



Drainage Strategy - Northcote Hotel, Langho, BB6 8BE

Northcote Hotel - Phase 1, Pavilion Restaurant

Northcote Hotel

Northcote Road
Langho
BB6 8BE

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Basis of Report

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Appendices

- Appendix A Proposed Block Plan**
- Appendix B Topographical and GPR Survey**
- Appendix C United Utilities Sewer Records**
- Appendix D Infiltration Testing**
- Appendix E Drainage Strategy**
- Appendix F SuDS Maintenance Schedule**



Acronyms and Abbreviations

AEP	ANNUAL EXCEEDANCE PROBABILITY
bgl	Below ground level
BGS	British Geological Survey
DS	Drainage Strategy
EA	Environment Agency
FRA	Flood Risk Assessment
ha	hectares
LLFA	Lead Local Flood Authority
m aOD	metres above Ordnance Datum
NGR	National Grid Reference
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
RVBC	Ribble Valley Borough Council
SLR	SLR Consulting Limited
SPZ	Source Protection Zone
SuDS	Sustainable Drainage Systems
UU	United Utilities



1.0 Introduction

SLR Consulting Limited (SLR) has been appointed by Northcote Hotel (the Client) to provide drainage consultancy services in relation to the proposed pavilion restaurant at Northcote Hotel, Northcote Road, Langho, BB6 8BE. The Site is centred at approximate Ordnance Survey National Grid Reference 370625, 434878.

This Drainage Strategy has been completed in accordance with guidance presented within the National Planning Policy Framework and its associated Planning Practice Guidance, taking due account of the current National Standards for Sustainable Drainage Systems, local planning policies and industry best practice.

The report describes the existing drainage and flood risk setting and sets out the proposed surface water and foul water drainage arrangements for the pavilion restaurant and associated access, parking and landscape works.

1.1 Site Location

The Site is located on the western side of Northcote Road, immediately northwest of Langho. The wider Northcote Hotel grounds comprise the main hotel, detached accommodation, landscaped gardens, parking, access roads and paddock land. The Site location is shown in Figure 1-1.

Figure 1-1: Aerial Photograph showing approximate location (© Google 2023)



Ribble Valley Borough Council is the Local Planning Authority. Lancashire County Council is the Lead Local Flood Authority and highway authority for the Site. United Utilities is the statutory sewerage undertaker.

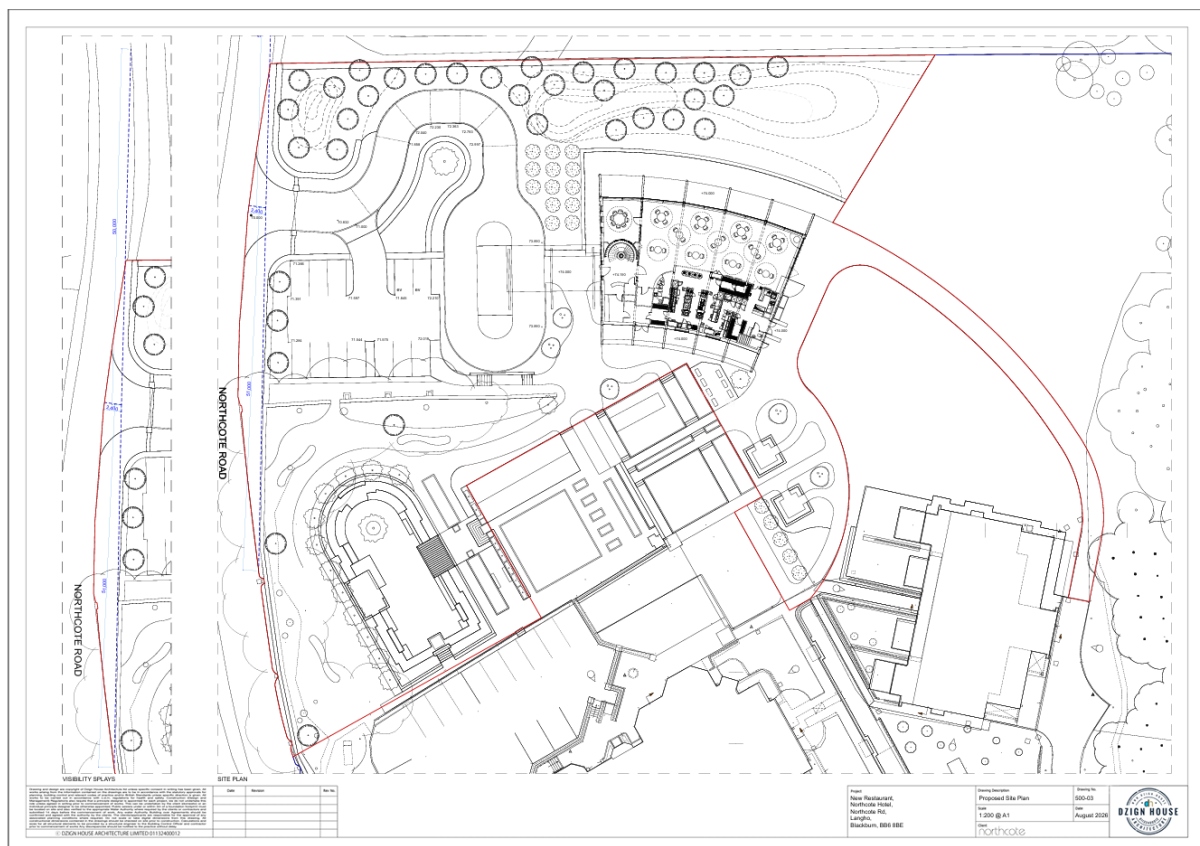


1.2 Proposed Development Summary

The proposed development comprises a pavilion restaurant within the grounds of Northcote Hotel, together with associated access, parking, terraces, permeable paving, buggy route and landscape works. For foul flow assessment the proposal has been considered on the basis of 50 pavilion restaurant covers, alongside 60 hotel residents and 60 function room covers. The drainage strategy addresses a total contributing area of approximately 2,711 m².

The proposed block plan is shown in Figure 1-2 and included in Appendix A

Figure 1-2: Proposed Block Plan



2.0 Baseline Site Appraisal

A high level overview of the baseline hydrological and drainage environment relevant to the proposed development is provided below. The assessment is based on the topographical and utilities survey, available geological and soils mapping, United Utilities sewer records, Environment Agency flood mapping and the infiltration information prepared for the Site.

2.1 Site Description

Northcote Hotel provides dining, accommodation and function facilities throughout the year. The proposed pavilion occupies land previously forming part of a paddock to the west of the main hotel. The wider grounds include a kitchen garden, lawns, terraces, established planting, parking and access roads.



The Site is bounded predominantly by pastoral land to the north, east and south, with Northcote Road along the western side of the hotel grounds. The proposed works are located wholly within the existing Northcote Hotel landholding.

2.2 Topography

A site specific topographical survey has been undertaken. Ground levels generally fall from east to west across the development area, from approximately 76.5 m aOD at the upper part of the Site to approximately 70.7 m aOD adjacent to Northcote Road. The topographical and utilities survey is included in Appendix B.

2.3 Ground Conditions

British Geological Survey mapping identifies the Site as being underlain by mudstone of the Bowland Shale Formation. Superficial deposits are identified as Devensian Till comprising diamicton.

Soilscapes information indicates slowly permeable, seasonally wet, acid loamy and clayey soils with impeded drainage. On this basis, infiltration potential is expected to be limited and variable across the Site.

Two site specific infiltration tests were undertaken during April 2023 within the lower part of the Site. No measurable fall in water level was recorded during the six hour test periods. The results demonstrate that infiltration within the lower western part of the Site is limited; they do not establish the infiltration potential at the proposed eastern geocellular storage location. Site specific infiltration testing will therefore be required at the eastern geocellular storage unit during detailed design.

The Site is outside a groundwater Source Protection Zone and is identified as being within an area of medium to low groundwater vulnerability.

2.4 Hydrology

No formal above ground watercourse has been identified within the Site boundary. An existing pond currently receives surface water runoff from the existing hotel building and associated paved areas. The pond is to be removed to accommodate the proposed development, and its drainage function will be replaced by the proposed unlined geocellular infiltration storage unit.

The nearest Main River is the river Ribble with flows approximately 2km to the north of the site. An unnamed drainage channel or field drainage feature is present to the west of Northcote Road.

2.5 Existing Drainage Regime

United Utilities records indicate that foul water from the property is connected to the public sewerage system, whereas surface water is not recorded as connected.

The GPR survey shows a private foul water drainage connection through the northern boundary connecting to the United Utilities network which ultimately flows by gravity to the wastewater treatment works. The private route is shown as a black line in the United Utilities sewer records, shown in Figure 2-1 and included in Appendix C.



Figure 2-1: Extract from United Utilities Sewer Record (© UU 2023)



The existing hotel building and associated paved areas discharge through the private surface water network towards the existing pond.

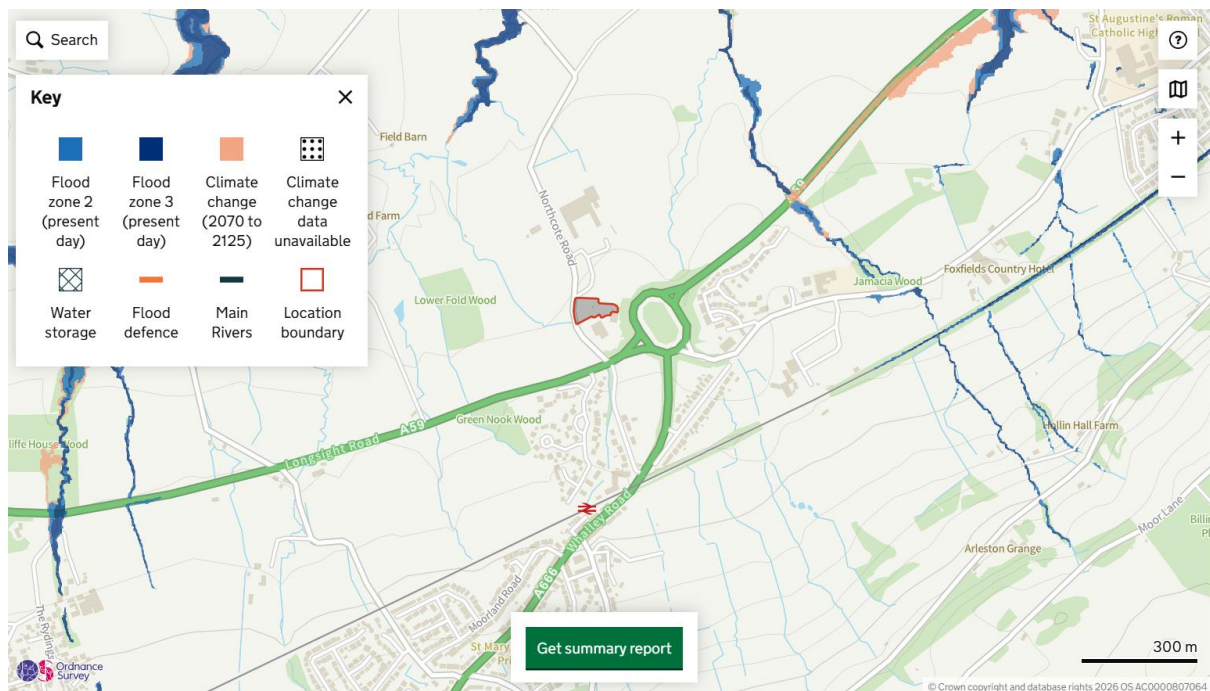
The surveyed chamber adjacent to the pond has a cover level of approximately 77.07 m aOD, an incoming invert level of approximately 75.48 m aOD and an internal weir level of approximately 75.68 m aOD. The condition, connectivity and suitability of the existing private surface water network for diversion will be confirmed at detailed design.

2.6 Flood Risk Summary

Environment Agency Flood Map for Planning information identifies the Site as lying wholly within Flood Zone 1. A site classified as Flood Zone 1 is categorised as having a chance of flooding of less than 1 in 1000 (0.1%) as shown in Figure 2.2.



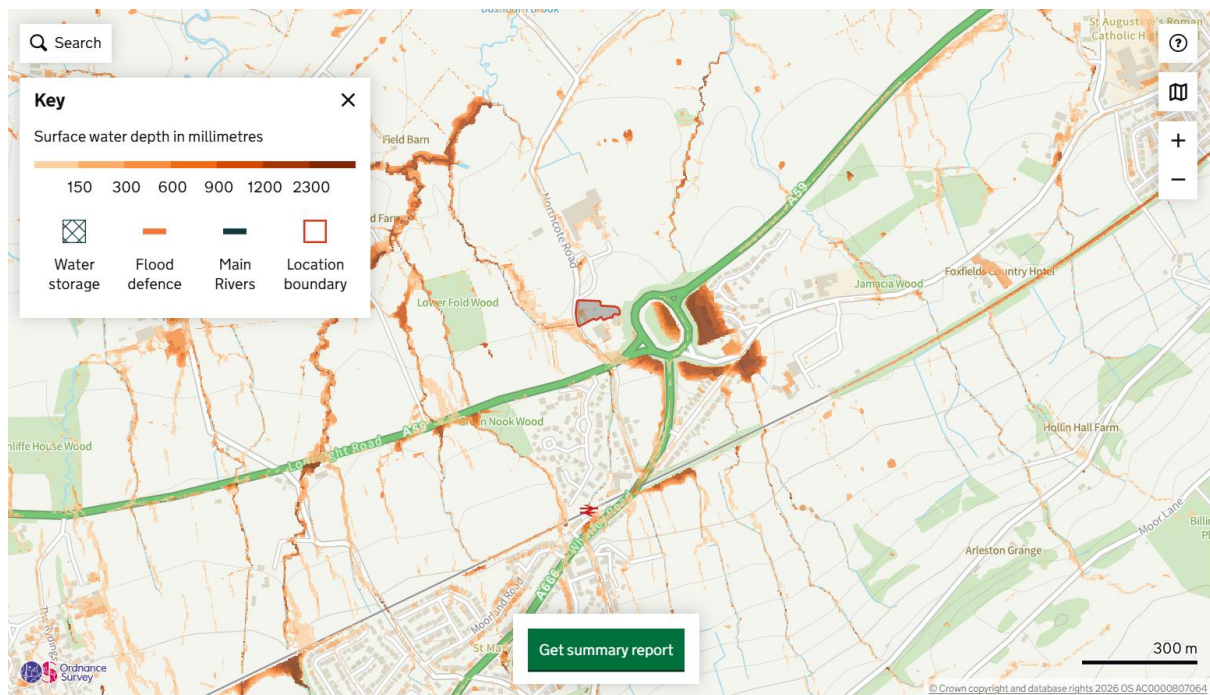
Figure 2-2: Flood Map for Planning - Rivers and Sea



The Environment Agency Risk of Flooding from Surface Water mapping identifies localised areas of surface water flood risk along Northcote Road. Figure 2-3 shows the surface water flood maps. There is some localised medium surface water risk on Northcote Road however this does not impact the site and there are no areas of flood risk within the site boundary. To that end, the site is at very low risk of flooding.



Figure 2-3: Surface Water Flood Maps



The following EA flooding maps were consulted, and all showed the site within an unshaded area, further indicating Flood Zone 1 and a very low risk of flooding,

- Flood Risk from Rivers or the Sea (fluvial),
- Flood Risk from Surface Water,
- Flood Risk from Reservoirs and infrastructure.



3.0 Planning Policy and Guidance

3.1 National Planning Policy

This report has been prepared in accordance with the National Planning Policy Framework and with reference to the associated Planning Practice Guidance.

3.1.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) details the UK Government's planning policies for development within England. It was first published in March 2012, with the latest update published in December 2024 and subsequently amended in February 2025.

With regards to drainage for new development, the NPPF states:

Paragraph 181 (c)

Development should incorporate sustainable drainage systems (SuDS), unless there is clear evidence that this would be inappropriate.

Paragraph 182

Development which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of proposals for major development should:

- a) take account of advice from the Lead Local Flood Authority;*
- b) have appropriate proposed minimum operational standards; and*
- c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.*

The National Planning Policy Framework (NPPF)¹ sets out the Government's planning policies for development within England. The latest version was published in August 2026 and replaced the previous NPPF published in December 2024 and subsequent amendments.

With regard to drainage for new development, Policy F8 of the NPPF states that:

Policy F8(1)

Development proposals which could affect drainage on or around the site should incorporate sustainable drainage systems which control surface-water flow rates and reduce runoff volumes. The drainage measures should be proportionate to the nature and scale of the development and, wherever possible, provide wider benefits for water quality, biodiversity and amenity.

Policy F8(2)

Sustainable drainage systems should:

- a) be designed in accordance with the National Standards for Sustainable Drainage Systems;*

¹ Ministry of Housing, Communities & Local Government (2026). National Planning Policy Framework.



- b) include maintenance arrangements sufficient to ensure an acceptable standard of operation throughout the anticipated lifetime of the development; and*
- c) for major development, take account of advice provided by the Lead Local Flood Authority.*

3.1.2 Planning Practice Guidance

The Planning Practice Guidance (PPG)² provides further context and guidance to enable the application of the NPPF and its policies. It was first published in November 2016, with the latest update published in December 2024.

In relation to drainage, the PPG details the requirements for the use of SuDS within new developments in order to control surface water runoff at or close to source while providing benefits for water quality, biodiversity and amenity. PPG also outlines the requirements for SuDS to be utilised to reduce the causes and impacts of flooding through the control and slow release of surface water runoff from a development, while maximising the opportunities for encouraging infiltration to ground and evapotranspiration with planted features.

3.1.3 National Standards for Sustainable Drainage Systems (SuDS)

On 19 June 2025 the Government published the new National Standards for Sustainable Drainage Systems (SuDS) which should be applied in the design of surface water drainage for new infrastructure and development, whether on brownfield or greenfield sites. The proposed surface water drainage strategy follows the eight principles for surface water drainage and incorporates the seven standards set out below:

- Standard 1: Runoff destinations;
- Standard 2: Management of everyday rainfall (interception);
- Standard 3: Management of extreme rainfall and flooding;
- Standard 4: Water quality;
- Standard 5: Amenity;
- Standard 6: Biodiversity; and
- Standard 7: Design of drainage for construction, operation, maintenance, decommissioning and structural integrity.

3.1.4 Building Regulations 2010 Part H

Approved Document H: drainage and waste disposal, of Schedule 1 of the Building Regulations 2010 outlines the preferred order for discharging surface water runoff to minimise environmental impact and manage water resources effectively.

The document also provides best practice guidance for the following requirements:

- Foul water drainage;
- Wastewater treatment systems and cesspools;
- Rainwater drainage;
- Building over sewers;

² Ministry of Housing, Communities & Local Government (2024). Planning Practice Guidance.



- Separate systems of drainage; and
- Solid waste storage.

3.2 Local Planning Policy

The Site lies within the administrative area of Ribble Valley Borough Council. Lancashire County Council is the Lead Local Flood Authority. The drainage strategy has regard to relevant adopted local planning policy and available local guidance relating to flood risk and sustainable drainage.

3.3 Relevant Guidance

Further guidance documents which represent best practice have been used to inform this drainage strategy, as listed below:

- CIRIA C753 The SuDS Manual³, which provides comprehensive guidance for the design and incorporation of SuDS;
- CIRIA C635 Designing for Exceedance in Urban Drainage⁴, which provides advice for the design and management of urban sewerage and drainage systems to reduce the impacts that arise when flows occur that exceed their capacity; and
- The Environment Agency's Approach to Groundwater Protection⁵, which covers the overarching groundwater protection principles and approaches that will apply to a range of development types.
- Approved Document H - Drainage and Waste Disposal;
- Current United Utilities requirements for connections to the public sewerage network; and
- Relevant Lancashire County Council and Ribble Valley Borough Council guidance.

3.4 Key Principles of Surface Water Management

Current best practice guidance document: The Sustainable Drainage System (SuDS) Manual (CIRIA Report C753)⁶, promotes sustainable water management through the use of SuDS. There are four main categories of SuDS which are referred to as the 'four pillars of SuDS design' as depicted in Figure 3-1.

The SuDS Manual identifies a hierarchy of SuDS for managing runoff, which is commonly referred to as a 'management train' and is depicted in Figure 3-2.

The hierarchy of techniques is identified as:

- **Prevention** – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (e.g. minimise areas of hard standing).
- **Source Control** – control of runoff at or very near its source (such as the use of rainwater harvesting).
- **Site Control** – management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole site).

3 CIRIA (2015). C753 The SuDS Manual.

4 CIRIA (2006). C635 Designing for Exceedance in Urban Drainage.

5 Environment Agency (2018). The Environment Agency's Approach to Groundwater Protection, Version 1.2.

6 Report C753, The SuDS Manual; CIRIA (2015). Report C753, November 2015.



- **Regional Control** – management of runoff from several sites, typically in a retention pond or wetland

Figure 3-1: Four Pillars of SuDS (extract from CIRIA Report C753)

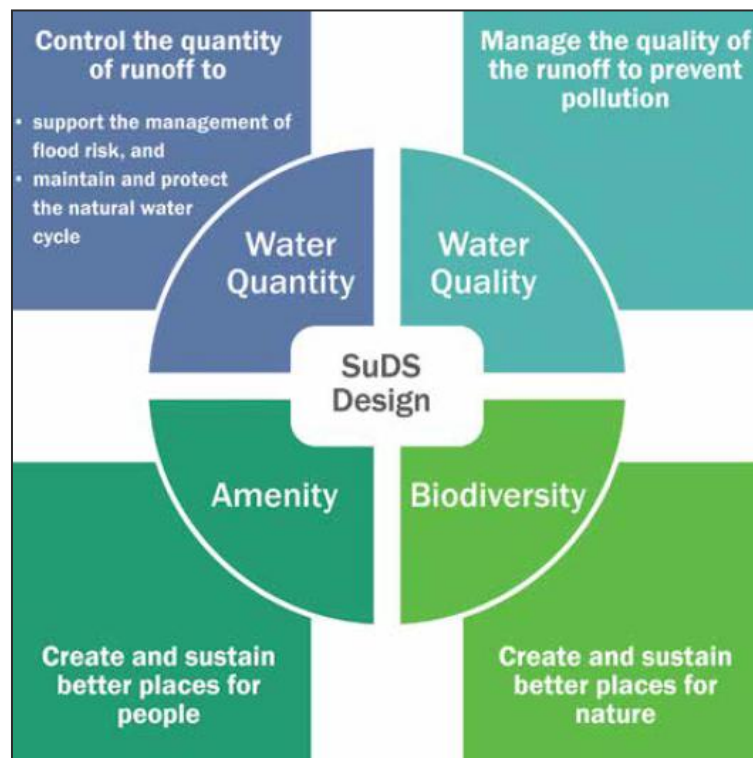
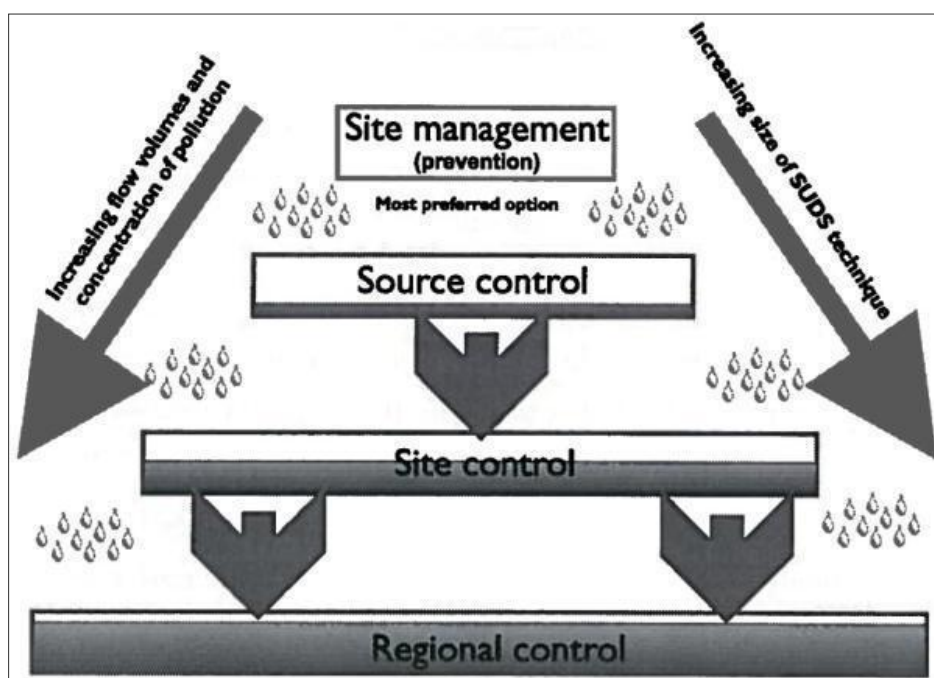


Figure 3-2: SuDS Management Train



It is generally accepted that the implementation of SuDS, as opposed to conventional drainage systems, provides a number of benefits by:

- Reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream;
- Reducing the volumes and frequency of water flowing directly to watercourses or sewers from developed sites;
- Improving water quality over conventional surface water sewers by removing pollutants from diffuse pollutant sources;
- Reducing potable water demand through rainwater harvesting;
- Improving amenity through the provision of public open spaces and wildlife habitat; and replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

3.4.1 Four Pillars of SuDS

The SuDS Manual promotes sustainable water management through the use of SuDS. There are four main categories of benefits that can be achieved by SuDS, referred to as the 'four pillars of SuDS design':

- Water Quantity: SuDS should be designed to control the quantity of surface water runoff;
- Water Quality: SuDS should be designed to manage the quality of surface water runoff to prevent pollution;
- Amenity: SuDS should create and sustain better places for people; and
- Biodiversity: SuDS should create and sustain better places for nature.

The surface water drainage strategy outlined in Section 5.0 has been developed to maximise these benefits where practicable.



4.0 Development Proposals

4.1 Development Proposals

The proposed development comprises the new pavilion restaurant, associated access road, car park, terrace, permeable paving, buggy route, footpath and landscape works, together with alterations to the existing private surface water and foul water systems. The illustrative site plan is included in Appendix A.

The strategy replaces the drainage function of the existing pond with an eastern unlined geocellular infiltration unit and provides a separate western porous car-park and road with associated sub-base attenuation and pumped discharge system for the lower part of the Site.

4.2 Principles of Surface Water Management

4.2.1 Rainwater Drainage Hierarchy

In accordance with Part H of the Building Regulations 2010, surface water runoff from all impermeable surfaces shall discharge to one of the following receptors in order of priority:

- a) an adequate soakaway or infiltration system;
- b) an open watercourse; or,
- c) a sewer.

The SuDS Manual expands upon this hierarchy further, adding that, where discharge to a sewer is necessary, then preference should be given to surface water sewers, highway drains or another surface water drainage system before considering discharge to a combined sewer as a last resort.

The above hierarchy can be expanded upon further, as consideration for rainwater collection and reuse should take priority over the disposal of surface water via infiltration.

Table 4-1 summarises the suitability of surface water disposal methods in the context of the site and the proposed development.

Table 4-1: Suitability of Surface Water Disposal Methods

Surface Water Disposal Method (in Order of Preference)	Suitability Description	Method Suitable? (Y / N)
Rainwater Harvesting	Rainwater reuse may be incorporated where practical for landscape irrigation or other non potable uses, but will not provide the sole means of disposal.	Y
Infiltration to Ground	Infiltration and evaporation are proposed as the primary methods where local ground conditions and groundwater levels allow. Permeable paving will promote infiltration in suitable areas.	Y
Discharge to Open Watercourse	An unnamed drainage feature is present west of Northcote Road. A connection would require confirmation of levels, ownership, permissions and a crossing of the public highway.	N
Discharge to A Surface Water Sewer	No suitable public surface water sewer has been identified in the immediate vicinity.	N



Surface Water Disposal Method (in Order of Preference)	Suitability Description	Method Suitable? (Y / N)
Discharge to a Combined Sewer	A preliminary restricted surface water discharge is proposed from the western catchment via the existing private foul drain to the downstream adopted combined sewer. The eastern geocellular infiltration unit will also incorporate a high level overflow to the same private drain. Both arrangements are subject to confirmation of private drain and public sewer capacity and formal United Utilities approval.	Y

4.2.2 Proposed Discharge Rate

The Site has been divided into western and eastern surface water drainage catchments. The western catchment has a contributing area of approximately 956 m², while the eastern catchment has a contributing area of approximately 1,755 m². The eastern catchment includes approximately 645 m² of existing hotel roof and paved areas currently draining to the existing pond, as this runoff will be incorporated into the proposed replacement drainage system.

The total contributing area is therefore approximately 2,711 m², equivalent to 0.2711 ha.

The greenfield runoff rate has been estimated using the Institute of Hydrology Report 124 methodology. For sites smaller than 50 ha, the calculation is undertaken using a minimum hydrological catchment area of 50 ha and the resulting flow is prorated to the actual contributing area.

The following parameters have been adopted:

Parameter	Value
Hydrological calculation area	50 ha
Actual contributing area	0.271 ha
SAAR	1,158 mm
WRAP soil type	4
SPR	0.47

The IH124 calculation gives a QBAR of approximately 435 l/s for the 50 ha hydrological catchment. When prorated to the actual contributing area of 0.271 ha, the corresponding Site QBAR is approximately:

$$\text{QBAR} = 2.36 \text{ l/s}$$

A preliminary pumped discharge rate of 2.0 l/s is proposed from the western pump chamber. The western pumped discharge and eastern surface water network will combine upstream of a dedicated surface water flow-control chamber. The outlet will restrict the combined surface water discharge to a preliminary maximum rate of 2.36 l/s, subject to agreement with United Utilities.



The eastern geocellular infiltration unit will provide offline storage connected to the surface water network through high-level connections. When water levels in the network reach the connection levels, runoff will enter the unit for temporary storage and infiltration. The high-level connections will also allow overflow from the unit back into the network when hydraulic conditions permit.

Storage below the gravity overflow level will rely on infiltration to empty. The final pump duty, flow-control arrangement, connection levels, maximum water levels and backflow protection requirements will be confirmed through detailed hydraulic modelling.

The proposed surface water connection to the adopted combined sewer, via the existing private foul drain, remains subject to confirmation of the condition and hydraulic capacity of the private drain, available capacity within the downstream public sewer and formal United Utilities approval.

4.2.3 Stormwater Volumes

Preliminary planning allowances comprise approximately 35 m³ of storage within the lined western access road sub-base and approximately 140 m³ of geocellular storage beneath the 300 m² car park.

A preliminary effective water storage allowance of approximately 110 m³ is retained for the eastern geocellular infiltration unit. The gross installation volume will account for the selected system's void ratio. The effective storage available at the proposed operating levels, infiltration performance, emptying time and required storage volume will be confirmed through site-specific infiltration testing, groundwater assessment and detailed hydraulic modelling.

The final assessment will model the western and eastern catchments separately because they contain different drainage components and may have different critical storm durations. The allowable discharge at the surface water flow control chamber will be assessed as a single overall site discharge.

4.2.4 Existing Pond and Landscape Drainage

The existing pond currently receives runoff from the existing hotel building and associated paved areas. The pond will be removed, and the existing surface water drainage will be intercepted and rerouted into the proposed eastern surface water network.

The replacement drainage arrangement will comprise the piped network, a restricted discharge and an offline geocellular infiltration unit with a preliminary effective storage allowance of approximately 110 m³. Runoff will enter the unit through high-level connections when the network surcharges. Water retained below the gravity overflow level will empty by infiltration, subject to satisfactory testing at the proposed location.

4.2.5 Design Standard

The drainage system will be designed so that no flooding occurs during the 1 in 30 year rainfall event plus 40% climate change. Runoff from the 1 in 100 year rainfall event plus 50% climate change will be contained within the drainage system or safely managed within designated exceedance areas without flooding buildings or increasing flood risk elsewhere.



4.3 Climate Change

The hydraulic design will apply a 40% climate change allowance to the 1 in 30 year event and a 50% allowance to the 1 in 100 year event.



5.0 Proposed Surface Water Drainage Arrangement

Surface water will be managed through a combination of source control and site control measures. The western catchment will use lined permeable sub-base storage, geocellular storage and central tree pit feature with a pump chamber duty/standby pumping. The eastern catchment will use permeable paving and an unlined geocellular infiltration unit, subject to site specific testing.

5.1 Source Control Measures

5.1.1 Permeable Paving

Permeable surfacing is proposed across the car park, western access paving, central paved area and buggy route/footpath. Runoff will pass through the pavement surface and be stored temporarily within an open-graded sub-base. Western storage will be lined to prevent groundwater ingress and will drain positively towards the pumping station. Upper eastern areas may promote infiltration where site specific conditions permit.

5.1.2 Tree Pits

Often located along roads and public walkways, tree pits are specifically designed depressions in the ground designed to capture run off from roads, pavements, and roofs. They are offering primary filtration prior to water entering the formal SuDS system, reducing peak flows and provide both amenity and biodiversity benefits.

A tree pit attenuation and infiltration feature is proposed within the central paved area, consistent with the original strategy. It will provide source control, water quality treatment, amenity and biodiversity benefits. The tree pit will overflow to the wider western drainage system and ultimately to the pump station. Its final design and hydraulic contribution will be confirmed at detailed design.

5.1.3 Rainwater Reuse

Rainwater harvesting will be considered at detailed design for appropriate non potable uses such as WC flushing, irrigation and external washdown. Any reuse system will supplement rather than replace the principal surface water drainage strategy.

5.2 Site Control

5.2.1 SuDS Catchment Areas

For the purposes of the drainage strategy, the proposed development is divided into western and eastern drainage catchments:

Surface	Area	Proposed drainage route
Proposed car park	300 m ²	Permeable paving and geocellular storage to pumping station
Western permeable paving/access road	242 m ²	Lined permeable sub-base to pumping station
Central permeable paving/tree-pit area	414 m ²	Tree pit and permeable sub-base to pumping station



Pavilion restaurant roof	475 m ²	Adjacent permeable paving, with onward drainage to the eastern surface water network and access to offline geocellular infiltration storage through high-level connections
Restaurant terrace	135 m ²	Mirror pool with high-level overflow to the eastern surface water network / geocellular infiltration unit
Buggy route and footpath	500 m ²	Permeable sub-base with potential infiltration and overflow to the eastern surface water network.
Existing hotel roof and paving	645 m ²	Existing private surface water drainage intercepted and rerouted to the eastern surface water network.
Total	2,711 m²	

The proposed surface water and foul water systems will remain private within the Site.

5.2.2 Western Catchment

Attenuation will be provided to the west in the sub-base of the road and carpark. This may either be using a suitable basecourse with adequate voids ratio or geocellular sub-base replacement, subject to detailed design. The car park, tree pit and road will discharge to a pump chamber that will pump surface water flow eastward to combine with the eastern catchment flows, prior to final discharge at a new manhole on the existing drain.

The duty/standby package pumping station will discharge at a preliminary rate of 2.0 l/s. This rate is subject to detailed hydraulic modelling and agreement with United Utilities as part of the single overall surface water discharge allowance for the Site.

5.2.3 Eastern Catchment

Runoff from the pavilion roof will discharge to adjacent permeable paving, with onward drainage to the eastern surface water network. The buggy route and footpath will incorporate permeable sub-base storage with potential infiltration and overflow to the same network. Existing hotel roof and paved-area drainage formerly discharging to the pond will be intercepted and rerouted to this network. The mirror pool will provide no credited attenuation below its normal operating water level and will have a high-level overflow to the network.

The eastern network will discharge towards the dedicated surface water flow-control chamber. An unlined geocellular infiltration unit will provide offline storage through high-level connections to the network. As the network surcharges, runoff will spill into the unit and subsequently infiltrate into the surrounding ground. The combined eastern runoff and western pumped discharge will be restricted to a preliminary maximum of 2.36 l/s.

The unit's ability to empty below its gravity overflow level depends on adequate infiltration. Testing at the proposed location and depth, together with groundwater assessment and hydraulic modelling, will confirm feasibility. If adequate infiltration cannot be demonstrated, an alternative emptying arrangement and revised drainage design will be required; the high-level overflow alone will not drain the lower storage..



5.2.4 Catchpits and Silt Control

Catchpits and silt trap chambers will be provided where required to intercept sediment and protect downstream SuDS components. A catchpit will be provided upstream of the surface water pumping station, subject to confirmation through detailed design.

5.3 Exceedance

Exceedance flows directions are indicated on the drainage strategy drawing. Flows will be guided away from buildings via grading of surfacing, to grassed / rural areas on site. These areas will be graded to allow for attenuation during exceedance events.

5.4 Surface Water Quality

In accordance with the National Standards for Sustainable Drainage Systems (SuDS) and The SuDS Manual, sufficient surface water runoff treatment should be provided within the development to reduce the risk of pollution to receiving waterbodies and groundwater. In the majority of cases, a suitably designed SuDS system can serve as a cost-effective method for the treatment of runoff and removal of pollution in perpetuity to providing conveyance and attenuation.

The Simple Index Approach is detailed by The SuDS Manual as a high-level assessment of water treatment on a development based upon applied indices for sources of pollution and treatment components, providing a simple way to quantify the treatment benefits of SuDS. Varying Pollution Hazard Indices, ranging from 0 to 1, are applied for each contaminant type (Total Suspended Solids, Metals and Hydrocarbons) based upon land use categories. Table 5-1 below presents the land use categories and their accompanying Pollution Hazard Indices relevant to the site.



Table 5-1: Pollution Hazard Indices for Development Land Use Type

Land Use	Pollution Hazard Level	Pollution Hazard Indices		
		Total Suspended Solids (TSS)	Metals	Hydrocarbons
Restaurant roof – low metal-leaching potential	Low / very low	0.3	0.2	0.05
Visitor car park	Low	0.5	0.4	0.4
Low-traffic access road	Low	0.5	0.4	0.4
Central paved/tree-pit area	Low	0.5	0.4	0.4

The treatment train comprises permeable paving, the central tree pit feature and the eastern infiltration geocellular infiltration unit. Catchpits will be included where required, including upstream of the pumping station. The mirror pool overflow will pass onward to the eastern geocellular infiltration unit.

In order to ensure adequate treatment of contaminants from a development, SuDS components are applied SuDS Mitigation Indices, ranging from 0 to 1, based upon their ability to remove each contaminant type, as detailed in Table 5-2 below.

Table 5-2: SuDS Mitigation Indices for Discharges to Surface Water

SuDS Component	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Permeable paving	0.7	0.6	0.7
Bioretention/tree pit	0.8	0.8	0.8

Where multiple SuDS components are proposed for a development, the full mitigation index for the primary component is applied, with the mitigation index for all subsequent components applied to a factor of 0.5.

Applying a factor of 0.5 for subsequent SuDS components ensures that diminishing returns for the removal of contaminants is accounted for. This is due to where a portion of these contaminants have already been removed by the primary SuDS component, resulting in lower concentrations of each contaminant within a given volume of water.

In order to ensure sufficient treatment of surface water runoff from the development, the total mitigation index must be greater than or equal to the total pollution hazard index, as detailed below:

$$\begin{array}{lcl}
 \text{Total SuDS Mitigation Index} & \geq & \text{Total Pollution Hazard Index} \\
 \text{(For each contaminant type)} & & \text{(For each contaminant type)}
 \end{array}$$



Table 5-3 presents the pollution hazard levels associated with each identified land use within the Site, alongside the corresponding SuDS mitigation indices installed to manage these hazards. For a conservative approach, SuDS mitigation indexes have been rounded down to the nearest decimal place.

Table 5-3: SuDS mitigation Indices vs Pollution Hazard Level for the Site

Land Use	Pollution Hazard Level	Pollution Hazard and SuDS Mitigation Indices Comparison					
		Total Suspended Solids (TTS)		Metals		Hydro-Carbons	
		Pollution Index	SuDS Mitigation Index	Pollution Index	SuDS Mitigation Index	Pollution Index	SuDS Mitigation Index
Restaurant roof – low metal-leaching potential	Low / very low	0.3	0.7	0.2	0.6	0.05	0.7
Visitor car park	Low	0.5	0.7	0.4	0.6	0.4	0.7
Low-traffic access road	Low	0.5	0.7	0.4	0.6	0.4	0.7
Central paved/tree-pit area	Low	0.5	1	0.4	1	0.4	1

In each case, the SuDS mitigation index provided by the proposed treatment train is equal to or greater than the corresponding pollution hazard index. The proposed water-quality treatment is therefore considered satisfactory, subject to confirmation of the final SuDS component design and detailed drainage arrangement.

5.5 SuDS Operation and Maintenance

All proposed drainage within the Site will remain private and will be maintained by the site owner/operator. Inspection and maintenance will be undertaken in accordance with an asset specific maintenance plan and the recommendations of proprietary system manufacturers.

The surface-water pumping station will be subject to routine inspection and planned preventative maintenance, including testing of the duty/standby pump changeover, high-level alarm, control panel, float switches, valves and non-return valves. The wet well will be inspected for sediment and debris accumulation, and the installation will be serviced by a competent specialist in accordance with the manufacturer's requirements.

The maintenance plan will include inspection and cleaning of permeable paving, catchpits, chambers, pipes, flow controls, the duty/standby pumping station, tree pit, geocellular infiltration unit and associated inlets and overflows. An outline maintenance schedule is included in Appendix F.



5.6 National Standard for Sustainable Drainage Systems (SuDS)

STANDARD	INSTALLED MEASURES	PRELIMINARY ASSESSMENT STATUS (SUBJECT TO DETAILED VERIFICATION)
Runoff destinations	Infiltration and evaporation where feasible, with a restricted pumped connection for the lower catchment.	Y
Management of everyday rainfall	Permeable paving, tree pit and other source-control measures.	Y
Management of extreme rainfall and flooding	Attenuation within permeable pavement and storage, with controlled discharge and exceedance routing.	Y
Water quality	Permeable paving and vegetated source-control measures provide treatment.	Y
Amenity	Tree pit, permeable landscape treatment.	Y
Biodiversity	Vegetated tree-pit and landscape features; contributions to be confirmed through coordination with the landscape and ecology proposals.	Y
Construction, operation and maintenance	Outline maintenance requirements are provided and will be developed at detailed design.	Y



6.0 Proposed Foul Water Drainage Strategy

This section sets out the proposed approach to foul water drainage from the pavilion restaurant.

6.1 Existing Foul Drainage Scheme

The site utilities survey identifies an existing private foul drain passing through the northern part of the Site and ultimately connecting to the adopted United Utilities combined sewer. All proposed drainage within the Site will remain private.

6.2 Discharge Rates

The foul flow assessment retains the original inputs of 60 hotel residents, 60 function room covers and 50 pavilion restaurant covers. The combined peak foul flow is approximately 0.27 l/s.

6.3 Proposed Foul Drainage Scheme

Foul drainage from the pavilion will connect by gravity to a common new manhole on the existing private foul drain. The private drain ultimately discharges to the adopted combined sewer. The connection arrangement and downstream capacity will be confirmed with United Utilities.

Drainage from the commercial kitchen will incorporate appropriate grease management measures. The detailed internal and external foul drainage design will be coordinated with the building services and kitchen design.

7.0 Consultation

The strategy is subject to consultation with Ribble Valley Borough Council, Lancashire County Council as Lead Local Flood Authority and United Utilities. No approval of the proposed surface water connection has been obtained at this stage.

The western pumped discharge and eastern surface water network will combine upstream of a dedicated surface water flow-control chamber before discharging indirectly to the adopted combined sewer through the existing private drain. The eastern network will incorporate offline geocellular infiltration storage accessed through high-level connections. The combined surface water discharge will be restricted to a preliminary maximum rate of 2.36 l/s, subject to detailed hydraulic modelling, confirmation of private and public sewer capacity and United Utilities approval.

8.0 Conclusions & Recommendations

SLR Consulting Limited has been appointed by Northcote Hotel to prepare a drainage strategy for the proposed pavilion restaurant and associated access, parking and landscape works at Northcote Hotel, Northcote Road, Langho.

The Site lies within Flood Zone 1 and the proposed development area is outside the principal mapped areas of surface water flood risk. The underlying mudstone and till deposits are generally of low permeability. Two tests in the lower Site recorded no measurable infiltration, supporting the use of lined western attenuation; separate testing is required at the proposed eastern geocellular infiltration unit.



The western catchment will be managed through lined permeable sub-base storage, approximately 140 m³ of preliminary geocellular storage and the central tree pit feature with flows discharging through a duty/standby pumping station at a preliminary rate of 2.0 l/s.

Existing drainage formerly discharging to the pond will be rerouted to the proposed eastern surface water network. An unlined geocellular infiltration unit will provide offline storage with a preliminary effective capacity of approximately 110 m³, accessed through high-level connections. Storage below the gravity overflow level will rely on infiltration to empty. Feasibility and final sizing remain subject to testing at the proposed location, groundwater assessment and detailed hydraulic modelling. An alternative drainage arrangement will be required if adequate infiltration cannot be demonstrated.

The greenfield runoff assessment has been based on the full contributing drainage area of approximately 2,711 m². The IH124 calculation gives a preliminary Site QBAR of approximately 2.36 l/s. As the western pumped discharge and eastern surface water network will combine via a dedicated flow control chamber, they will be treated as a single overall surface water discharge arrangement. The final flow control design and discharge rate remain subject to detailed hydraulic modelling and United Utilities approval.

The drainage system will be designed so that no flooding occurs during the 1 in 30 year rainfall event plus 40% climate change. Runoff from the 1 in 100 year event plus 50% climate change will be contained within the drainage system or safely managed within designated exceedance areas. All on site drainage will remain private and will be maintained by the site owner/operator.



Appendix A Proposed Block Plan

Drainage Strategy

Northcote Hotel, Northcote Road, Langho

Northcote Hotel

SLR Project No.: VD23863



Appendix B Topographical and GPR Survey

Drainage Strategy

Northcote Hotel, Northcote Road, Langho

Northcote Hotel

SLR Project No.: VD23863



Appendix C United Utilities Sewer Records

Drainage Strategy

Northcote Hotel, Northcote Road, Langho

Northcote Hotel

SLR Project No.: VD23863



Appendix D Infiltration Testing

Drainage Strategy

Northcote Hotel, Northcote Road, Langho

Northcote Hotel

SLR Project No.: VD23863



Doc Ref: MCD SS 0104 Doc Name: MCD Trial Pit Permeability Test Record

Doc Version: 1.0



Permeability Test BS 5930:1999

MCD Trial Pit Permeability Test Record	Site: Blackburn	Location: SA101
Trial Pit Width: 400mm Trial Pit Length: 1.3m Trial Pit Depth: 1m	Job No: M11363	Trial Pit No:
	Date: 03/04/23	Sheet: of:
	Ground level	Operator: RS
	Weather: Clear	
	Type of test: Rising/Falling Head	
Any pit collapses? Y/N No		
Water level (if present before fill)	Water level at start of test (after fill) 0.35	

Test Record

Time	Time Elapsed min:sec	Depth to water level m	Time	Time Elapsed min:sec	Depth to water level m
	0:00	0.35		20:00	0.35
	0:15	0.35		30:00	0.35
	0:30	0.35		40:00	0.35
	0:45	0.35		50:00	0.35
	1:00	0.35		60:00	0.35
	1:30	0.35		90:00	0.35
	2:00	0.35		120:00	0.35
	2:30	0.35		180:00	0.35
	3:00	0.35		240:00	0.35
	3:30	0.35		300:00	0.35
	4:00	0.35		360:00	0.35
	4:30	0.35			
	5:00	0.35			
	6:00	0.35			
	7:00	0.35			
	8:00	0.35			
	9:00	0.35			
	10:00	0.35			
	15:00	0.35			

Remarks:

NOTE: Depth to water level measured from top of Pit edge / Marker point across pit*

* Delete as appropriate



Doc Ref: MCD SS 0104 Doc Name: MCD Trial Pit Permeability Test Record

Doc Version: 1.0



Permeability Test BS 5930:1999

MCD Trial Pit Permeability Test Record	Site: Blackburn	Location: SA102
Trial Pit Width: 400mm Trial Pit Length: 1.3m Trial Pit Depth: 1m	Job No: M11363	Trial Pit No:
	Date: 03/04/23	Sheet: of:
	Ground level	Operator: RS
	Weather: Clear	
	Type of test: Rising/Falling Head	
Any pit collapses? Y/N No		
Water level (if present before fill)	Water level at start of test (after fill) 0.40	

Test Record

Time	Time Elapsed min:sec	Depth to water level m	Time	Time Elapsed min:sec	Depth to water level m
	0:00	0.40		20:00	0.40
	0:15	0.40		30:00	0.40
	0:30	0.40		40:00	0.40
	0:45	0.40		50:00	0.40
	1:00	0.40		60:00	0.40
	1:30	0.40		90:00	0.40
	2:00	0.40		120:00	0.40
	2:30	0.40		180:00	0.40
	3:00	0.40		240:00	0.40
	3:30	0.40		300:00	0.40
	4:00	0.40		360:00	
	4:30	0.40			
	5:00	0.40			
	6:00	0.40			
	7:00	0.40			
	8:00	0.40			
	9:00	0.40			
	10:00	0.40			
	15:00	0.40			

Remarks:

NOTE: Depth to water level measured from top of Pit edge / Marker point across pit*

* Delete as appropriate



Appendix E Drainage Strategy

Drainage Strategy

Northcote Hotel, Northcote Road, Langho

Northcote Hotel

SLR Project No.: VD23863



Appendix F SuDS Maintenance Schedule

Drainage Strategy

Northcote Hotel, Northcote Road, Langho

Northcote Hotel

SLR Project No.: VD23863

COMPONENT	REQUIRED ACTION	TYPICAL FREQUENCY
Permeable paving	Inspect for ponding, silting, weed growth and surface damage. Brush and vacuum sweep as required.	Monthly for first 3 months, then annually and after severe storms
Inspection chambers and pipes	Inspect for sediment, blockage and evidence of poor operation. Clean, rod or jet as required.	Every 3 months and after severe storms
Tree pit / vegetated SuDS	Remove litter and invasive growth; inspect inlets, outlets and vegetation condition.	Monthly during establishment, then twice yearly
Pump chamber	Service pumps, valves, controls and alarms in accordance with manufacturer requirements.	At least annually and as specified by supplier
Storage and flow controls	Inspect for sediment, blockage and structural condition. Remove sediment as required.	Every 6 months and after severe storms
Geocellular infiltration unit	Inspect accessible chambers, sediment traps, connections and inspection points. Monitor emptying performance and remove sediment from accessible pretreatment components. Investigate prolonged high water levels or reduced infiltration performance.	In accordance with manufacturer recommendations and the final maintenance plan; additionally following significant storms or evidence of poor drainage.
Surface-water pumping station	Inspect pumps, controls, alarms, floats, valves and wet well. Test duty/standby operation and remove debris or sediment. Service in accordance with manufacturer's requirements.	inspect and test every 3 months; full service annually; inspect after alarms or pump failure

