AW | AW |
| W | 13.12.23 | Layout updated to work with the supporting plans | AW | AW |
| V | 12.12.23 | Highway comments incorporated | AW | AW |

Client
Bewley Homes PLC

Boyer

Project
Land West of Lymington Bottom Rd
South Medstead

Drawing Title
Proposed Site Layout

Drawing No. SL-01
Job Ref. 21.2039
Scale @ A1 1:500
Revision Z
Scale Bar 0 5 10 15m

Boyer Planning Ltd, Crowthorne House, Nine Mile Ride, Wokingham, Berkshire, RG40 3GZ

# APPENDIX B

## TOPOGRAPHICAL SURVEY

# APPENDIX C

## FOUL AND SURFACE WATER DRAINAGE STRATEGY

Deep borehole Soakaway to utilise chalk bedrock.
Infiltration Rate: TBC
Location, size and depth TBC following further infiltration testing and site investigations.

Hydrobrake Control Chamber. Flow rate TBC based on infiltration rate.

Indicative Cellular Crate Tank (SDS Geolight units or similar approved) designed to store 1:100 year +45% +10% Urban Creep. 13m x 8m x 2.25m deep (234m³).

Cellular Crate Soakaway (SDS Geolight units or similar approved) designed to store 1:100 year +45% +10% Urban Creep. 8m x 36m x 2.25m deep (648m³). Infiltration Rate: 3.0 x $10^{-5}$ m/s (Lowest rate from TP07 test.)

Foul water drainage from development to connect via gravity into the existing Thames Water sewer within Lymmington Bottom Road. A connection via a S106 agreement will be made with Thames Water. The peak sewer discharge from the site will be 2.45 l/s and will connect to the existing system at an unrestricted rate.

Existing Thames Water Foul Sewer

KEY:

Proposed Sewers:
- Foul sewer
- Storm sewer
- Highway Gully
- Foul drain
- Storm drain
- Rodding eye
- Yard gully
- Cellular Soakaway
- Exceedance Flow Path

| REV. No. | DATE | DESCRIPTION | DRAWN | CHECKED |
|---|---|---|---|---|
| P3 | 01.03.24 | Updated to new layout. | RJC | TC |
| P2 | 26.01.24 | Surface water amended. Private drainage added. | TC | TC |
| P1 | 19.12.23 | First Issue. | RJC | TC |

Client: BEWLEY HOMES

MJA CONSULTING
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Project: Lymington Bottom Road, Medstead

Title: Drainage Strategy

Scale: 1:250 @ A0
Status: PRELIMINARY
Drawn: RJC
Project Engineer: TC
MJA Project No: 6958
Date: 12/2023
Drawing Number: 6958-MJA-SW-XX-DR-C-070
Rev: P3

# APPENDIX D

## PRE / POST DEVELOPMENT RUNOFF AND STORAGE CALCULATIONS

## ICP SUDS Mean Annual Flood

```
                          Input

Return Period (years)   100          Soil    0.150
            Area (ha) 1.002         Urban    0.000
            SAAR (mm)   900 Region Number Region 7

                     Results   l/s

                   QBAR Rural 0.5
                   QBAR Urban 0.5

                   Q100 years 1.7

                      Q1 year 0.5
                    Q30 years 1.2
                   Q100 years 1.7
```

## Greenfield Runoff Volume

### FSR Data

| | |
|---|---|
| Return Period (years) | 100 |
| Storm Duration (mins) | 360 |
| Region | England and Wales |
| M5-60 (mm) | 20.000 |
| Ratio R | 0.350 |
| Areal Reduction Factor | 1.00 |
| Area (ha) | 1.002 |
| SAAR (mm) | 900 |
| CWI | 121.952 |
| Urban | 0.000 |
| SPR | 10.000 |

### Results

| | |
|---|---|
| Percentage Runoff (%) | 13.62 |
| Greenfield Runoff Volume ($m^3$) | 89.888 |

## Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 720 minutes.

| **Storm Event** | **Max Level (m)** | **Max Depth (m)** | **Max Infiltration (l/s)** | **Max Volume (m³)** | **Status** |
|---|---|---|---|---|---|
| 15 min Summer | 96.810 | 0.810 | 5.4 | 221.6 | O K |
| 30 min Summer | 97.081 | 1.081 | 5.8 | 295.6 | O K |
| 60 min Summer | 97.361 | 1.361 | 6.2 | 372.5 | O K |
| 120 min Summer | 97.627 | 1.627 | 6.5 | 445.2 | O K |
| 180 min Summer | 97.755 | 1.755 | 6.7 | 480.1 | O K |
| 240 min Summer | 97.824 | 1.824 | 6.8 | 499.0 | O K |
| 360 min Summer | 97.897 | 1.897 | 6.9 | 519.0 | O K |
| 480 min Summer | 97.916 | 1.916 | 6.9 | 524.4 | O K |
| 600 min Summer | 97.907 | 1.907 | 6.9 | 521.8 | O K |
| 720 min Summer | 97.891 | 1.891 | 6.9 | 517.4 | O K |
| 960 min Summer | 97.849 | 1.849 | 6.8 | 505.9 | O K |
| 1440 min Summer | 97.754 | 1.754 | 6.7 | 479.9 | O K |
| 2160 min Summer | 97.624 | 1.624 | 6.5 | 444.3 | O K |
| 2880 min Summer | 97.503 | 1.503 | 6.3 | 411.3 | O K |
| 4320 min Summer | 97.280 | 1.280 | 6.0 | 350.1 | O K |
| 5760 min Summer | 97.080 | 1.080 | 5.8 | 295.4 | O K |
| 7200 min Summer | 96.907 | 0.907 | 5.5 | 248.2 | O K |
| 8640 min Summer | 96.756 | 0.756 | 5.3 | 206.9 | O K |
| 10080 min Summer | 96.625 | 0.625 | 5.2 | 171.0 | O K |
| 15 min Winter | 96.810 | 0.810 | 5.4 | 221.6 | O K |

| **Storm Event** | **Rain (mm/hr)** | **Flooded Volume (m³)** | **Time-Peak (mins)** |
|---|---|---|---|
| 15 min Summer | 136.560 | 0.0 | 25 |
| 30 min Summer | 91.729 | 0.0 | 38 |
| 60 min Summer | 58.739 | 0.0 | 68 |
| 120 min Summer | 36.254 | 0.0 | 126 |
| 180 min Summer | 26.900 | 0.0 | 186 |
| 240 min Summer | 21.623 | 0.0 | 244 |
| 360 min Summer | 15.914 | 0.0 | 362 |
| 480 min Summer | 12.782 | 0.0 | 480 |
| 600 min Summer | 10.774 | 0.0 | 574 |
| 720 min Summer | 9.365 | 0.0 | 624 |
| 960 min Summer | 7.499 | 0.0 | 750 |
| 1440 min Summer | 5.473 | 0.0 | 1012 |
| 2160 min Summer | 3.985 | 0.0 | 1428 |
| 2880 min Summer | 3.178 | 0.0 | 1844 |
| 4320 min Summer | 2.306 | 0.0 | 2640 |
| 5760 min Summer | 1.834 | 0.0 | 3456 |
| 7200 min Summer | 1.536 | 0.0 | 4184 |
| 8640 min Summer | 1.330 | 0.0 | 4928 |
| 10080 min Summer | 1.178 | 0.0 | 5648 |
| 15 min Winter | 136.560 | 0.0 | 25 |

## Summary of Results for 100 year Return Period (+45%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 30 min Winter | 97.081 | 1.081 | 5.8 | 295.8 | O K |
| 60 min Winter | 97.363 | 1.363 | 6.2 | 373.0 | O K |
| 120 min Winter | 97.632 | 1.632 | 6.5 | 446.4 | O K |
| 180 min Winter | 97.762 | 1.762 | 6.7 | 482.1 | O K |
| 240 min Winter | 97.833 | 1.833 | 6.8 | 501.5 | O K |
| 360 min Winter | 97.911 | 1.911 | 6.9 | 523.0 | O K |
| 480 min Winter | 97.937 | 1.937 | 6.9 | 530.0 | O K |
| 600 min Winter | 97.934 | 1.934 | 6.9 | 529.1 | O K |
| 720 min Winter | 97.914 | 1.914 | 6.9 | 523.6 | O K |
| 960 min Winter | 97.860 | 1.860 | 6.8 | 508.9 | O K |
| 1440 min Winter | 97.740 | 1.740 | 6.7 | 476.0 | O K |
| 2160 min Winter | 97.561 | 1.561 | 6.4 | 427.0 | O K |
| 2880 min Winter | 97.388 | 1.388 | 6.2 | 379.7 | O K |
| 4320 min Winter | 97.073 | 1.073 | 5.8 | 293.4 | O K |
| 5760 min Winter | 96.804 | 0.804 | 5.4 | 219.9 | O K |
| 7200 min Winter | 96.581 | 0.581 | 5.1 | 159.1 | O K |
| 8640 min Winter | 96.398 | 0.398 | 4.9 | 108.9 | O K |
| 10080 min Winter | 96.250 | 0.250 | 4.7 | 68.4 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 30 min Winter | 91.729 | 0.0 | 38 |
| 60 min Winter | 58.739 | 0.0 | 66 |
| 120 min Winter | 36.254 | 0.0 | 124 |
| 180 min Winter | 26.900 | 0.0 | 182 |
| 240 min Winter | 21.623 | 0.0 | 240 |
| 360 min Winter | 15.914 | 0.0 | 354 |
| 480 min Winter | 12.782 | 0.0 | 466 |
| 600 min Winter | 10.774 | 0.0 | 574 |
| 720 min Winter | 9.365 | 0.0 | 676 |
| 960 min Winter | 7.499 | 0.0 | 766 |
| 1440 min Winter | 5.473 | 0.0 | 1074 |
| 2160 min Winter | 3.985 | 0.0 | 1536 |
| 2880 min Winter | 3.178 | 0.0 | 1964 |
| 4320 min Winter | 2.306 | 0.0 | 2812 |
| 5760 min Winter | 1.834 | 0.0 | 3584 |
| 7200 min Winter | 1.536 | 0.0 | 4328 |
| 8640 min Winter | 1.330 | 0.0 | 5096 |
| 10080 min Winter | 1.178 | 0.0 | 5744 |

## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 1.000 |
| Region | England and Wales | Cv (Winter) | 1.000 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.350 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +45 |

## Time Area Diagram

Total Area (ha) 0.668

| Time From: | (mins) To: | Area (ha) | Time From: | (mins) To: | Area (ha) | Time From: | (mins) To: | Area (ha) |
|---|---|---|---|---|---|---|---|---|
| 0 | 4 | 0.300 | 4 | 8 | 0.300 | 8 | 12 | 0.068 |

## Model Details

Storage is Online Cover Level (m) 100.000

## Cellular Storage Structure

Invert Level (m) 96.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.10800 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.10800

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 288.0 | 288.0 | 2.251 | 0.0 | 490.4 |
| 2.250 | 288.0 | 490.4 | | | |

## Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 1063 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 96.452 | 0.452 | 1.8 | 100.8 | O K |
| 30 min Summer | 96.602 | 0.602 | 1.9 | 134.5 | O K |
| 60 min Summer | 96.761 | 0.761 | 2.0 | 170.0 | O K |
| 120 min Summer | 96.918 | 0.918 | 2.1 | 204.9 | O K |
| 180 min Summer | 96.999 | 0.999 | 2.1 | 222.9 | O K |
| 240 min Summer | 97.047 | 1.047 | 2.1 | 233.8 | O K |
| 360 min Summer | 97.109 | 1.109 | 2.2 | 247.6 | O K |
| 480 min Summer | 97.141 | 1.141 | 2.2 | 254.6 | O K |
| 600 min Summer | 97.155 | 1.155 | 2.2 | 257.9 | O K |
| 720 min Summer | 97.159 | 1.159 | 2.2 | 258.7 | O K |
| 960 min Summer | 97.146 | 1.146 | 2.2 | 255.8 | O K |
| 1440 min Summer | 97.107 | 1.107 | 2.2 | 247.1 | O K |
| 2160 min Summer | 97.045 | 1.045 | 2.1 | 233.2 | O K |
| 2880 min Summer | 96.988 | 0.988 | 2.1 | 220.5 | O K |
| 4320 min Summer | 96.880 | 0.880 | 2.1 | 196.5 | O K |
| 5760 min Summer | 96.779 | 0.779 | 2.0 | 174.0 | O K |
| 7200 min Summer | 96.687 | 0.687 | 2.0 | 153.4 | O K |
| 8640 min Summer | 96.603 | 0.603 | 1.9 | 134.7 | O K |
| 10080 min Summer | 96.527 | 0.527 | 1.9 | 117.6 | O K |
| 15 min Winter | 96.452 | 0.452 | 1.8 | 100.8 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 136.560 | 0.0 | 19 |
| 30 min Summer | 91.729 | 0.0 | 34 |
| 60 min Summer | 58.739 | 0.0 | 64 |
| 120 min Summer | 36.254 | 0.0 | 124 |
| 180 min Summer | 26.900 | 0.0 | 182 |
| 240 min Summer | 21.623 | 0.0 | 242 |
| 360 min Summer | 15.914 | 0.0 | 362 |
| 480 min Summer | 12.782 | 0.0 | 482 |
| 600 min Summer | 10.774 | 0.0 | 600 |
| 720 min Summer | 9.365 | 0.0 | 720 |
| 960 min Summer | 7.499 | 0.0 | 912 |
| 1440 min Summer | 5.473 | 0.0 | 1138 |
| 2160 min Summer | 3.985 | 0.0 | 1516 |
| 2880 min Summer | 3.178 | 0.0 | 1932 |
| 4320 min Summer | 2.306 | 0.0 | 2764 |
| 5760 min Summer | 1.834 | 0.0 | 3576 |
| 7200 min Summer | 1.536 | 0.0 | 4328 |
| 8640 min Summer | 1.330 | 0.0 | 5104 |
| 10080 min Summer | 1.178 | 0.0 | 5856 |
| 15 min Winter | 136.560 | 0.0 | 19 |

## Summary of Results for 100 year Return Period (+45%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 30 min Winter | 96.603 | 0.603 | 1.9 | 134.6 | O K |
| 60 min Winter | 96.762 | 0.762 | 2.0 | 170.1 | O K |
| 120 min Winter | 96.919 | 0.919 | 2.1 | 205.2 | O K |
| 180 min Winter | 97.001 | 1.001 | 2.1 | 223.4 | O K |
| 240 min Winter | 97.050 | 1.050 | 2.1 | 234.4 | O K |
| 360 min Winter | 97.113 | 1.113 | 2.2 | 248.6 | O K |
| 480 min Winter | 97.147 | 1.147 | 2.2 | 256.1 | O K |
| 600 min Winter | 97.164 | 1.164 | 2.2 | 259.8 | O K |
| 720 min Winter | 97.170 | 1.170 | 2.2 | 261.2 | O K |
| 960 min Winter | 97.162 | 1.162 | 2.2 | 259.3 | O K |
| 1440 min Winter | 97.111 | 1.111 | 2.2 | 248.0 | O K |
| 2160 min Winter | 97.035 | 1.035 | 2.1 | 231.0 | O K |
| 2880 min Winter | 96.956 | 0.956 | 2.1 | 213.3 | O K |
| 4320 min Winter | 96.800 | 0.800 | 2.0 | 178.5 | O K |
| 5760 min Winter | 96.655 | 0.655 | 1.9 | 146.2 | O K |
| 7200 min Winter | 96.526 | 0.526 | 1.9 | 117.5 | O K |
| 8640 min Winter | 96.413 | 0.413 | 1.8 | 92.2 | O K |
| 10080 min Winter | 96.314 | 0.314 | 1.8 | 70.1 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 30 min Winter | 91.729 | 0.0 | 33 |
| 60 min Winter | 58.739 | 0.0 | 62 |
| 120 min Winter | 36.254 | 0.0 | 122 |
| 180 min Winter | 26.900 | 0.0 | 180 |
| 240 min Winter | 21.623 | 0.0 | 238 |
| 360 min Winter | 15.914 | 0.0 | 356 |
| 480 min Winter | 12.782 | 0.0 | 470 |
| 600 min Winter | 10.774 | 0.0 | 584 |
| 720 min Winter | 9.365 | 0.0 | 694 |
| 960 min Winter | 7.499 | 0.0 | 914 |
| 1440 min Winter | 5.473 | 0.0 | 1156 |
| 2160 min Winter | 3.985 | 0.0 | 1620 |
| 2880 min Winter | 3.178 | 0.0 | 2076 |
| 4320 min Winter | 2.306 | 0.0 | 2944 |
| 5760 min Winter | 1.834 | 0.0 | 3800 |
| 7200 min Winter | 1.536 | 0.0 | 4608 |
| 8640 min Winter | 1.330 | 0.0 | 5360 |
| 10080 min Winter | 1.178 | 0.0 | 6056 |

## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 1.000 |
| Region | England and Wales | Cv (Winter) | 1.000 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.350 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +45 |

## Time Area Diagram

Total Area (ha) 0.300

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.300 |

## Model Details

Storage is Online Cover Level (m) 100.000

## Cellular Storage Structure

Invert Level (m) 96.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.05000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.05000

| **Depth (m)** | **Area (m²)** | **Inf. Area (m²)** |
|---|---|---|
| 0.000 | 235.0 | 235.0 |
| 2.250 | 235.0 | 389.1 |
| 2.251 | 0.0 | 389.1 |

# APPENDIX E

## SUDS COMPATIBILITY MATRIX

| SuDS Type | Description | Suitable for this site | Comments |
|---|---|---|---|
| Green 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 | ✗ | Living Roofs would not be technically feasible at this develoment due to factors such as loadings, steep roof pitch of proposed dwellings, visual impact and high maintenance burden to homeowners. |
| Rainwater Harvesting | Re-using rainwater for non-potable purposes such as irrigation and toilet flushing. | ✗ | Rainwater harvesting cannot be relied upon to guarantee a reduction in the volume of water leaving the site as it relies upon tanks having available capacity.<br>During intense/prolonged periods of rainfall it is likely that the tanks will be full and will overflow into the system.<br>These systems can also be a high maintenance burden for residential home owners.<br>Cost benifit of system is not recoverd unitl 10-15years. |
| Soakaways | Soakaways provide stormwater attenuation, stormwater treatment and groundwater recharge. | ✓ | Initial site desk study shows that this site is likely suitable for onsite infiltration via soakaways. This will be confirmed with infiltration testing to BRE365 and groundwater monitoring. |
| Filter Strip / Trenches / Swales | Filter strips are linear grassed or vegetated strips of land / channels designed to accept runoff as overland sheet flow from impermeable surfaces usually located adjacent road or parking areas and used to treat infiltrated or convey runoff. | ✓ | Potentially for conveyance only, may be insufficient open space to incorporate effectively on this development. |
| 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. | ✓ | Potentially on private drives / parking areas/ roads . This would improve water quality into the receiving waterbody. |
| 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. | ✓ | A bio retention pond could be utilised at this development if the receiving waterbody is considered sensitive and additional treatment is required. May be insufficient open space to incorporate effectively on this development as POS is limited. |
| 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.<br>Ponds can be designed to allow infiltration into the ground or to store water for a period of time before discharge. | ✓ | A pond / basin can be utilised at this development to provide attenuation and improvements in water quality. May be insufficient open space to incorporate effectively on this development as POS is limited. |
| Underground Storage | Underground large diameter Concrete pipes or Geocellular Tanks to reduce and attenuate peak flows | ✓ | Underground storage tanks can be utilised at this development if required. |

# APPENDIX F

## SUDS MANAGEMENT AND MAINTENANCE PLAN

**MJA CONSULTING**
Civil & Structural Engineers

PROPOSED DEVELOPMENT
LAND WEST OF LYMINGTON BOTTOM ROAD
MEDSTEAD
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GU34 5JN

# SUDS MANAGEMENT & MAINTENANCE PLAN

BEWLEY HOMES

DECEMBER 2023
REF: SS/23/0458/6958

www.mjaconsulting.co.uk

# DOCUMENT CONTROL RECORD

Document Issue:

| Rev | Date | Issue Status | Prepared by | Checked by |
|---|---|---|---|---|
| - | 19/12/23 | First Issue | T. Brooker | C. Pendle |

References:

The SUDS manual – CIRIA C753 (2015) ISBN 9780-86017-760-9

National Planning Policy Framework (NPPF) – Communities and Local Government
Technical Guidance - Flood Risk & Coastal Change (March 2012)

# 1 Introduction

1.1 This document sets out the principles for the long term management and maintenance of the proposed surface water Sustainable Drainage Systems (SuDS) installed at the residential development.

1.2 The purpose of this document is to set out the basis of the development SuDS Maintenance Plan and to ensure that the adopting management company is entrusted with a robust inspection and maintenance programme, ensuring the optimum operation of the surface water drainage network is continually maintained for the lifetime of the development and to prevent the increased risk of flooding both on and off site in accordance with the National Planning Policy Framework (NPPF).

1.3 The activities listed in this document are generic to the relative SuDS types and represent the minimum maintenance and inspection requirements, however additional tasks or varied maintenance frequency may be instructed by the maintenance company as required. Specific maintenance needs of the SuDS elements should be monitored and maintenance schedules adjusted to suit requirements.

1.4 The installed SuDS system at this development are the initial responsibility of the developer. Following installation and after an initial period (TBC) of operation, all SuDS are to be transferred to an appointed Management Company. An agreement shall be set up by the developer, who shall confirm in writing to the Principle Planning Officer at LLFA when the maintenance agreement is completed and is operative.

1.5 The Management Company will then be responsible for maintaining the surface water system including all SuDS in perpetuity. All property owners should be advised that an annual management fee will need to be paid to the management company for this service.

1.6 All those responsible for maintenance should follow relevant Health and Safety legislation (Health and Safety at Work Regulations, 1999) for all activities listed within this report including lone working, if relevant) and risk assessments should always be undertaken.

1.7 Any contractor employed by the Management Company shall carry out periodic maintenance of all such SuDS in accordance with the schedules listed in this report. Inspection checks shall be carried out by a qualified and competent person, at the minimum intervals listed within the schedules and the appropriate work carried out.

1.8 This report is to read in conjunction with the MJA drainage strategy drawing for the location of all SuDS elements present within the development. Reference should also be made to the detailed landscape proposals for the proposed treatment / maintenance regime for all landscape features. The operations contained within this plan shall (where feasible) be in conjunction with routine grounds maintenance operations to the surrounding landscape.

# 2 SuDS Layout & Design

2.1 The storm water drainage strategy for the proposed development is to utilise a range of SuDS features to attenuate all surface water runoff from impermeable areas.

2.2 The proposed storm water system may consist of the following SuDS components:

Permeable block paving (under-drained)
Storm water pipe work and road gullies
Cellular soakaways

2.3 There are three categories of maintenance activities referred to in this report:

Regular maintenance (including inspections and monitoring).
Consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.

Occasional maintenance
Comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).

Remedial maintenance
Comprises intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design.
Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.

2.4 It is also important that measures are taken to protect and ensure continued operation of drainage features during the construction phase. All road gullies will be blocked until the site is complete. Any permeable paving will be capped with a layer of concrete during construction and cored through once the majority of the construction is complete.

# 3 SUDS Management & Maintenance

## Permeable Block Paving

3.1 Note: Loose materials such as sand, cement soil or other loose substances should not be stored directly on top of the permeable blocks without the use of an impenetrable sheet.

3.2 To ensure the continual optimal performance of the permeable paving, it is recommended that the following maintenance should be carried out. The following guidelines are offered as an initial regime, but maybe either increased or decreased by the management company depending on the local environment and any external contributing factors.

3.3 Permeable pavements should be visually inspected a minimum of monthly for the first three months after installation and then a minimum of three times a year, preferably during and after heavy rainfall to check effective operation and identify areas of ponding. These inspections should occur close to the end of winter (March), mid-summer (July) and after the autumn (November).

3.4 During this inspection identify any areas that require remedial maintenance such as topping up of jointing grit or removal of vegetation, weeds, silts and sediments that may be clogging the joints between the blocks. Small areas such as driveways can be swept with a hand bristle broom, for larger areas such as parking courts a lorry mounted rotary brush and vacuum sweeper device can be used. Weeds can be removed from the surface through the controlled application of proprietary non-persistent contact herbicides. Those containing Glyphosate are the most suitable.

3.5 Care should be taken to ensure that only the detritus is removed from the joints and avoid removal of the jointing material. If required, joints should be replenished with aggregate material to lip of paver using specific 6-2mm single size grit using a stiff brush to sweep the material in ensuring joints are filled. Do not replace the jointing grit with sand as this will stop the permeable system from working.

3.6 For winter maintenance, the controlled use of de-icing may be used without causing significant detrimental effects towards the permeable pavements performance. When used carefully, the use of these chlorides will not result in an increase in the chloride levels in the local ground.

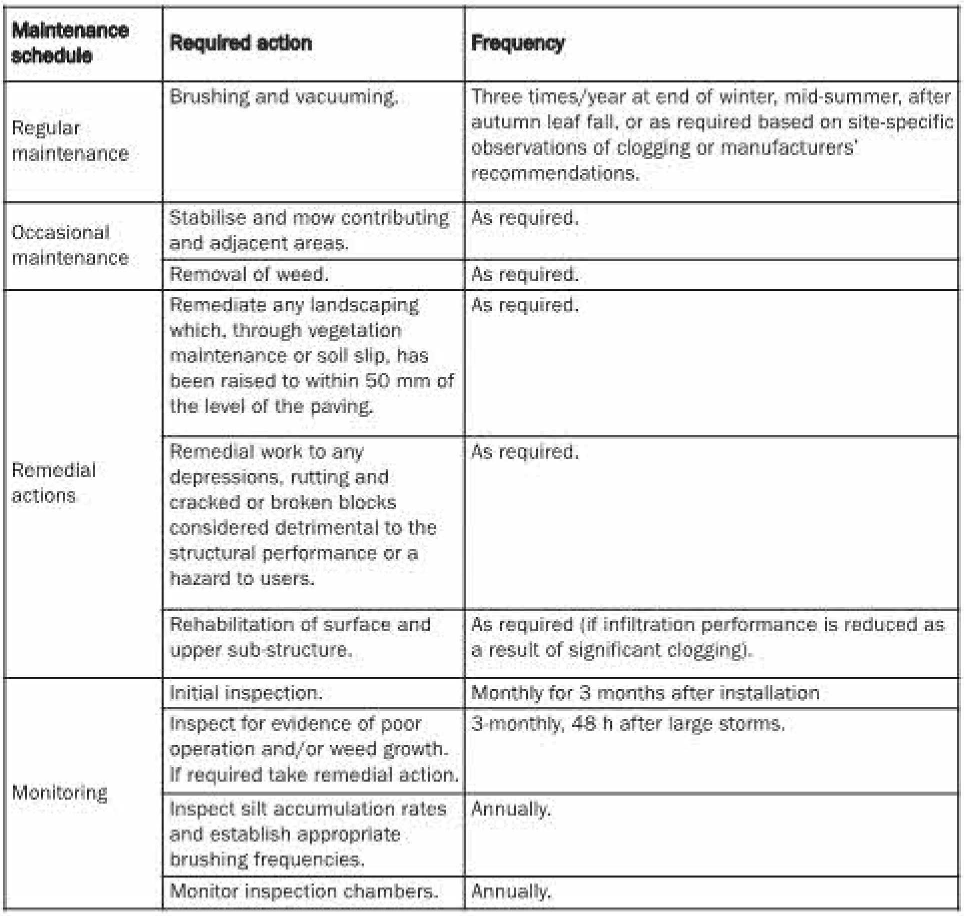
3.7 Contamination of the permeable block paving from routine landscape maintenance such as grass clippings from mowing, hedge trimming, mulching plant beds etc. should be prevented. If contamination occurs the debris should be immediately swept, collected and removed by the homeowner or landscape operative.

3.8 Depending on the amount of usage and the environment the permeable pavement has received and been exposed to, the sub base laying course material including geotextile membranes/ grids may require either replacement or cleaning after a 25 to 30 year period. This would be evident if the infiltration rate of the paving became prolonged, allowing ponding to develop. Should this occur, the uplifting and cleaning or replacing of the laying course maybe considered. The laying course material, jointing and blocks can be reused once cleaned, minimising costs.

3.9 Replacement sub-base material to be used should be a clean 4/20mm coarse graded aggregate to BS EN13242:2002. Jointing material between the blocks should be 6-2mm single size grit to the joints. Refer to MJA Consulting construction detail drawings for type of geotextile membrane/ geogrids to be used.

3.10 Materials removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and may need to be disposed of as controlled waste. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

Permeable Paving Operation and Maintenance Requirements



| **Maintenance schedule** | **Required action** | **Frequency** |
|---|---|---|
| Regular maintenance | Brushing and vacuuming. | Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' 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 50 mm of the level of the paving. | As required. |
| | Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users. | As required. |
| | Rehabilitation of surface and upper sub-structure. | As required (if infiltration performance is reduced as a result of significant clogging). |
| Monitoring | Initial inspection. | Monthly for 3 months after installation |
| | Inspect for evidence of poor operation and/or weed growth. If required take remedial action. | 3-monthly, 48 h after large storms. |
| | Inspect silt accumulation rates and establish appropriate brushing frequencies. | Annually. |
| | Monitor inspection chambers. | Annually. |

## Storm water pipe work and road gullies

3.11 The key maintenance requirement for the upstream surface water drainage system includes the removal of sediments and debris from the system as required.

3.12 All storm water pipe work should be visually inspected a minimum of monthly for the first three months after installation and then a minimum of once 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.

3.13 During this inspection identify any gully pots or pipes that require remedial maintenance such removal of sediment, debris, leaves and litter as required. This involves the removal all protective covers and grids and the cleaning out of channels or gully pots by hand or with suitable jetting equipment.

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

## Cellular Soakaways

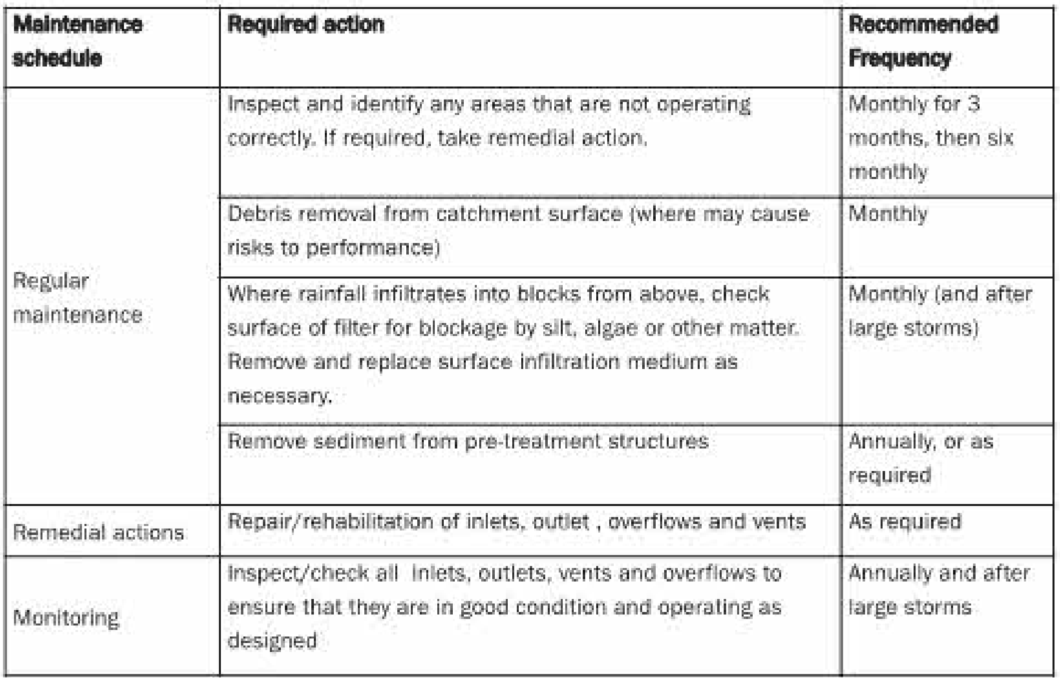
3.15 Key Maintenance Requirements:

Regular inspection of silt traps, manholes, pipework and pre-treatment devices, with removal of sediment and debris as required.

3.16 Regular inspection and maintenance is required to ensure the effective long-term operation of below ground modular and PCC ringed storage systems. Maintenance responsibility for systems should be placed with either a responsible organisation such as a management company or the property owner which is served by the soakaway.

3.17 Residents should be made aware of all SuDS systems that serve their property, the location of the device and the maintenance requirements and responsibilities.

Soakaway Operation and Maintenance Requirements



| **Maintenance schedule** | **Required action** | **Recommended Frequency** |
|---|---|---|
| Regular maintenance | Inspect and identify any areas that are not operating correctly. If required, take remedial action. | Monthly for 3 months, then six monthly |
| | Debris removal from catchment surface (where may cause risks to performance) | Monthly |
| | Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary. | Monthly (and after large storms) |
| | Remove sediment from pre-treatment structures | Annually, or as required |
| Remedial actions | Repair/rehabilitation of inlets, outlet , overflows and vents | As required |
| Monitoring | Inspect/check all Inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed | Annually and after large storms |

## Highway and Driveway Gullies

3.18 General gully maintenance involves the removal of dead leaves, soil and litter from the gratings and sediments from the sump within the gully pot or channel. This involves the removal all protective covers and grids and the cleaning out of channels or gully pots by hand or with suitable jetting equipment. During the first year of operation each gully and channel should be inspected every 4 months, and every year thereafter for structural integrity and cleaned out as required.

## During Construction

3.19 Road gullies will be capped and headwalls netted to ensure construction silts and debris does not entre the drainage system. Maintenance will comprise of the removal of large debris and litter by hand picker and sucking out the sediment/oil contents of any drainage feature into a tanker.

# 4 Contact Information

For further information on the management and maintenance of SuDS on the development please contact:

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