# Preliminary SuDs Report

## CHERITON PARCHIGH STREET Kent CT18 8AN

Manoj Pun BEng (Hons)

21 June 2022

Revision C

Checked By

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## Contents

## Safety

**All site operatives are to be made aware of this information if at any time health and safety concerns arise on site about any matter related to our design. Work is to be halted and we are to be contacted immediately.**

Whilst we have made every attempt to design out all risks with our design, some risks relating to the construction, maintenance or demolition of the structure may remain. Residual risks are detailed below with our assessment of how these risks can be managed.

| *TYPE OF RISK* | *Method of risk reduction* | *Risk Level* | |
|---|---|---|---|
| | | *Low* | *High* |
| *Site access* | Safe route to works to be put in place by contractor | | |
| *Demolition* | Contractor to survey existing building, plan sequencing, demolition and temporary support | | ✓ |
| *Temporary support* | Contractor to provide all necessary temporary support for vertical and lateral loads | | ✓ |
| *Manual handling* | Contractor to provide mechanical lifting equipment for items over 20KG and where manual lifting tasks are awkward | | ✓ |
| *Services* | Locations of all existing services to be confirmed prior to start of works | | ✓ |

# Introduction

## 1.1. General

Hume Planning Consultancy is proposing to construct 43 new dwelling houses in the existing commercial property and associated carparks in Newington, Kent. Adkins Consultants Ltd is the appointed consultant to propose a concept SuDs strategy for the development with respect to the matters which could arise during the planning stage. The objectives of the current report are to:

- Propose a conceptual drainage strategy with respect to the site condition and future climate change.
- Propose a sustainable and resilience drainage system to deal with vulnerability of the site to flood risk.

## 1.2. Proposed Development

The proposed development will comprise the construction of new 43 houses with their associated carparks. As part of the development the existing car park on the site will be redeveloped to houses and new soft-landscaping area. The existing four storey commercial building is being converted to 31 residential flats.

The scheme proposes to convert the former office building into residential apartments. The converted building will provide 31 units comprised of 1-bed & 2-bed apartments. The proposal for the site to the rear is to be used for 43 x houses, consisting of 3-bed (2 storey) & 4-bed (3 storey) houses.

## 1.3. Scope of works

This report demonstrates the considerations and design details of the SuDS proposals and includes the following:

- Concept of the catchment area of the site, soil type and estimated pre and post development run-off rates.
- A description of the SuDS proposals demonstrating the commitment to the 'management train' approach adopted within these proposals.
- Details of the maintenance requirements of the SuDS for the lifetime of the proposals.

The drainage system should endeavour to ensure that:

- Natural hydrological processes are protected through maintaining Interception of an initial depth of rainfall and prioritising infiltration, where appropriate.
- Flood risk is managed through the control of runoff peak flow rates and volumes discharged from the site.
- Stormwater runoff is treated to prevent detrimental impacts to the receiving water body as a result of urban contaminants.

In addition, it is desirable to maximise the amenity and ecological benefits associated with the drainage system where there are appropriate opportunities. SuDS are green infrastructure components and can provide health benefits, and reduce the vulnerability of developments to the impacts of climate change.

# 2. Reference documentation

2.1. This SuDS Report is based on the requirements as described by "Sustainable Drainage in Planning" published by Kent County Council and Sustainable Drainage SPD.

2.2. The following documents were referenced for guidance of the existing and proposed concept design:

2.2.1. CIRIA The SuDS Manual 2015.

2.2.2. Environment Agency on-line Flood Risk Assessment Tool.

2.2.3. British Geological Society on-line tool 2015.

2.2.4. Defra/EA Guidance on Rainfall Runoff Management.

2.2.5. www.UKSuds.com (Environment Agency on-line tool - HR Wallingford).

# 3. The site

3.1. The site is located to the west of Cheriton district, Folkestone, Kent at a National Grid Reference of 51.089992, 1.124517.

3.2. The site is irregular in shape and occupies an area of approximately 1.73 hectares. The boundaries of the site are shown in the below figure:


Figure- Site location on google map.

3.3. The site is situated on a reasonably flat ground at approximate altitude of 90m above MSL.

3.4. The recorder soils beneath the site comprise Folkestone Formation - Sandstone. Sedimentary Bedrock (BGS, 2022).

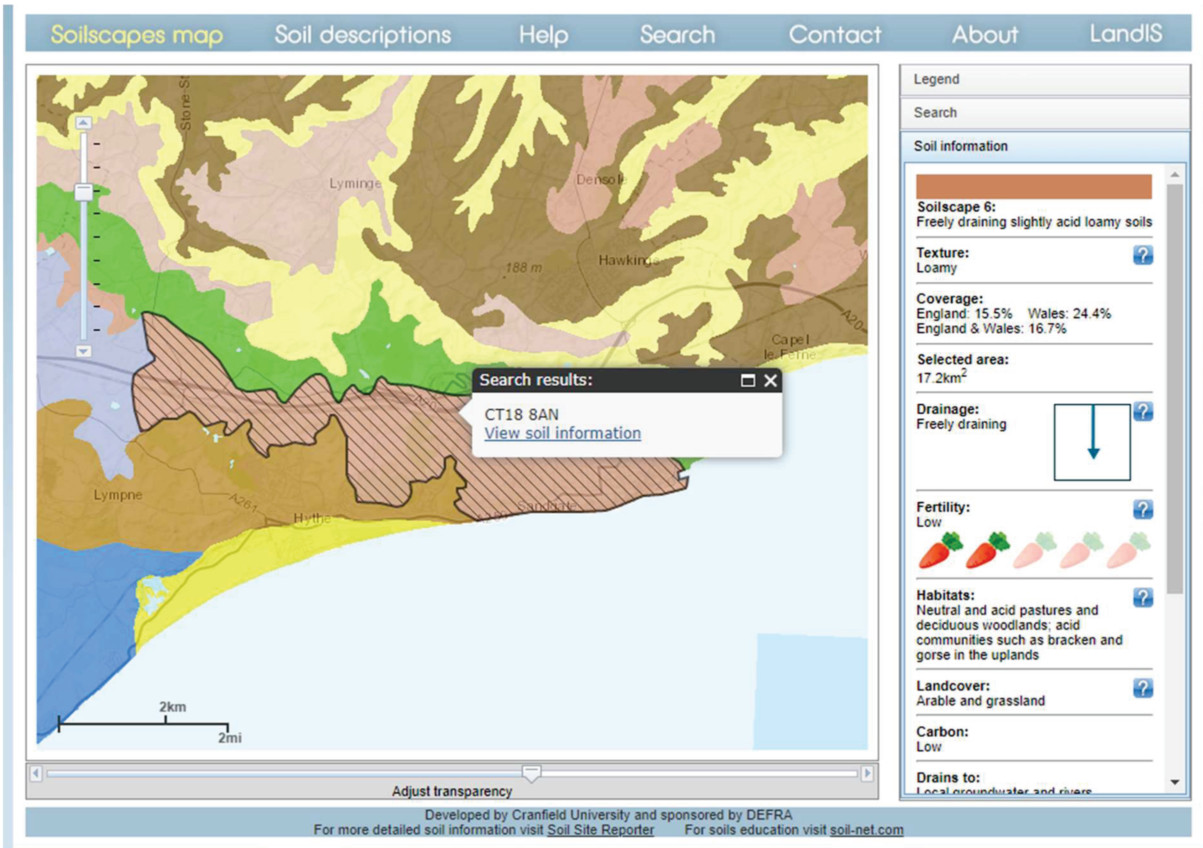
3.5. This site is located to the west of Cheriton district, Folkestone, with facilities and services within 500m of the site. The site is located off and can be accessed via Cheriton High Street. The east of the site is bounded by new residential development (currently under construction), along Cheriton High Street.

## 3.6. Geology

- Soil as found (BGS, 2022)

**Folkestone Formation**

| | |
|---|---|
| Lithological Description: | In Sussex, Kent and Surrey the formation comprises medium- and coarse-grained, well-sorted cross-bedded sands and weakly cemented sandstones; elsewhere includes calcareous sandstones. There are no formal divisions in the Weald, but equivalent beds in the west are termed the Child Okeford Sand Member and the Bedchester Sands Member. |
| Definition of Lower Boundary: | The base of the formation is the contact of sand or sandstone of the formation with underlying silty clay or clayey silt of the Marehill Clay Member (Sandgate Formation) or with a heterogeneous succession of clays, silts and sands (Sandgate Formation, undifferentiated). This boundary can be diffuse in places but is generally marked by a colour change. |
| Definition of Upper Boundary: | The upper boundary is generally placed at the upward disappearance of sand at the base of the Gault Formation. In places the top is at the base of a thin pebbly sandy clay condensed succession at the base of the Gault Formation. In Sussex the top of the formation is at the base of the "Iron Grit" (a hard, pebbly, limonitic, coarse-grained sandstone) (see Casey, 1961). |
| Thickness: | Between 0.5 and 80 m. |




**Soilscape 6:**
Freely draining slightly acid loamy soils

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**Texture:**
Loamy

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**Coverage:**
England: 15.5% Wales: 24.4%
England & Wales: 16.7%

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**Selected area:**
17.2km$^2$

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javascript:void(0)**Drainage:**
Freely draining

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javascript:void(0)**Fertility:**
Low

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javascript:void(0)**Habitats:**
Neutral and acid pastures and deciduous woodlands; acid communities such as bracken and gorse in the uplands

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javascript:void(0)**Landcover:**
Arable and grassland

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**Carbon:**
Low

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**Drains to:**
Local groundwater and rivers

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**Water protection:**
Groundwater contamination with nitrate; siltation and nutrient enrichment of streams from soil erosion on certain of these soils

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**General cropping:**
Suitable for range of spring and autumn sown crops; under grass the soils have a long grazing season. Free drainage reduces the risk of soil damage from grazing animals or farm machinery. Shortage of soil moisture most likely limiting factor on yields, particularly where stony or shallow

## 1.1. Flood Risk Zone 1

1.1.1. The site is located within Flood Risk Zone 1 as defined on the Environment Agency's Flood Map for Planning (Rivers and Seas). This flood risk zone is defined on the adjacent exert of this map as areas of 'no blue' shading.

1.1.2. Flood Risk Zone 1 is assessed as land which has a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%) as per the Flood Zone definitions set out in the National Planning Policy Guidance.

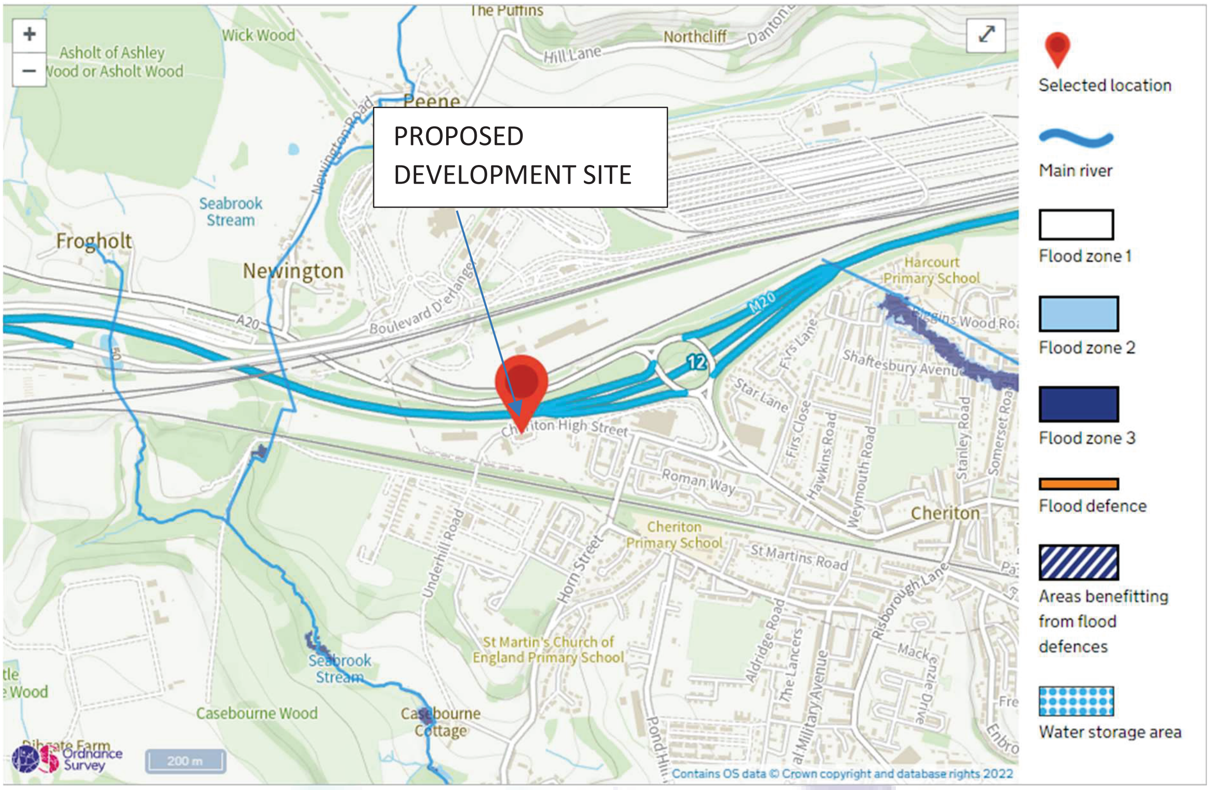


Figure- Flood zone map showing the site is located in low flood risk area.

Figure- Flood zone map (1:1000) scale showing the site is located aroun 2400m away from nearest Flood Zone 3.

1.1.3. The NPPF requires any planning application for new or re-development within Flood Zone 1, over 1Ha in size to be accompanied by a FRA to demonstrate that the development can be achieved in a sustainable manner, with an overall reduction of flood risk to the site and surrounding area.

1.1.4. To address surface water drainage from the site post-development a surface water drainage strategy is proposed:

1.1.4.1. The proposed development is located within Flood Zone 1 and has been deemed likely to remain located within this low flood risk classification for the lifetime of the development.

1.1.4.2. A Surface Water Drainage Strategy will accompany this application to demonstrate how the increased surface water runoff resultant from an increase in impermeable areas will be managed.

1.1.4.3. Ground floor thresholds and internal finished floor levels shall be raised a minimum of 150mm above the general external ground level for all structures on site to account for potential surface water flow in the future.

## 1.2. Flood Risk Reduction Strategy

1.2.1. An integral part of the scheme is to discharge water run-off via a sustainable drainage system (SuDS) where possible.

1.2.2. This system will continue to manage run-off water from the existing building and hardstands where these are proposed to remain. However, the existing building will be demolished which will reduce the amount of run-off significantly.

1.2.3. The proposed SuDS scheme will attenuate water run-off from the proposed building and provide a controlled discharge on-site into the detention basin for infiltration.

1.2.4. The proposed SuDS will include key features such as a rainwater harvester, rainwater gardens and a detention basin with controlled discharge.

1.2.5. Retaining the water on-site to naturally infiltrate into the substrata and be released at a rate which is equal to or less than the existing run-off rate will eliminate any additional impact from storm water conditions on the site and its locality.

1.2.6. Further reduction of the peak flow rate will be achieved through the demolition of existing roofs.

1.2.7. No flood related risks are to remain after the proposals are implemented.

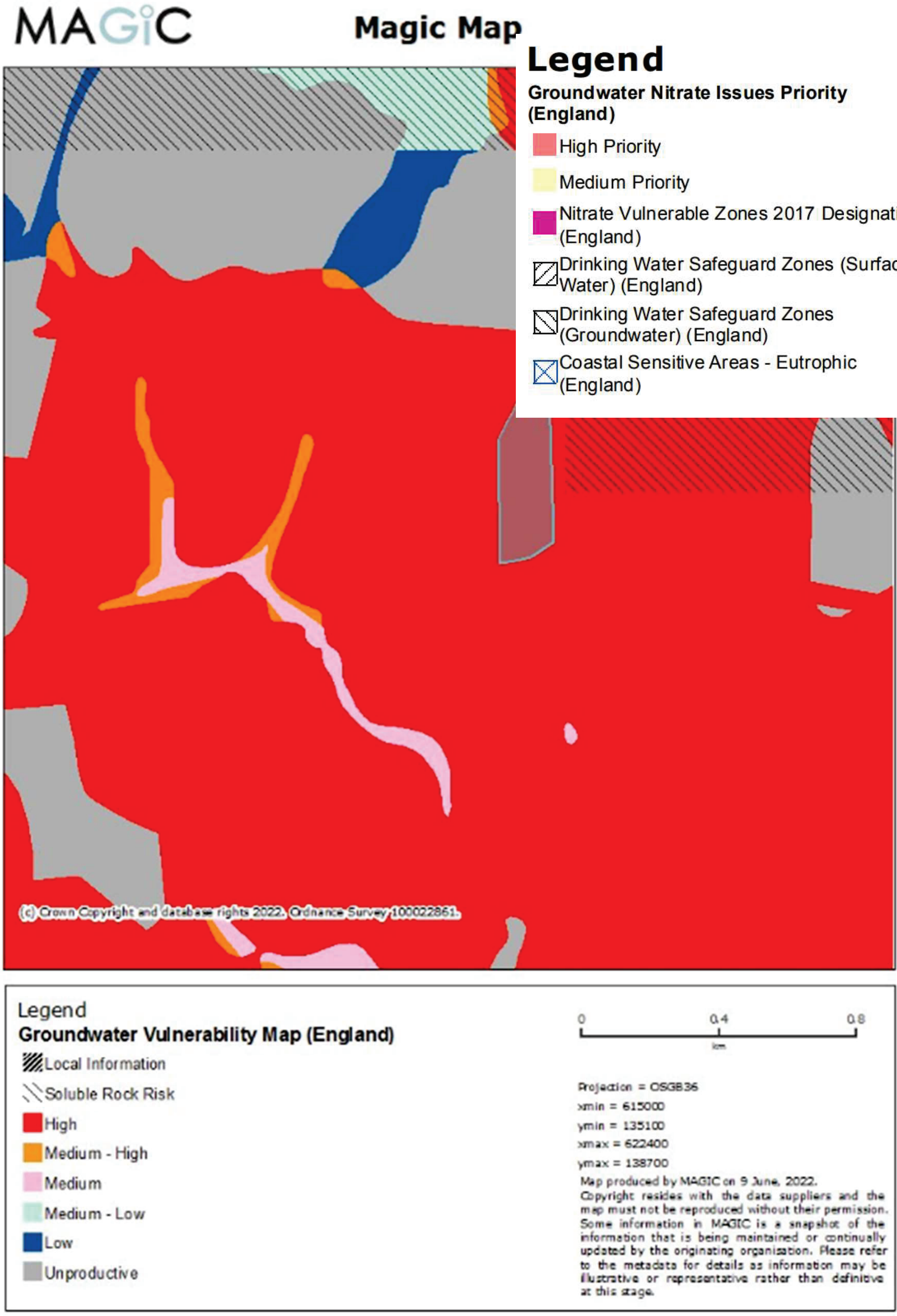


Figure- Impact appraisal tool using https://magic.defra.gov.uk/.

Impact Appraisal

- The site lies inside the Surface Water and Groundwater Safeguard zones, therefore the SuDS proposals will have impact on these zones.
- The site lies outside the Nitrate Vulnerable Zones, therefore the SuDS proposals will have no impact on these zones.
- The catchment area does not restrict the type of SuDS scheme to be utilised but because the risk of ground water vulnerability is high, then the infriltration to the soild shall be controlled strictly to avoid ground water polution.
- The Environment Agency Flood Risk Map as presented within the Envirocheck Report indicates that the site is not at risk of extreme flooding from rivers or sea without defences.
- The BGS Flood GFS Data map indicates that the site has limited potential for groundwater flooding to occur.
- Environment Agency will be involved during early planning stages to identify constraints and requirements on the proposed SuDs proposal. SuDs proposal will follow Ciria SuDs manual 2015 part E section 26.

## 1.3. Existing Surface Water Drainage

### 1.3.1. Existing building and car park

1.3.1.1. The existing roof and the area of impervious carpark surfacing are currently drained directly off-site to the mains sewer network and the highways. However, the author of the report is uncertain about this and further investigations are required.

# 2. 'Management Train' Approach

Adopting a 'management train' approach is fundamental to the development of a successful SuDS scheme.

- Prevention: The use of good site design and site housekeeping measures to prevent run-off and pollution.
- Source control: Control of run-off at or very near to its source including infiltration methods such as bioretention gardens and rainwater harvesting.
- Site control: management of water run-off within the site by conveying water from building roofs and hardstands to an attenuation basin.
- Regional control: controlled discharge of run-off from a site.

## 2.1. Runoff Destination

2.1.1. Infiltration should be prioritised as the method of controlling surface water runoff from the development site, unless it can be demonstrated that the use of infiltration would have a detrimental environmental impact.

2.1.2. Infiltration may be appropriate for managing runoff from this site. Robust studies are required to confirm the significance of the following constraints to infiltration:

2.1.2.1. Where infiltration rates are confirmed via testing to be < 1 x 10-7 m/s, infiltration will be very limited. Where infiltration rates are between 1 x 10-7 and 1 x 10-5 m/s, then soils can still provide Interception and partial infiltration. If rates are confirmed to be > 1 x 10-5 m/s, full infiltration can be considered in the design. BRE365 tests and CCTV surveys will be carried out for the design stage, 2.1.3. The groundwater beneath the site is designated as secondary zone aquifer, and this designation will define the treatment requirement for any infiltrated water (See Water Quality Design Criteria).

## 2.2. Surface water body

2.2.1. It has been determined that surface water runoff from the site (that cannot be discharged to groundwater via infiltration) cannot practicably be discharged to a surface water body.

2.2.2. The distance from the point of discharge from the site to the surface water body is significantly greater than to the proposed alternative receiving waterbody, and this constraint outweighs any negative impacts resulting from discharging to the alternative location.

## 2.3. Water Quality Design Criteria

Current practice takes a risk-based approach to managing discharges of surface runoff to the receiving environment. The following text provides guidance on the extent of water quality management likely to be appropriate for the site.

2.3.1.1. Hazard Classification

2.3.1.1.1. Runoff from clean roof surfaces (i.e. not metal roofs, roofs close to polluted atmospheric discharges, or roofs close to populations of flocking birds) is classified as Low in terms of hazard status.

2.3.1.1.2. Runoff from roads, parking and other areas of residential, commercial and industrial sites (that are not contaminated with waste, high levels of hydrocarbons, or other chemicals) is classified as Medium in terms of hazard status.

2.3.1.2. Treatment requirements for disposal to surface water systems

2.3.1.2.1. Roof runoff will not require treatment prior to discharge.

2.3.1.2.2. Runoff from other parts of this site such as roads, parking and other areas will require at least 2 treatment stages prior to discharge.

## 2.4. SuDS Hierarchy

The design process has considered the suitability of drainage techniques with respect to this site and the development proposal. Where SuDS are being designed for sites with steep slopes, careful consideration of site layout planning and SUDS alignment is needed to minimise gradients of conveyance pathways and construction of large embankments, and to minimise flood risk when drainage systems are exceeded.

The design of SuDS with access to temporary or permanent water should consider public health and safety as well as issues associated with construction and operational management of the structures. Health and safety issues and risk mitigation features are presented in the CIRIA SuDS Manual.

Individual SuDS components should not be treated in isolation, but should be seen together as providing a suite of drainage features which are appropriate in different combinations for varying scales. It is always desirable to have a mix of SuDS components across the site as different components have different capacities for treatment of individual pollutants.

The adoption of the following combination of SuDS techniques both maximise the control of water run-off and enhance the habitat and amenity value of the site.

### 2.4.1. Direct Water Harvesting System

2.4.1.1. Rainwater harvesting systems can be used to effectively drain roofs and provide both water supply and stormwater management benefits.

2.4.1.2. This is the direct capture of water runoff for re-use on site.

2.4.1.3. Harvested rainfall run-off can be extracted for the irrigation of new landscape areas within the site.

2.4.1.4. The contribution to flood risk management from such a technique will be dependent on the scale of the water harvesting system. Designs will need to ensure that there is a bypass to the storage system when overflowing occurs.

2.4.1.5. Benefits to the proposals:

2.4.1.5.1. Provides a 'hydro-brake' between part of the proposed roof area and the detention basin.

2.4.1.5.2. Creates a valuable water resource for recycling rainwater for the irrigation of the proposed courtyard.

2.4.2. <u>Pervious Pavement</u>

2.4.2.1. Roof water can be drained into pervious pavement areas using diffusers to dissipate the point inflows. Detailed design of the pavement will need to take account of the additional impermeable roof area.

2.4.2.2. Roads: some types of pervious pavement can be used for relatively highly trafficked roads and pavement manufacturers should be consulted on the appropriate specification.

2.4.2.3. Car parks/other impermeable surfaces: pervious pavements provide effective drainage, storage and treatment of car park surfacing,

2.4.3. <u>Detention Basin</u>

2.4.3.1. A detention basin will slow down surface water flows before their transfer downstream.

2.4.3.2. This is achieved using a storage volume and constrained outlet.

2.4.3.3. The storage volume can be accommodated within either a permanent detention basin or dry basin volume.

2.4.3.4. Roofs: detention basin can be used to attenuate and treat runoff.

2.4.3.5. Roads: detention basin can be used to attenuate and treat runoff.

2.4.3.6. Steep site: large basins may require embankments that may pose a safety risk to site residents.

2.4.3.7. Benefits to the proposals:

2.4.3.7.1. Reduces the peak run-off flow rate.

2.4.3.7.2. Enhances flood reduction and pollution reduction.

2.4.3.7.3. Enhances the landscape amenity and wildlife benefit of the proposal.

2.4.4. <u>Bioretention systems</u>

2.4.4.1. Roofs: bioretention gardens can be used to attenuate and treat roof runoff.

2.4.4.2. Roads: Linear bioretention systems (ie biofiltration swales) can be used to attenuate and treat road runoff.

2.4.4.3. Car parks/other impermeable surfaces: bioretention trees can be used for car park drainage

2.4.5. <u>Filter Strips</u>

2.4.6. Roads: filter strips can provide treatment for road runoff, upstream of swales or trench components. They can reduce the need for kerbing and runoff collection systems.

2.4.7. Car parks/other impermeable surfaces: filter strips can provide treatment for runoff from impermeable surfaces, upstream of swales or trench components. They can reduce the need for kerbing and runoff collection systems.

## 2.5. Suitability for this Site and Proposal

The SuDS proposal has had regard to the SuDS hierarchy. The techniques adopted within this SuDS scheme provide the most effective combination for this site and proposal.

2.5.1. Benefits to the proposals:

2.5.1.1. The SuDS scheme delivers a sustainable drainage solution that manages all water run-off generated by the existing and proposed building within the site.

2.5.1.2. The system is an integral part of this development, providing enhanced amenity and aesthetic value to the proposal and creating a multifunctional landscape.

## 2.6. SuDS TYPE / CONCEPT AND DESCRIPTION

In response to the SuDS hierarchy the proposal embraces a series of SuDS techniques through the 'management train' approach. The design responds to the soil conditions, site topography and natural drainage paths within the site. The following SuDS techniques are proposed along the 'management train' to control and delay the discharge of water from the site.

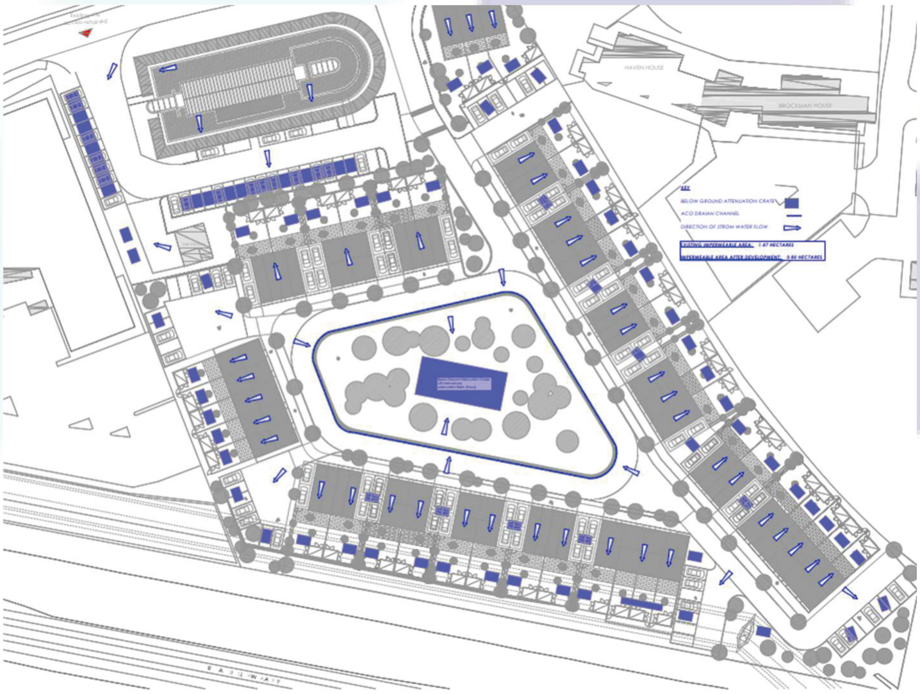

Figure- Proposed concept SuDs. A pdf format is attached for clarity.

2.6.1. Direct Water Harvesting System/ Below Ground Soakaways

2.6.1.1. Water run-off from part of the proposed roof passes through a coarse filter into an underground rainwater storage tank.

2.6.1.2. The water is recycled via a submersible pump to irrigation applications within the courtyard

2.6.1.3. The water harvester provides a 'hydro-brake' between part of the proposed roof and the

2.6.2. Detention Basin

2.6.2.1. A detention basin with a water storage capacity in excess of the required volume generated in a 1:100 year event including climate change factoring. Where infiltration is not possible minimum 50% reduction in peak runoff rate over the current rate will be maintained.

2.6.2.2. Controlled discharge at a rate equal to or less than the pre-development site run-off rate.

2.6.2.3. The detention basin forms an integral part of the courtyard design and provides both enhanced site biodiversity and landscape amenity for the benefit of the residents.

2.6.3. Overflow and Swale

2.6.3.1. An underground drain together with an open shallow / depression will convey overflow water from the attenuation basin off-site during exceedance events.

2.6.4. Potential Soakaway Sizes

2.6.4.1. New build houses will have approx. 6m$^2$ infiltration area and 0.36m depth. Detention basin infiltration area will cover 150m$^2$ infiltration and 0.48m depth. Cheriton parc conversion will consist 195m$^2$ infiltration and 0.75m depth. Parking court will have minimum 1 infiltration crate area of

20m² with depth of 0.57m. BRE365 test will be conducted to verify the preliminary infiltration storage estimation.

## 2.7. SuDS Capacity

2.7.1. The SuDS scheme is designed to provide water storage capacity in excess of that generated in a 1 in 100 years event including climate change factoring.

2.7.2. The peak flow rates are controlled so that the rate of run-off after development does not exceed the rate of run-off that would have occurred before development.

2.7.3. Exceedance Events

2.7.3.1. The site design and the SuDS layout are integrated to manage any flooding potential of exceedance events.

2.7.3.2. The risks associated with events that exceed the capacity of the drainage system or are a result of blockage to outlets etc are accommodated within the site design as follows:

- An overflow drain conveys overflow water to the retention basin.
- An open swale / depression which follows the natural flow path of the site will convey any further overflow water from the detention basin at a level which avoids the risk of flooding.

## 2.8. SuDS Construction

SuDS are a combination of civil engineering structures and landscaping practice. Due to the limited experience of building SuDS in the water industry, there are a number of key issues which need to be particularly considered as their construction requires a change in approach to some standard construction practices.

2.8.1. SuDS components should be constructed in line with either the manufacturer's guidelines or best practice methods.

2.8.2. The construction of SuDS usually only requires the use of fairly standard civil engineering construction and landscaping operations, such as excavation, filling, grading, top-soiling, seeding, planting etc. These operations are specified in various standard construction documents, such as the Civil Engineering Specification for the Water Industry (CESWI).

2.8.3. Construction of soakaways is regulated by the Buildings Regulations part H (Drainage and waste disposal) which sets out the requirements for drainage of rainwater from the roofs of buildings.

2.8.4. During construction, any surfaces which are intended to enable infiltration must be protected from compaction. This includes protecting from heavy traffic or storage of materials.

2.8.5. Water contaminated with silt must not be allowed to enter a watercourse or drain as it can cause pollution. All parts of the drainage system must be protected from construction runoff to prevent silt clogging the system and causing pollution downstream. Measures to prevent this include soil stabilisation, early construction of sediment management basins, channelling run-off away from watercourses and surface water drains, and erosion prevention measures.

2.8.6. After the end of the construction period and prior to handover to the site owner/operator:

- Subsoil that has been compacted during construction activities should be broken up prior to the re-application of topsoil to garden areas and other areas of public open space to reinstate the natural infiltration performance of the ground;
- Any areas of the SuDs that have been compacted during construction but are intended to permit infiltration must be completely refurbished;
- Checks must be made for blockages or partial blockages of orifices or pipe systems;
- Any silt deposited during the construction must be completely removed;

- Soils must be stabilised and protected from erosion whilst planting becomes established.

2.8.7. Detailed guidance on the construction related issues for SuDS is available in the SuDS Manual and the associated Construction Site handbook (CIRIA, 2007).

### 4.11. SuDs Maintenance

Regular maintenance is essential to ensure effective operation of the soakaways for the lifespan of the proposed development. The SuDS Manual (C753) provides a maintenance schedule for SuDs with details of the necessary required actions.

#### 4.11.1. Hydro-Brake Flow Control

- Low amounts of maintenance required as there as no moving parts within the Hydro-Brake® Flow Control.
- Initial monthly inspection at the manhole once the construction phase is over.
- If blockages occur, they normally do so at the intake. Hydro-Brake® Flow Controls are fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur.
- Inspection should be undertaken annually or when a storm event occurs.

#### 4.11.2. Rainwater Harvesting

- Inspection of tank for debris and sediment build up (annually and following poor performance).
- Inspection of inlets, outlets, overflow areas, pumps and filters (annually and following poor performance).
- Cleaning of tank, inlets, outlets, gutters, roof drain filters and withdrawal devices (annually or as required).
- Remedial actions: Repair or overflow erosion damage or damage to tank and associated components (as required)

#### 4.11.3. Swales

- Remove litter and debris, inspect inlets, outlets and overflows for blockage, and clear if required.
- Insect the vegetation coverage and manage it if required.
- Repair erosion or damage by re-turfing  or reseeding.
- Remove build-up sediment on upstream gravel trench, flow spreader or at top of filter strip

#### 4.11.4. Bio-retention systems

- Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water level to determine maintenance is necessary.
- Check operation of underdrain by inspection of flows after rain.

- Inspect inlet and outlets for blockage.
- Remove litter, surface debris and weeds.
- Infill any holes or scour in the filter medium, improve erosion protection if required.
- Repair minor accumulation of silt by raking away surface mulch, scarifying surface of medium and replacing mulch.

# Our Terms & Conditions

Adkins Consultants Terms and Conditions

1. Additional Services

   In the event of additional services being required, the fees will be adjusted by prior agreement between us.

2. Diligence and Care
   Adkins Consultants will exercise reasonable care, skill and diligence in the performance of the Services. All dimensions should be checked by the client or client's contractor before ordering any components. The client will be responsible for dealing with Building Control unless agreed otherwise.

3. Disbursements and Expenses

   Disbursements and expenses are not included in our quoted fees unless stated to the contrary in our fee proposal.

4. Document Formats
   The proposed fees allow for a digital copy usually in PDF format.

   Hard copies of documents may be subject to a fee dependent on the type of document. Our printing costs are available upon request.

5. Copyright

   Adkins Consultants retain copyright in any document and works they produce; in all cases the copyright will remain vested in Adkins Consultants. The Client, subject to payment of fees and disbursements due under the Agreement, will have a license to copy and use all such documents for any purpose related to the project in question. They will not have a license to use these documents for any other project and no liability will be held by Adkins Consultants.

6. Value Added Tax

   All quotations are subject to the addition of VAT at the current rate.

7. Liability
   7.1 Excepting the case of death or personal injury you will look to the limited company Adkins Consultants, and not to any individual employee of Adkins Consultants, if you consider that there has been any breach of this Agreement. By agreeing to these conditions, you agree not to pursue any claims against any Individual as a result of them carrying out their obligations under this Agreement at any time.

   The liability of Adkins Consultants Ltd to the client, (or any third party claiming through the client) shall in no circumstance (except in case of death or personal injury) exceed the lesser of:

   (a) The amount that can be recovered from our professional indemnity insurance
   (b) Six times our Fee for the relevant works.
   (c) The diminution in value of the property concerned.

   7.3 Adkins Consultants shall have no liability to the Client (or to any third party claiming through the Client) whether in contract or in tort (including but not limited to negligence) or for breach of statutory duty or otherwise for any claim arising in connection with:-
   (a) pollution, contamination, terrorism, asbestos or any related risk or
   (b) designs or reports prepared by other professionals and specialist sub-contractors/suppliers.
   7.4 The limitation period, before which any claim must commence, is six years.
8. Payments
   Payment shall be received in full before Adkins Consultants will release any work, save for clients with an account with Adkins Consultants.

   8.1 Where such an account is available our invoices will be issued monthly for the work completed in that month or upon completion of the work, whichever occurs soonest. Payment shall become due on submission of the invoice and the final date of payment shall be 7 days after the invoice date. We reserve the right to charge interest at the statutory rate on any overdue amounts. Please note that all invoices not settled within our payment terms will be referred to our debt recovery agents, and will be subject to a surcharge of 15% plus VAT in lieu of our recovery charges.

   8.2 If you do not have an account with Adkins Consultants Ltd, then payment is required prior to the release of information, unless agreed otherwise in the quotation, which would be unusual.

   8.3 Please note that all invoices not settled within our payment terms will be referred to our debt recovery agents, and will be subject to a surcharge of 15% plus VAT in lieu of our recovery charges.

9. CDM Regulations
   Under the current CDM Regulations 2015 it is held to be our responsibility to inform you that the aforementioned regulations may be applicable to your project.

10. Changes in Terms and Conditions

Terms and conditions are liable to change without notice. Amended versions will supersede any printed or electronic versions held in the clients' possession. You can find an up-to-date copy of this Terms and Conditions Statement on our website.

11. Terms and Conditions further information

Unless otherwise agreed in writing by the Company these Conditions will override any terms and conditions stipulated or referred to by the Customer in his order or pre-contract negotiations.

12. Cancellations

Adkins Consultants will only accept cancellations at the discretion of Adkins Consultants unless they are within the cooling-off period of 14 days. Acceptance of the cancellation will only be binding on the company if it is sent in writing. Any cost or expenses incurred by the company up to the date of cancellation and all loss and damage resulting from the cancellation will be paid by the customer to the company, including within the cooling-off period if Adkins Consultants have started works during this time, which is a likely course of events given Adkins Consultant's desire to dispatch customer's instructions at a speedy rate .

13. Exclusions

In dispute of any assertion that anything is excluded, all warranties, conditions and other terms, implied, statutory or otherwise, are expressly excluded excepting so far as they are contained in these conditions or otherwise expressly agreed by Adkins Consultants Ltd in writing. If any legislation makes it unlawful to exclude any term from the Contract this clause will naturally not apply to such.

14. Resolutions of Disputes

14.1 The parties will endeavor to resolve any dispute amicably. Each of them shall in good faith consider any proposal by the other that a dispute be referred to mediation.

14.2 Disputes shall be finally resolved by the English Courts.

15. Governing Law

The Agreement shall be solely within the jurisdiction of and governed by English Courts

## Appendix 1.

### New Build Houses Infiltration Storage Approximation

**PLANE INFILTRATION SYSTEM DESIGN**

**In accordance with CIRIA C753 SUDS**

Tedds calculation version 2.0.04

**Design rainfall intensity**

Location of catchment area — London

Impermeable area drained to the system — A = **55.0** $m^2$

Return period — Period = **100** yr

Ratio 60 min to 2 day rainfall of 5 yr return period — r = **0.440**

5-year return period rainfall of 60 minutes duration — M5_60min = **20.0** mm

Increase of rainfall intensity due to global warming — $p_{climate}$ = **40** %

**Infiltration blanket details**

Base area of blanket — $A_b$ = **6.0** $m^2$

Porosity — n = **0.95**

Drainage ratio — R = A / $A_b$ = **9.2**

Soil infiltration rate — f = **46.7×10**$^{-6}$ m/s

**Table equations**

Rainfall intensity — i = M100 / D

Minimum depth required (Eq. 25.1) — H = D / n × (R × i - f)

| Duration, D (min) | Growth factor Z1 | M5 rainfalls (mm) | Growth factor Z2 | 100 year rainfall, M100 (mm) | Intensity, i (mm/hr) | Depth (mm) |
|---|---|---|---|---|---|---|
| 5 | 0.39; | 10.8; | 1.92; | 20.8; | 249.87; | 186; |
| 10 | 0.54; | 15.0; | 1.99; | 29.9; | 179.44; | 259; |
| 15 | 0.65; | 18.1; | 2.01; | 36.5; | 145.93; | 308; |
| 30 | 0.82; | 22.9; | 2.02; | 46.2; | 92.31; | 357; |
| 60 | 1.00; | 28.0; | 1.99; | 55.6; | 55.61; | 360; |
| 120 | 1.19; | 33.4; | 1.94; | 64.9; | 32.46; | 272; |
| 240 | 1.39; | 39.0; | 1.90; | 74.0; | 18.51; | 7; |
| 360 | 1.53; | 42.8; | 1.87; | 80.0; | 13.33; | 0; |
| 600 | 1.70; | 47.6; | 1.83; | 87.1; | 8.71; | 0; |
| 1440 | 2.07; | 58.1; | 1.76; | 101.9; | 4.25; | 0; |

Min depth of blanket req'd — $H_{max}$ = **360** mm

Time to empty blanket to half volume - Eq.25.6(1) — $t_{s50}$ = n × $H_{max}$ / (2 × f) = 1hr 58s

***PASS - Infiltration system discharge time less than or equal to 24 hours***

## Cheriton Parc Conversion Infiltration Storage Approximation

**PLANE INFILTRATION SYSTEM DESIGN**

**In accordance with CIRIA C753 SUDS**

Tedds calculation version 2.0.04

**Design rainfall intensity**

| | |
|---|---|
| Location of catchment area | London |
| Impermeable area drained to the system | A = **3000.0** $m^2$ |
| Return period | Period = **100** yr |
| Ratio 60 min to 2 day rainfall of 5 yr return period | r = **0.440** |
| 5-year return period rainfall of 60 minutes duration | M5_60min = **20.0** mm |
| Increase of rainfall intensity due to global warming | $p_{climate}$ = **40** % |

**Infiltration blanket details**

| | |
|---|---|
| Base area of blanket | $A_b$ = **194.0** $m^2$ |
| Porosity | n = **0.95** |
| Drainage ratio | R = A / $A_b$ = **15.5** |
| Soil infiltration rate | f = **46.7×10$^{-6}$** m/s |

**Table equations**

| | |
|---|---|
| Rainfall intensity | i = M100 / D |
| Minimum depth required (Eq. 25.1) | H = D / n × (R × i - f) |

| Duration, D (min) | Growth factor Z1 | M5 rainfalls (mm) | Growth factor Z2 | 100 year rainfall, M100 (mm) | Intensity, i (mm/hr) | Depth (mm) |
|---|---|---|---|---|---|---|
| 5 | 0.39; | 10.8; | 1.92; | 20.8; | 249.87; | 324; |
| 10 | 0.54; | 15.0; | 1.99; | 29.9; | 179.44; | 457; |
| 15 | 0.65; | 18.1; | 2.01; | 36.5; | 145.93; | 550; |
| 30 | 0.82; | 22.9; | 2.02; | 46.2; | 92.31; | 663; |
| 60 | 1.00; | 28.0; | 1.99; | 55.6; | 55.61; | 728; |
| 120 | 1.19; | 33.4; | 1.94; | 64.9; | 32.46; | 703; |
| 240 | 1.39; | 39.0; | 1.90; | 74.0; | 18.51; | 497; |
| 360 | 1.53; | 42.8; | 1.87; | 80.0; | 13.33; | 240; |
| 600 | 1.70; | 47.6; | 1.83; | 87.1; | 8.71; | 0; |
| 1440 | 2.07; | 58.1; | 1.76; | 101.9; | 4.25; | 0; |

| | |
|---|---|
| Min depth of blanket req'd | $H_{max}$ = **728** mm |
| Time to empty blanket to half volume - Eq.25.6(1) | $t_{s50} = n \times H_{max} / (2 \times f)$ = 2hr 3min 27s |

***PASS - Infiltration system discharge time less than or equal to 24 hours***

## Detention Basin Infiltration Storage Approximation

**PLANE INFILTRATION SYSTEM DESIGN**

**In accordance with CIRIA C753 SUDS**

Tedds calculation version 2.0.04

**Design rainfall intensity**

| | |
|---|---|
| Location of catchment area | London |
| Impermeable area drained to the system | A = **1680.0** $m^2$ |
| Return period | Period = **100** yr |
| Ratio 60 min to 2 day rainfall of 5 yr return period | r = **0.440** |
| 5-year return period rainfall of 60 minutes duration | M5_60min = **20.0** mm |
| Increase of rainfall intensity due to global warming | $p_{climate}$ = **40** % |

**Infiltration blanket details**

| | |
|---|---|
| Base area of blanket | $A_b$ = **150.0** $m^2$ |
| Porosity | n = **0.95** |
| Drainage ratio | $R = A / A_b$ = **11.2** |
| Soil infiltration rate | $f = \mathbf{46.7 \times 10^{-6}}$ m/s |

**Table equations**

| | |
|---|---|
| Rainfall intensity | i = M100 / D |
| Minimum depth required (Eq. 25.1) | $H = D / n \times (R \times i - f)$ |

| Duration, D (min) | Growth factor Z1 | M5 rainfalls (mm) | Growth factor Z2 | 100 year rainfall, M100 (mm) | Intensity, i (mm/hr) | Depth (mm) |
|---|---|---|---|---|---|---|
| 5 | 0.39; | 10.8; | 1.92; | 20.8; | 249.87; | 231; |
| 10 | 0.54; | 15.0; | 1.99; | 29.9; | 179.44; | 323; |
| 15 | 0.65; | 18.1; | 2.01; | 36.5; | 145.93; | 386; |
| 30 | 0.82; | 22.9; | 2.02; | 46.2; | 92.31; | 456; |
| 60 | 1.00; | 28.0; | 1.99; | 55.6; | 55.61; | 479; |
| 120 | 1.19; | 33.4; | 1.94; | 64.9; | 32.46; | 411; |
| 240 | 1.39; | 39.0; | 1.90; | 74.0; | 18.51; | 165; |
| 360 | 1.53; | 42.8; | 1.87; | 80.0; | 13.33; | 0; |
| 600 | 1.70; | 47.6; | 1.83; | 87.1; | 8.71; | 0; |
| 1440 | 2.07; | 58.1; | 1.76; | 101.9; | 4.25; | 0; |

| | |
|---|---|
| Min depth of blanket req'd | $H_{max}$ = **479** mm |
| Time to empty blanket to half volume - Eq.25.6(1) | $t_{s50} = n \times H_{max} / (2 \times f)$ = 1hr 21min 8s |

***PASS - Infiltration system discharge time less than or equal to 24 hours***

## Parking Court Infiltration Storage Approximation

**PLANE INFILTRATION SYSTEM DESIGN**

**In accordance with CIRIA C753 SUDS**

Tedds calculation version 2.0.04

**Design rainfall intensity**

| | |
|---|---|
| Location of catchment area | London |
| Impermeable area drained to the system | A = **255.0** $m^2$ |
| Return period | Period = **100** yr |
| Ratio 60 min to 2 day rainfall of 5 yr return period | r = **0.440** |
| 5-year return period rainfall of 60 minutes duration | M5_60min = **20.0** mm |
| Increase of rainfall intensity due to global warming | $p_{climate}$ = **40** % |

**Infiltration blanket details**

| | |
|---|---|
| Base area of blanket | $A_b$ = **20.0** $m^2$ |
| Porosity | n = **0.95** |
| Drainage ratio | R = A / $A_b$ = **12.8** |
| Soil infiltration rate | f = **46.7×10$^{-6}$** m/s |

**Table equations**

| | |
|---|---|
| Rainfall intensity | i = M100 / D |
| Minimum depth required (Eq. 25.1) | H = D / n × (R × i - f) |

| Duration, D (min) | Growth factor Z1 | M5 rainfalls (mm) | Growth factor Z2 | 100 year rainfall, M100 (mm) | Intensity, i (mm/hr) | Depth (mm) |
|---|---|---|---|---|---|---|
| 5 | 0.39; | 10.8; | 1.92; | 20.8; | 249.87; | 265; |
| 10 | 0.54; | 15.0; | 1.99; | 29.9; | 179.44; | 372; |
| 15 | 0.65; | 18.1; | 2.01; | 36.5; | 145.93; | 445; |
| 30 | 0.82; | 22.9; | 2.02; | 46.2; | 92.31; | 531; |
| 60 | 1.00; | 28.0; | 1.99; | 55.6; | 55.61; | 569; |
| 120 | 1.19; | 33.4; | 1.94; | 64.9; | 32.46; | 517; |
| 240 | 1.39; | 39.0; | 1.90; | 74.0; | 18.51; | 286; |
| 360 | 1.53; | 42.8; | 1.87; | 80.0; | 13.33; | 12; |
| 600 | 1.70; | 47.6; | 1.83; | 87.1; | 8.71; | 0; |
| 1440 | 2.07; | 58.1; | 1.76; | 101.9; | 4.25; | 0; |

| | |
|---|---|
| Min depth of blanket req'd | $H_{max}$ = **569** mm |
| Time to empty blanket to half volume - Eq.25.6(1) | $t_{s50}$ = n × $H_{max}$ / (2 × f) = 1hr 36min 31s |

***PASS - Infiltration system discharge time less than or equal to 24 hours***