

EVOLVE

Downlands Retail Park Costa Surface Water Drainage Strategy

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1 Introduction

1.1 Scope

Evolve Consulting Engineers Limited has been appointed by Melford Capital Partners in respect to the proposed development at Downlands Retail Park, Lyons Way, Upper Brighton Road centred at approximate National Grid Reference TQ 15288 05203 (E 515288 , N 105203).

The planning application area is approximately 0.118ha and is part of the car parking lot of Downlands Retail Centre.

The proposed development is for the removal of the existing hardstanding comprised of roads and car parking bays and construction of a Costa Coffee store, external seating area and access roads.

1.2 Sources of Information

This report has been prepared based on the following set of information.

- Site Location Plan produced by Mountford Pigott, drawing reference 2227-01-L01, dated Oct 2021
- Proposed Site Layout Plan produced by Mountford Pigott, drawing reference 2227-01-P01, dated Oct 2021
- Magic website mapping available at <https://magic.defra.gov.uk/magicmap.aspx>
- Lead Local Flood Authority (LLFA) information – West Sussex County Council – SuDS Design Guidance, available at https://www.westsussex.gov.uk/media/2270/suds_design_guidance.pdf
- National Planning Policy guidance on Flood Risk and Coastal Change, UK Government, published 6 March 2014, last updated 25 August 2022, available at <https://www.gov.uk/guidance/flood-risk-and-coastal-change>
- The National Planning Policy Framework (NPPF) : Annex 3, Flood risk vulnerability classification – UK Government, published March 2012, available at <https://www.gov.uk/guidance/national-planning-policy-framework/annex-3-flood-risk-vulnerability-classification>

1.3 Limitations

This report has been prepared in accordance with the NPPF and Local Planning Policy. The proposed flood management and surface water management strategies are based on the relevant British Standards (BS8533), the standing advice provided by the EA or based on common practice. The findings of this report are based on the information available at the time of the production.

The Construction (Design and Management) Regulations 2015 (CDM Regulations) will apply to any future development of this site which involves “construction” work, as defined by the CDM Regulations. As such it is the responsibility of the proposed developer (ultimate Client) to fulfil its duties under the CDM Regulations.

2 Site Setting

2.1 Existing Site

The site location is presented in Figure 1. The site covers an area of 0.118 hectares and is located near the intersection of Lyons Way and A27 at postcode BN14 9JL and Grid Reference TQ 15288 05203. The proposed development would be accessed from Lyons Way.

The redline site boundary is irregular in shape and is part of the car parking lot of Downlands Retail Centre.

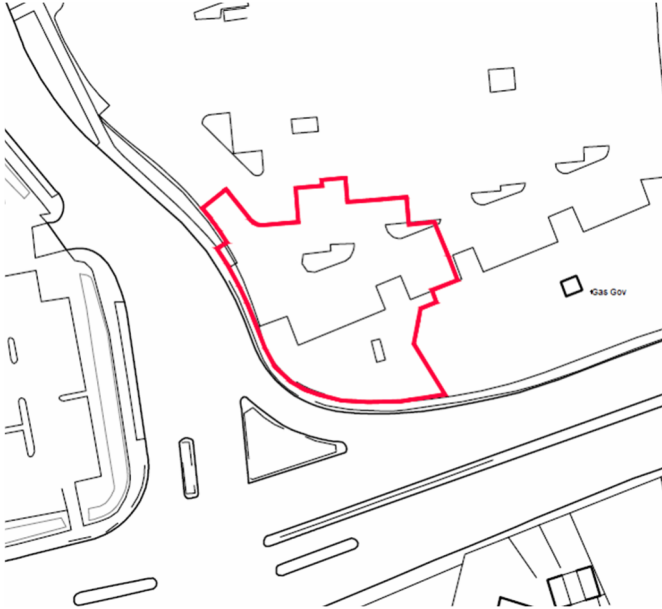


Figure 1 - Site location plan

2.2 Proposed Development

The proposed development is for the construction of a Costa Coffee store unit, external sitting area and drive thru access road.

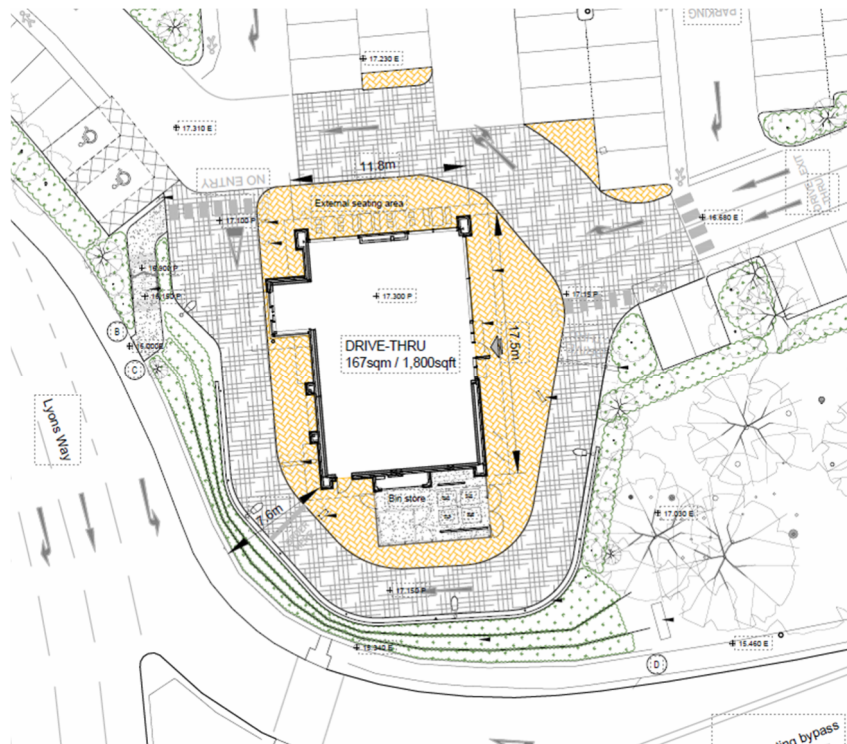


Figure 2 - Proposed site layout plan

2.3 Topography

The topographical survey undertaken by Greenhatch Group indicates that site levels generally fall from north to south, from approximately 17.2mAOD to 15.2mAOD at the site's boundary with A27 Stompting Bypass.

2.4 Hydrology

Ordnance Survey (OS) mapping and the EA's web-based mapping indicate that the closest watercourses to the site are a local network of local ditches located approximately 450m to the southeast from the site. The largest of the channels are classified as Main Rivers by the EA.

2.5 Geology

Based on the information available from BGS online mapping:

Bedrock geology description – Tarrant Chalk Member - Chalk. Sedimentary bedrock formed between 83.6 and 72.1 million years ago during the Cretaceous period.

Superficial deposits – Head - Clay, silt, sand and gravel. Sedimentary superficial deposit formed between 2.588 million years ago and the present during the Quaternary period.

The nearest borehole record (ref. TQ10NE29) indicates that the superficial drift deposits are mainly comprised of sand and gravel. No information regarding groundwater table depths is provided in the nearby borehole logs.

Soilscape information available from Magic Maps service indicate this area as: "Freely draining slightly acid but base-rich soils"

2.6 Hydrogeology

The following hydrogeological information was obtained from the online Magic Maps service.

- Aquifer designation (Bedrock) – Principal
- Aquifer Designation Map (Superficial Drift) – Secondary (undifferentiated)
- Groundwater Vulnerability – Medium to High

The Principal Aquifer Designation (for both Bedrock and Superficial) is described by the EA as strategically important rock units that have high permeability and water storage capacity.

Groundwater provides a third of the drinking water in England and Wales and maintains the flow in many of our rivers. In some areas of Southern England, groundwater supplies up to 80% of the drinking water, therefore it is crucial that these sources are looked after thus ensuring that the water is completely safe to drink.

The Environment Agency has identified Source Protection Zones (SPZs) for 2000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The maps show three main zones (inner, outer and total catchment) and a fourth zone of special interest, which is occasionally applied to a groundwater source.

According to Environment agency data, the site is located in a *Zone II - Outer Protection Zone* Groundwater Source Protection Zone (SPZ).

2.7 Existing Drainage

Severn Trent asset record reference TQ1505SW - indicates a 150Ø public foul sewer and a 450Ø public surface water sewer running generally parallel to the western site boundary, within Lyons Way.

A schematic excerpt from the Severn Trent asset record is reproduced in Figure 3.

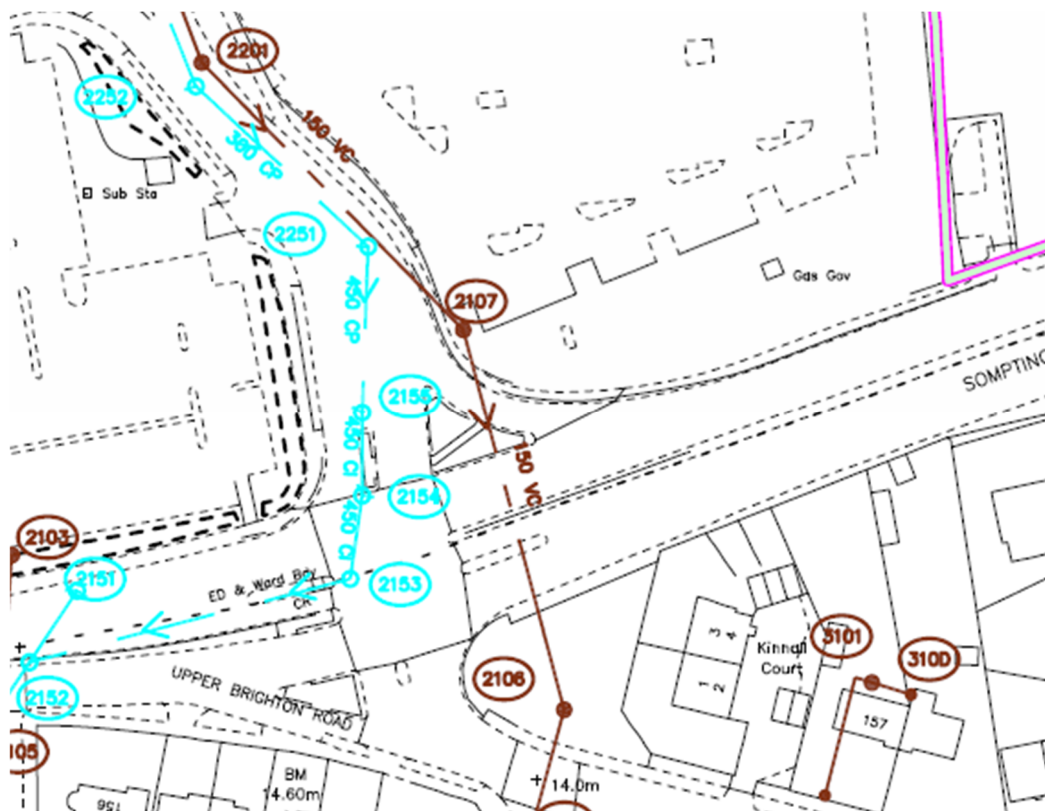


Figure 3 - Southern Water asset record extract

Analysis of the topographic survey indicates the presence of an private drainage infrastructure within the proposed redline application boundary area.

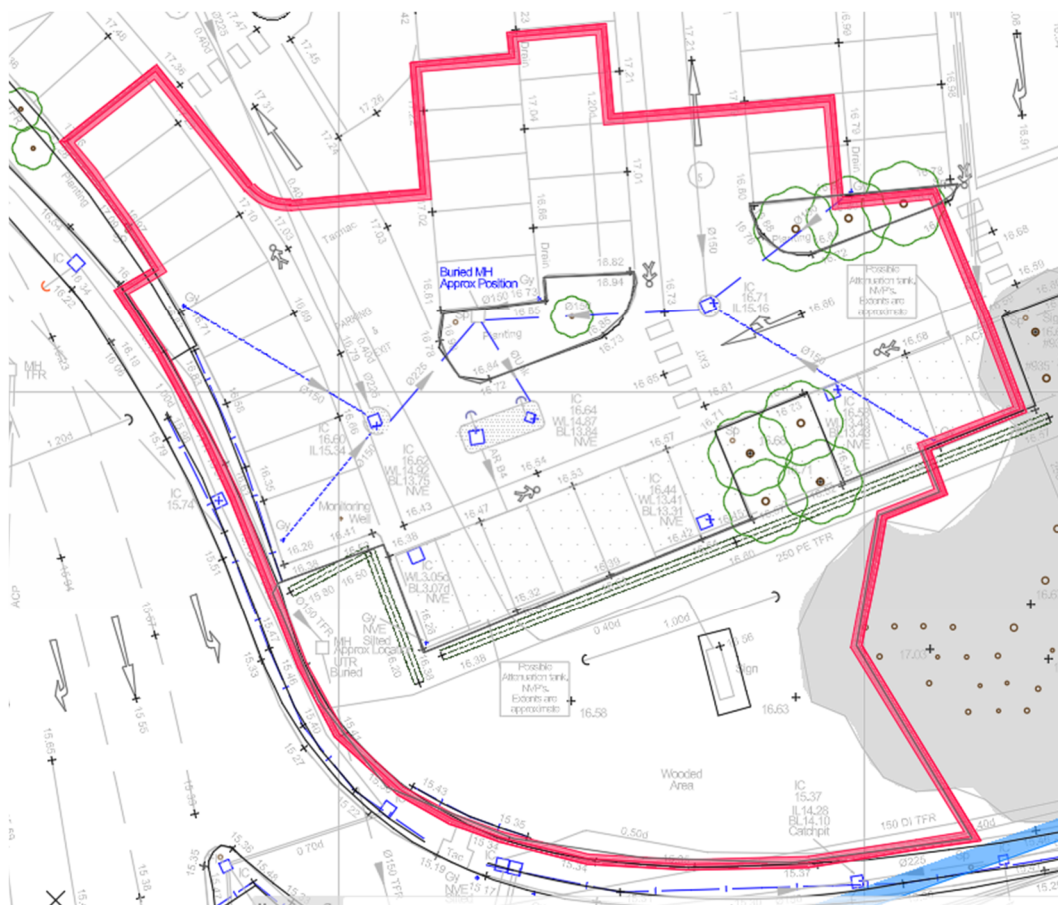


Figure 4 - Existing private drainage infrastructure

2.8 Summary of Flood Risk

The following table provides a summary of flood risk for the site:

Table 1 - Summary of sources of flood risk

Source of Flooding	Risk Level	Source of Data	Comments, Mitigation Requirements
Fluvial	Low	EA mapping	Flood Zone 1.
Tidal	Low	EA mapping	Inland location.
Surface water (Pluvial)	Medium	EA mapping	The proposed shop unit would not reside in any storm flood outline, being at a 'Very Low' risk of surface water flooding and would not be affected by a 1 in 1000 year storm event. A 'Medium' to 'High' flood risk area is located along the southern boundary of the car parking area, likely due a local topographic depression.
Groundwater	Low	BGS mapping, LPA information	Adur and Worthing Councils SFRA: Appendix H JBA Groundwater Flood Risk Mapping indicates that the site is not at a risk of ground water flooding.
Sewers	Medium	LPA information	Table 6-4: Sewer Incident Report Form database for Adur District and Worthing Borough of Adur and Worthing SFRA indicates that 7 sewer flooding incidents have occurred in the BN14 9 post-code area.
Reservoirs	Low	EA mapping	The 'wet day' reservoir flood mapping outline produced by the EA indicates that the site is not located at risk of reservoir flooding even if it would occur concurrently with a fluvial flooding event.

Key	Description
	Low/Negligible Risk – No noticeable impact to site and not considered to be a constraint to development.
	Medium Risk – Issue requires consideration but not a significant constraint to development
	High Risk – Major constraint to development requiring active consideration in mitigation proposals

3 Surface Water Drainage Assessment

3.1 Policy Requirements

The 'DEFRA Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems' (March, 2015) states that the following options must be considered for disposal of surface water runoff in order of preference:

- Discharge to ground
- Discharge to a surface water body
- Discharge to a surface water sewer
- Discharge to a combined sewer

3.2 Contributing Areas.

This assessment includes an overview and comparison of the existing scenario and proposed development scenario which is summarised in Table 2.

Table 2 - Contributing areas

Parameter	Existing (m ²)	Proposed (m ²)
Roof Area	0	228
Hardstanding Area	818	636
Soft Landscape Area	366	324
Total area	1184	1184

3.3 Pre-development Situation

3.3.1 Greenfield Rates

The Greenfield ICP SuDS method was used to estimate the greenfield rates for the proposed impermeable areas (0.086ha). Calculations are presented in Appendix C and the results are summarised in Table 3. The greenfield runoff rates are very low due to the sand and gravel superficial deposits, having a soil index of 0.1.

Table 3 - Greenfield runoff rates

Return period	Peak flow (l/s)
QBar	0.0
1 in 1 year	0.0
1 in 30 year	0.0
1 in 100 year	0.1

3.3.2 Brownfield Rates

As this is a brownfield site, the existing runoff rates for a variety of return periods have been calculated using the standard hydraulic network modelling method and using the FEH22 rainfall data set.

Table 4 Pre-development surface water runoff

Return period	Peak flow (l/s)
1 in 1 year	18.2
1 in 30 year	40.8
1 in 100 year	51.3

3.4 Discharge Options

When developing or redeveloping a site, the control and dispersion of surface water falling on the site's catchment always must be considered. Wherever possible runoff from developments should be managed on the surface. This enables their performance to be more easily inspected and managed with pollution incidents and potential flood risk being visible. But due to the nature of some developments this is not always possible.

If surface water is to be discharged from the site it should be discharged as high up the following hierarchy of drainage options as reasonably practicable. The proposed development has been developed in accordance with this hierarchy.

- 1) rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
- 2) rainwater infiltration to ground at or close to source
- 3) rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
- 4) rainwater discharge direct to a watercourse (unless not appropriate)
- 5) controlled rainwater discharge to a surface water sewer or drain
- 6) controlled rainwater discharge to a combined sewer.

It is recommended to manage surface water as close to the source i.e., where the rain falls. The effective use of control and management of surface water runoff will need to be addressed through the application of the above drainage hierarchy.

3.4.1 Rainwater Harvesting

As the site is proposed for commercial activities providing facilities such as internal/external siting areas and implicitly toilets for potential customers or staff, it is recommended to provide specialist rainwater harvesting systems (RWH) and water used in grey water applications (ie toilet flushing). A RWH specialist should provide the design of the RWH system at the detailed design stage, as required.

3.4.2 Discharge to Ground

The potential for surface water to discharge to ground has been assessed through a desk-based review of the likely ground conditions and possible infiltration structures.

Various online geology sources indicate a porous superficial geology at the site location, comprised mainly of sand and gravel. As such, for the purposes of this study, a conservative infiltration rate of 5×10^{-6} m/s (0.018 m/hr) was assumed in calculations. A site specific bespoke infiltration testing study to BRE365 methodology should be undertaken prior to the detailed design stage to reveal the actual infiltration rates and guide the final SuDS design scheme for the development.

3.4.3 Blue/Green Roofs and Raingardens

The design of the proposed shop and the pitch of the roof does not allow for the use of blue roofs on the development. A green roof specialist should assess the development and inform if an extensive green roof system could be feasible across certain parts of the shop's roof.

3.4.4 Discharge to Surface Water Body

Ordnance Survey (OS) mapping and the EA's web-based mapping indicate that the nearest watercourses to the site are located approximately 450m to the southeast from the site.

Due to the distance from the site for the surface water bodies mentioned above, this discharge option is not suitable.

3.4.5 Discharge to Surface Water Sewer

Discharge to the public sewer network should only be considered once all other options for draining surface water from the site have been exhausted.

Should the infiltration tests reveal that soil strata at the site are not suitable for infiltration, the proposed development should discharge runoff to the surface water sewer in Lyons Way via the existing private connections, if suitable, or establish a new connection.

Any works and/or flow rates to the sewers should be approved by Southern Water prior to commencement of construction works.

3.4.6 Discharge to Combined Water Sewer

No combined sewers are in the vicinity of the site.

3.5 Post-development Situation

3.5.1 Discharge Rate

The proposed drainage strategy is for the full infiltration of runoff generated by the proposed impermeable areas by using permeable pavement SuDS devices. As such, there would be no offsite discharges for all rainfall events up to, and including, the 1 in 100 year + 45%CC design storm event.

Should the infiltration tests reveal that soil strata at the site are not suitable for infiltration, the proposed development should discharge runoff to the surface water sewer in Lyons Way via the existing private connections, if suitable, or establish a new connection. In this scenario, outflows from the proposed development should be restricted to the minimum feasible rate, whilst managing the risk of blockages, subject to a particular SuDS design option.

3.5.2 Climate Change Allowance

The data published on the DEFRA database shows the site located within the Adur and Ouse Management Catchment and for a commercial development (lifespan 60yrs) an upper end allowance of 45% should be applied to rainfall events as the climate change allowance within this region.

By controlling runoff rates and providing attenuation for all storm events up to and including the 1 in 100-year storm + 45 % climate change allowance, the risk of downstream flooding will be minimised. Details of the drainage system calculations are provided in Appendix C.

3.5.3 Urban Creep

As the site has limited scope for layout changes based on the intended use and proposed permeable areas, no allowances have been made for urban creep.

3.6 Sustainable Drainage Systems (SuDS)

To maximise the potential use of SuDS at the site, a review has been undertaken as shown in Table 5. in accordance with the SuDS Hierarchy. This review highlights the components referenced in the SuDS Hierarchy and provides recommendations on whether the components could be incorporated into the development.

Table 5 - SuDS selection based on the SuDS Hierarchy

Component	Recommendation
Rainwater reuse	It is recommended to provide specialist rainwater harvesting systems (RWH) and water used in grey water applications (ie toilet flushing). A RWH specialist should provide the design of the RWH system at the detailed design stage, as required.
Green/Blue roofs	The design of the proposed shop and the pitch of the roof does not allow for the use of blue roofs on the development. A green roof specialist should assess the development and inform if an extensive green roof system could be feasible across certain parts of the shop's roof.
Basins and Ponds	Basins and ponds were not considered suitable due to various site constraints, including limited open space and steep topography across the soft landscaped areas.
Filter Strips and Swales	Swales were not considered suitable due to various site constraints, including limited open space and steep topography across the soft landscaped areas.
Infiltration Devices	Various online geology sources indicate a porous superficial geology at the site location, comprised mainly of sand and gravel. As such, for the purposes of this study, a conservative infiltration rate of 5×10^{-6} m/s (0.018 m/hr) was assumed in calculations. A site-specific bespoke infiltration testing study to BRE365 methodology should be undertaken prior to the detailed design stage to reveal the actual infiltration rates and guide the final SuDS design scheme for the development.
Permeable Paving	Permeable paving and similar SuDS products are recommended to be used in all proposed hardstanding areas, providing interception, treatment, attenuation and full infiltration of runoff.
Tanked Systems	More sustainable and suitable SuDS devices, such as permeable paving, would be able to deliver the SuDS requirements for the proposed development.

3.7 Attenuation Requirements

The proposed development would provide a commercial shop, external siting areas and drive thru road. The external siting area would be provided with typical permeable paving materials (including block pavers and bedding layer) and the drive thru would be surfaced with traditional asphalt.

According to the proposed site plan, site levels would be flat at 17.3mAOD for the shop and external sitting area, and 17.1-17.15mAOD for the drive thru road.

It is proposed to provide a 6-20mm clean crushed stone sub-base (0.3 void ratio) in all hardstanding areas, including beneath the asphalt surfaced drive thru road.

The external sitting area next to the shop, and some paths across the drive thru, would have a total surface area of approximately 232m², the drive thru road of 396m² and the shop's roof of 228m² – total catchment area of 856m² or approximately 0.086ha.

Preliminary calculations for the 1 in 100 year + 45%CC design storm event for the respective catchment (0.086ha) and using a volumetric runoff coefficient (Cv) of 1 and assumed infiltration rate of 0.018 m/hr (Factor of Safety = 3) at the bottom of the stone sub-base layers, indicates a total runoff attenuation requirement of 69.8m³.

Should the external sitting area be provided with a 0.35m deep sub-base layer, it would provide approximately 24.3m³ of attenuation storage capacity. Similarly, the drive thru road if provided with a 0.4m deep sub-base it would offer 47.5m³ of attenuation storage capacity. The total runoff attenuation capacity of the development would be 71.8m³.

3.8 Flood Risk Reduction

Compared to the existing drainage network which appears not to contain any flow controls or attenuation, the proposed scheme will provide significant improvement to the flow rates, hence offer flood risk reduction.

3.9 Exceedance Flooding and Overland Flow

Drainage exceedance will occur when the rate of surface water runoff exceeds the inlet capacity of the drainage system, when the receiving water or pipe system becomes overloaded, or when the outfall becomes restricted due to flood levels in the receiving water.

Underground conveyance cannot economically or sustainably be built large enough for all types of extreme rainfall, as a result, there will be occasions when surface water runoff will exceed the capacity of drains. This is especially problematic with combined sewers and sewage flooding can result. When drainage system capacity is exceeded the excess water (exceedance flow) surcharges above ground, causing surface water flooding and indiscriminate flooding of property can occur when this flow of water is not controlled.

The area is not subject to overland flow routes and surface water flooding as summarised in Section 2.8 of this report. The drainage system for the proposed development has been designed to cater for the 1 in 100 year + 45 % climate change storm i.e. in such a storm event, all surface water would be collected on site and slowly released. Thus, the overland flow route would only be required in the event of a drainage network failure, or if a storm in excess of the 1 in 100 year + 45 % climate change storm caused flows from offsite to flow through the site.

The existing flow paths, from north to south and east to west, would be maintained post-development and excess flows would be directed toward the intersection of Lyons Way with A27, as existing.

3.10 Adoption and Maintenance

The long-term maintenance of the SuDS features within the site boundary will most likely be undertaken by a management company.

Maintenance of SuDS features should be undertaken in line with maintenance schedules outlined in the SuDS Manual. Full maintenance schedules should be confirmed at the detailed design stage in consultation with appropriate product suppliers. An example maintenance schedule is provided below:

The following is an example of a SuDS Maintenance Plan for the scheme based on CIRIA Guidance.

As the maintenance of the communal SuDS features will be carried out via a Management Company, the form of agreement should include the required maintenance listed below. Should the maintenance be transferred at a later

date to a public body, then the model agreement SuDS MA1 should be used, details of which can be found in the CIRIA guidance C625.

The following section describes the required maintenance for each feature in turn. The SuDS maintenance requirements listed below should be reviewed after the first 5 years, with a view to agreeing a new regime for the ongoing maintenance.

Notwithstanding the routine inspections and maintenance requirements, after severe storm events all features shall be inspected to clear debris and repair damaged structures or features. Records of the maintenance carried out shall be prepared by the Management Company.

Table 6 - Permeable Paving Maintenance Schedule

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm 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, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three monthly 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 7 – Proprietary Treatment System Maintenance Schedule

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Table 8 - General Drainage Maintenance Schedule

Product Type	Period	Responsibility	Maintenance Methods
Standard Manholes/ Inspection Chambers/	As necessary	Owner/ Maintenance Company	Remove and clean any soil and vegetation that covers the manhole cover to prevent blockage of the drainage system at the manhole. Renew/replace any damaged/missing bolts and damaged/missing manhole covers
Drainage pipes	Six monthly intervals	Owner/ Maintenance Company	Inspect underground drainage pipes to ensure that the distribution pipework arrangement is operational and free from blockages. If required, take remedial action

3.11 Drainage During Construction

Drainage is typically an early activity in the construction stage of a development, taking form during the earthworks phase. However, final construction i.e. piped drainage system connections to the SuDS devices should not take place until the end of site development work, unless a robust strategy for silt-removal is implemented prior to occupation of the site. A plan for the management of construction (including phasing of works, details of any offsite works etc.) cannot be provided at this early stage, as construction work plans are not yet known.

Runoff control measures will need to be implemented in order not to overwhelm the temporary system and cause flooding issues. Runoff rates from the site should be managed so they are no greater than pre-development or in keeping with the best practice guidance to minimise risk of blockages. Any additional conveyance measures should be installed as needed during grading. All drainage infrastructure should be protected from damage by construction traffic and heavy machinery through the implementation of measures such as protective barriers, and storing construction materials away from the drainage infrastructure.

4 Water Quality

In line with the 2015 SuDS Manual (CIRIA C753), particular criteria should be applied to manage the quality of runoff to support and protect the natural environment effectively. Treatment design, wherever practicable, should be based on good practice, comprising the following principles:

- Manage surface water runoff close to source
- Treat surface water runoff on the surface
- Treat surface water runoff to remove a range of contaminants
- Minimise risk of sediment remobilisation
- Minimise impacts from accidental spills

Managing pollution close to the source can help keep pollutant levels and accumulation rates low, essentially allowing natural treatment processes to be effective. This in turn can help maximise the amenity and biodiversity value of downstream surface SuDS components and keep maintenance activities straightforward and cost-effective.

SuDS Manual Table 26.2 provides the details for assessing the pollution levels associated with the developments. This table is reproduced below in Table 9 with the applicable land use highlighted.

Table 9 - Extract of SuDS Manual Table 26.2: Pollution hazard indices for different land use classifications

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2*	0.05
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7

*(up to 0.8 where there is potential for metals to leach from the roof)

The proposed drainage strategy utilises the following SuDS features:

- Permeable paving
- Proprietary treatment/ Petrol & metals interceptor

The indicative SuDS mitigation indices, provided in Table 26.3 of the 2015 SuDS Manual (C753) have been reviewed in relation to the proposed measures. This table is reproduced in Table 10.

Table 10 - Extract of Table 26.3: Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS	Mitigation Indices		
	TSS	Metals	Hydro-carbons
Permeable pavement	0.7	0.6	0.7
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

The SuDS Manual States:

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

- Runoff generated on the commercial roof and tarmacked road areas should be treated by specialist stormwater treatment devices (ie Naylor Smart Sponge) prior to entering the SuDS devices.

- Runoff generated on the hardstanding areas provided with permeable paving surfacing would be adequately treated.

Therefore, it can be concluded that the provision of proposed SuDS measures exceeds the required pollution mitigation indices and provides sufficient treatment as part of the surface water management train, in accordance with the 2015 SuDS Manual (CIRIA C753).

5 Conclusion

This surface water drainage strategy has been prepared for the proposed Downlands Retail Park development located near the intersection of Lyons Way and A27 at postcode BN14 9JL. The redline site application area covers approximately 0.118ha and is currently part of the car parking lot of Downlands Retail Centre.

The proposed development is for the construction of a Costa Coffee store unit, external sitting area and drive thru access road.

According to the proposed site plan, site levels would be flat at 17.3mAOD for the shop and external sitting area, and 17.1-17.15mAOD for the drive thru road.

Various online geology sources indicate a porous superficial geology at the site location, comprised mainly of sand and gravel. As such, for the purposes of this study, a conservative infiltration rate of 5×10^{-6} m/s (0.018 m/hr) was assumed in calculations. A site specific bespoke infiltration testing study to BRE365 methodology should be undertaken prior to the detailed design stage to reveal the actual infiltration rates and guide the final SuDS design scheme for the development.

The proposed drainage strategy is for the use of permeable paving SuDS devices to manage runoff post-development. The external siting area would be provided with typical permeable paving materials (including block pavers, bedding layer and 6-20mm crushed stone sub-base) and the drive thru would be surfaced with traditional asphalt and provided with 6-20mm crushed stone sub-base below for runoff attenuation and infiltration.

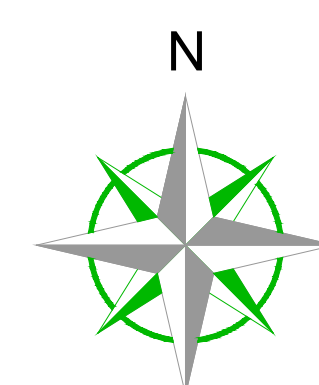
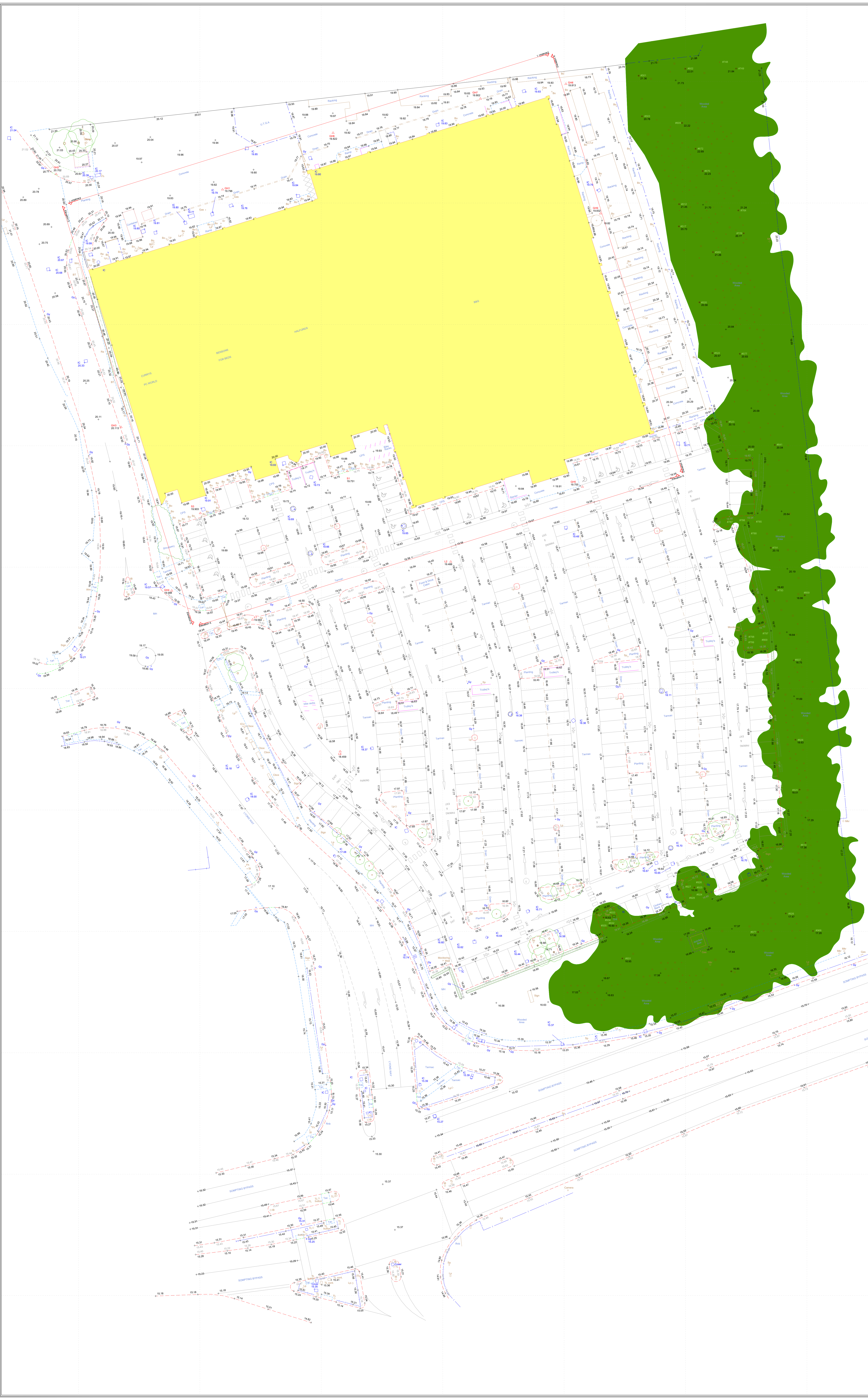
Preliminary calculations for the 1 in 100 year + 45%CC design storm event for the respective catchment (0.086ha) and using a volumetric runoff coefficient (Cv) of 1 and assumed infiltration rate of 0.018 m/hr (FoS = 3) at the bottom of the stone sub-base layers, indicates a total runoff attenuation requirement of 69.8m³.

Should the external sitting area be provided with a 0.35m deep sub-base layer, it would provide approximately 24.3m³ of attenuation storage capacity. Similarly, the drive thru road if provided with a 0.4m deep sub-base it would offer 47.5m³ of attenuation storage capacity. The total runoff attenuation capacity of the development would be 71.8m³.

Runoff generated on the commercial roof and tarmacked road areas should be treated by specialist stormwater treatment devices (ie Naylor Smart Sponge) prior to entering the SuDS devices. Runoff generated on the hardstanding areas provided with permeable paving surfacing would be adequately treated, as per the SuDS mitigation index for permeable pavements.

This report demonstrates that the site can be developed in a sustainable manner to manage the surface water discharge from the development.

Appendix A – Site Survey & Sewer Records



Station Information:

Station	Easting (m)	Northing (m)	Level (m)
GH1	515229.687	105352.776	19.796
GH2	515195.420	105355.946	20.713
GH3	515208.793	105303.840	20.103
GH4	515219.217	105270.163	19.588
GH5	515303.784	105291.565	19.755
GH6	515252.446	105364.441	19.822
GH7	515282.790	105371.494	19.802
GH8	515300.391	105374.528	19.813
GH9	515307.496	105347.836	19.832
S1	515255.384	105294.793	19.751
S3	515225.105	105286.112	19.903
L1	515235.885	105264.188	19.564
L2	515276.673	105276.119	19.488
L3	515253.909	105237.048	18.459

OS Note:

Some services may have been omitted due to parked vehicles.
The Ordnance Survey tile is to be used as a guide only.

OS Buildings  Surveyed Buildings 

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigation Satellite

A true OSG836 coordinate has been established near to the

The survey has been correlated to this point and a further one

The survey has been correlated to this point and a further one or more OSGB36 (15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates

Please refer to Survey Station Table to enable establishment of the on-site grid and datum.

[illegible][illegible]

Rev	Date	Description	Drawn	Q. Re



- Topographical Surveys
- Measured Building Surveys
- Site Engineering
- 3D Laser Scanning

Rowan House
Duffield Road

Dunfield Road
Little Eaton
Derby

DE21 5DR
Tel (01332) 830044 Fax (01332) 830055
admin@greenhatch-group.co.uk

advertising@greenhatch-group.co.uk www.greenhatch-group.co.uk		
St Albans	Newcastle	London

Unit B, The Courtyard
Alban Park
St Albans
Hertfordshire

AL4 DLA	NE4 TYL	NW1 SLL
t. (01727) 854481	t. (01912) 736391	t. (02072) 241806

CLIENT **Mountford**

Piggot

PROJECT

Downlands Retail Park
Lyons Way

Eyons Way Worthing

TITLE	Topographical
-------	---------------

Survey	
SCALE	DATE

A0@ 1: 250	28.10.20
-------------------	-----------------

DRAWN LW/DH	QUALITY REF GH8809
-----------------------	------------------------------

Level datum	See note
Grid orientation	See note

Job number	38311
------------	-------

Drawing No.	Rev
-------------	-----

38311_T	0
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This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than

All dimensions should be checked on site prior to design and construction.

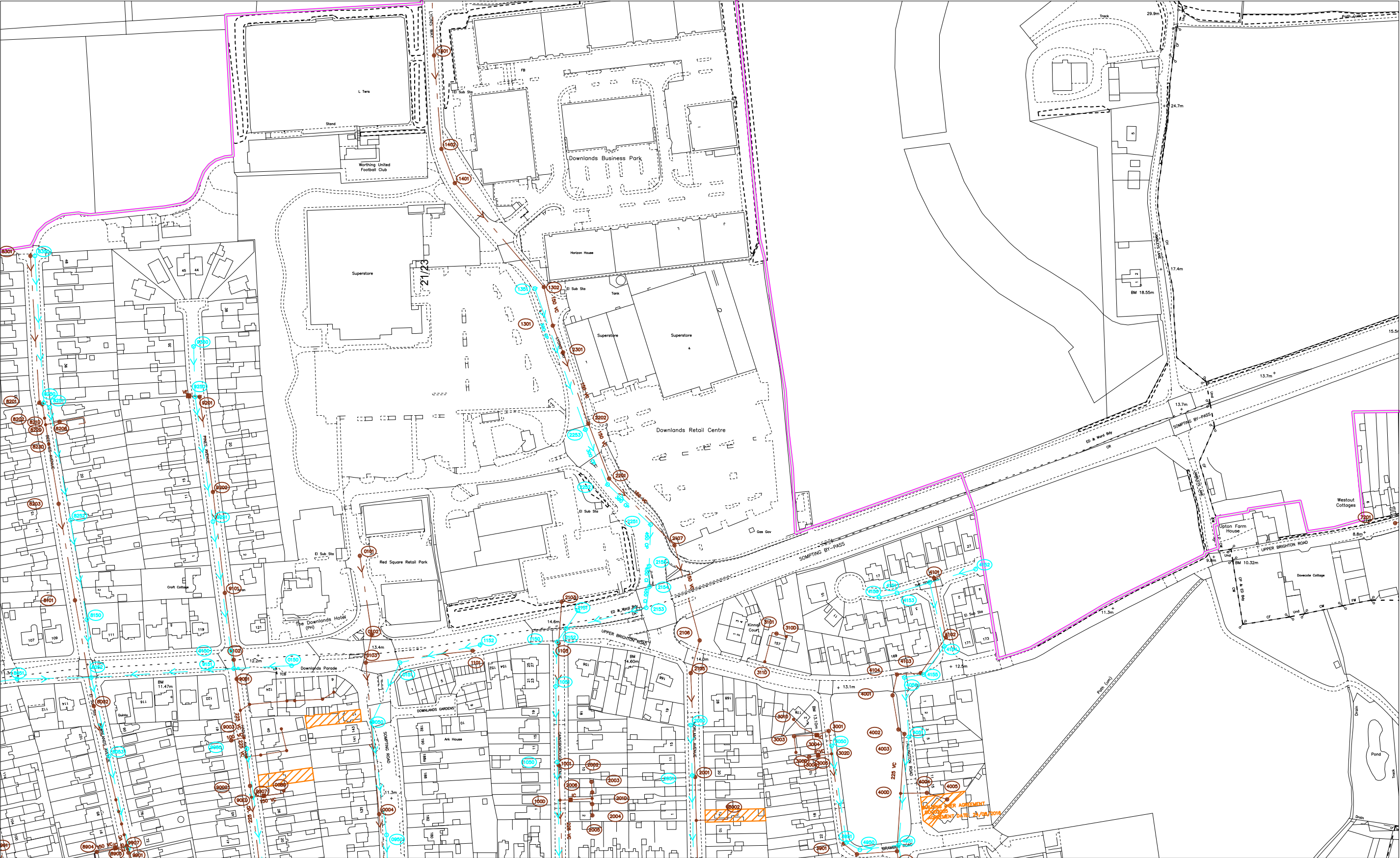
Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

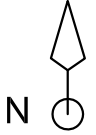
Copyright Greenhatch Group. 05/07/13

SEWER RECORDS PAGE 1 OF 2

105555



104977

514821	O.S. REF. TQ1505SW	Drawn by: duttaai	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement	 N		515765
	Title: Downlands Retail Park Lyons Wa	Scale: 1:2500				
		Date: 02/07/2020	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.			

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0004X	11.26	9.78	225	VC	CIRC	310DX			UNK	UNK	UNK	9201X	15.72	14.05	225	VC	CIRC						
000DX			150	VC	CIRC	3901X	10.69	9.05	225	VC	CIRC	9202X	14.52	12.84	225	VC	CIRC						
001DX			150	VC	CIRC	3902X	10.59	8.92	225	VC	CIRC	9250Y	15.68		150	VC	CIRC	*					
002DX			150	VC	CIRC	3951X	10.72	9.29	225	VC	CIRC	9250X	15.68	13.69	300	CP	CIRC	*					
003DX			150	VC	CIRC	4001X	12.8	11.12	150	VC	CIRC	9251X	14.19	12.11	300	CP	CIRC						
004DX			UNK	UNK	CIRC	4002X	12.31	10.89	150	VC	CIRC	9350X	16.57	14.79	150	VC	CIRC						
0050X	12.44	11.06	225	VC	CIRC	4003X	12.12	10.83	225	VC	CIRC	9901X	9.55	7.95	225	VC	CIRC						
00ADX			UNK	UNK	CIRC	4004X			UNK	UNK	CIRC	9907X			225	VC	CIRC						
00BDX			150	VC	CIRC	4005X			UNK	UNK	CIRC	991DX			225	VC	CIRC						
0101X	15.3		225	VC	CIRC	400DX			225	VC	CIRC	994DX			225	VC	CIRC						
0102X	13.75	12.96	225	VC	CIRC	4050X	12.77	11.18	225	VC	CIRC												
0103X	13.51	12.11	225	VC	CIRC	4051X	12.09	10.67	225	VC	CIRC												
0150X	12.84	11.89	225	VC	CIRC	4101X	14.02	12.84	150	VC	CIRC												
0151X			225	VC	CIRC	4102X	12.97	12.19	150	VC	CIRC												
0950X	11.03	9.22	225	VC	CIRC	4103X	12.67	11.67	150	VC	CIRC												
1001X	12.65	11.11	225	VC	CIRC	4104X	12.78	11.3	150	VC	CIRC												
100DX			225	VC	CIRC	4150X	14.24	13.18	150	VC	CIRC												
1050X	12.72	10.92	525	CP	CIRC	4151X	14.18	12.87	150	VC	CIRC												
1051X	14.02	12.27	525	CP	CIRC	4152X	13.87	12.96	150	VC	CIRC												
1101X	14.41	13.09	150	VC	CIRC	4153X	14.01	12.32	225	VC	CIRC												
1105X	14.85	13.15	225	VC	CIRC	4154X	12.81	11.77	225	VC	CIRC												
1150X	14.94	12.43	450	CP	CIRC	4155X	12.69	11.39	225	VC	CIRC												
1152X	14.51	13.24	225	VC	CIRC	4901X	10.47	8.78	225	VC	CIRC												
1301X	20.73	18.43	150	VC	CIRC	4950X	10.61	9.17	225	VC	CIRC												
1302X	21.1	19.12	150	VC	CIRC	4951X	10.49	8.75	225	VC	CIRC												
1351X	21.13	17.78	300	CP	CIRC	7201X			UNK	UNK	CIRC												
1401X	23.5	20.93	150	VC	CIRC	8002X	10.75		225	VC	CIRC												
1402X	24.59	21.79	150	VC	CIRC	800DX			225	VC	CIRC												
1501X	27.66	24.76	150	VC	CIRC	8051X	11.14	9.82	450	CP	CIRC												
2001X	12.08		225	VC	CIRC	8052X			450	CP	CIRC												
2002X			UNK	UNK	CIRC	8053X	10.36	8.54	450	CP	CIRC												
2003X			UNK	UNK	CIRC	8101X	11.61		225	VC	CIRC												
2004X			UNK	UNK	CIRC	8150X	11.46	9.63	300	VC	CIRC												
2005X			UNK	UNK	CIRC	8201X	13.8	12.28	225	VC	CIRC												
2006X			UNK	UNK	CIRC	8202X	13.75	12.08	225	VC	CIRC												
200DX			225	VC	CIRC	8203X	12.64	10.7	225	VC	CIRC												
201DX			UNK	UNK	CIRC	8206X			UNK	UNK	CIRC												
2050X	12.92	11.55	150	VC	CIRC	821DX			225	VC	CIRC												
2051X	12.11	10.65	150	VC	CIRC	822DX			225	VC	CIRC												
2103X			225	VC	CIRC	823DX			225	VC	CIRC												
2105X	13.92	12.42	225	VC	CIRC	8250X	13.75	11.94	225	VC	CIRC												
2106X	14.82	12.99	150	VC	CIRC	8251X	13.72	11.63	300	VC	CIRC												
2107X	15.54	13.7	150	VC	CIRC	8252X	12.42	10.2	300	VC	CIRC												
2151X	15.28	14.26	225	CP	CIRC	8301X	19.28	16.09	225	VC	CIRC												
2152X	15.41	12.68	450	CP	CIRC	8350X	19.29	16.35	225	VC	CIRC												
2153X	15.44	14.02	450	CP	CIRC	8901X	10.29		225	VC	CIRC												
2154X	15.29	14.06	450	CI	CIRC	8904X			150	VC	CIRC												
2155X	15.43	14.2	450	CI	CIRC	8905X			150	VC	CIRC												
2201X	18.23	16.6	150	VC	CIRC	9001X	11.88		225	VC	CIRC												
2202X	19.59	17.33	150	VC	CIRC	9002X	10.98		225	VC	CIRC												
2251X	16.3	14.55	450	CP	CIRC	9003X			100	VC	CIRC												
2252X	18.04	15	300	CP	CIRC	9007X			150	VC	CIRC												
2253X	19.39	17.09	300	CP	CIRC	900DX			150	VC	CIRC												
2301X	20.37	18.2	150	VC	CIRC	901DX			225	VC	CIRC												
3001X	12.35	10.87	225	VC	CIRC	902DX			UNK	UNK	CIRC												
3002X			UNK	UNK	CIRC	903DX			225	VC	CIRC												
3003X			UNK	UNK	CIRC	904DX			225	VC	CIRC												
3004X			UNK	UNK	CIRC	9050X	11.28	9.89	150	VC	CIRC												
3005X			UNK	VC	CIRC	90CDX			225	VC	CIRC												
3006X			150	VC	CIRC	90DDX			225	VC	CIRC												
300DX			UNK	UNK	CIRC	90EDX			225	VC	CIRC												
301DX			UNK	UNK	CIRC	9101X	12.23	10.67	225	VC	CIRC												
302DX			225	VC	CIRC	9102X			225	VC	CIRC												
3050X	12.12	10.65	225	VC	CIRC	9150X	12.05	10.85	300	CP	CIRC												
3101X			UNK	UNK	UNK	9151X	11.97	10.37	300	CP	CIRC												

LINE STYLES / COLOURS	
Brown	— Foul
	— Foul Syphon Sewer
	— Foul Vacuum Main
Red	— Foul Rising Main
	— Combined
	— Combined Syphon Sewer
	— Combined Rising Main
	— Lateral Drain
Orange	— Building Over Agreement Area
Dark Blue	— Treated Effluent
Purple	— Sludge
	— Sewer Catchment
	— Section 104 Area
Light Blue	— Surface Water
	— Surface Water Rising Main
Yellow	— Private
Green	— Access Shaft
	— Decommissioned

MATERIALS	
AK	Alkathene
BAC	Bonded Asbestos Cement
BRC	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRC	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAR	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Verified Clay
XXX	Other
ZZZ	Unknown

Manhole (SW)	Manhole (F&C)	Lamp hole (SW)	Lamp hole (F&C)	Pumping Station (SW)	Pumping Station (F&C)	Side entry manhole (SW)	Side entry manhole (F&C)	Blind shaft (SW)	Blind shaft (F&C)	Ejector station (SW)	Ejector station (F&C)	Waterlight door (SW)	Waterlight door (F&C)	Flushing ch. Min-e (SW)	Flushing ch. Min-e (F&C)	Flushing ch. No-e (SW)	Flushing ch. No-e (F&C)	Demarcation Chamber
--------------	---------------	----------------	-----------------	----------------------	-----------------------	-------------------------	--------------------------	------------------	-------------------	----------------------	-----------------------	----------------------	-----------------------	-------------------------	--------------------------	------------------------	-------------------------	---------------------

Washout (SW)	Washout (F&C)	Rodding Eye (SW)	Rodding Eye (F&C)	Gauging point (SW)	Gauging point (F&C)	Intercept chamber (SW)	Intercept chamber (F&C)	Storm Tank (SW)	Storm Tank (F&C)	Vortex chamber (SW)	Vortex chamber (F&C)	Label ellipse	Dummy/S24 manhole	Outfall	Penstock chamber	Damboards	Storm Overflow	Backdrop manhole
--------------	---------------	------------------	-------------------	--------------------	---------------------	------------------------	-------------------------	-----------------	------------------	---------------------	----------------------	---------------	-------------------	---------	------------------	-----------	----------------	------------------

Other (s)	Other	Change in sewer (s)	Change in sewer	Reflex valve	Flap valve	Cascade	Anode	Valve	Closed Valve	Air Valve	Hatch box (SW)	Hatch box (F&C)	Direction arrow	Emptying valve	Catchpit	Soakaway	Inlet	Balancing Pond
-----------	-------	---------------------	-----------------	--------------	------------	---------	-------	-------	--------------	-----------	----------------	-----------------	-----------------	----------------	----------	----------	-------	----------------

	Wastewater treatment works
	Marine treatment works
	Outfall headworks
	Vent
	Vent column
	Tidal storage tank
	Blank end
	Head of Public Sewer
	Micro Pumping Station

SHAPES (S)

A	Arched	R	Rectangular
B	Barrel	S	Square
C	Circular	T	Trapezoidal
E	Egg	U	U Shape
H	Horseshoe	X	Other

NODE REFERENCING SYSTEM

1st digit: hundred metre easting identifier

2nd digit: hundred metre northing identifier

3rd digit: sewer type identifier

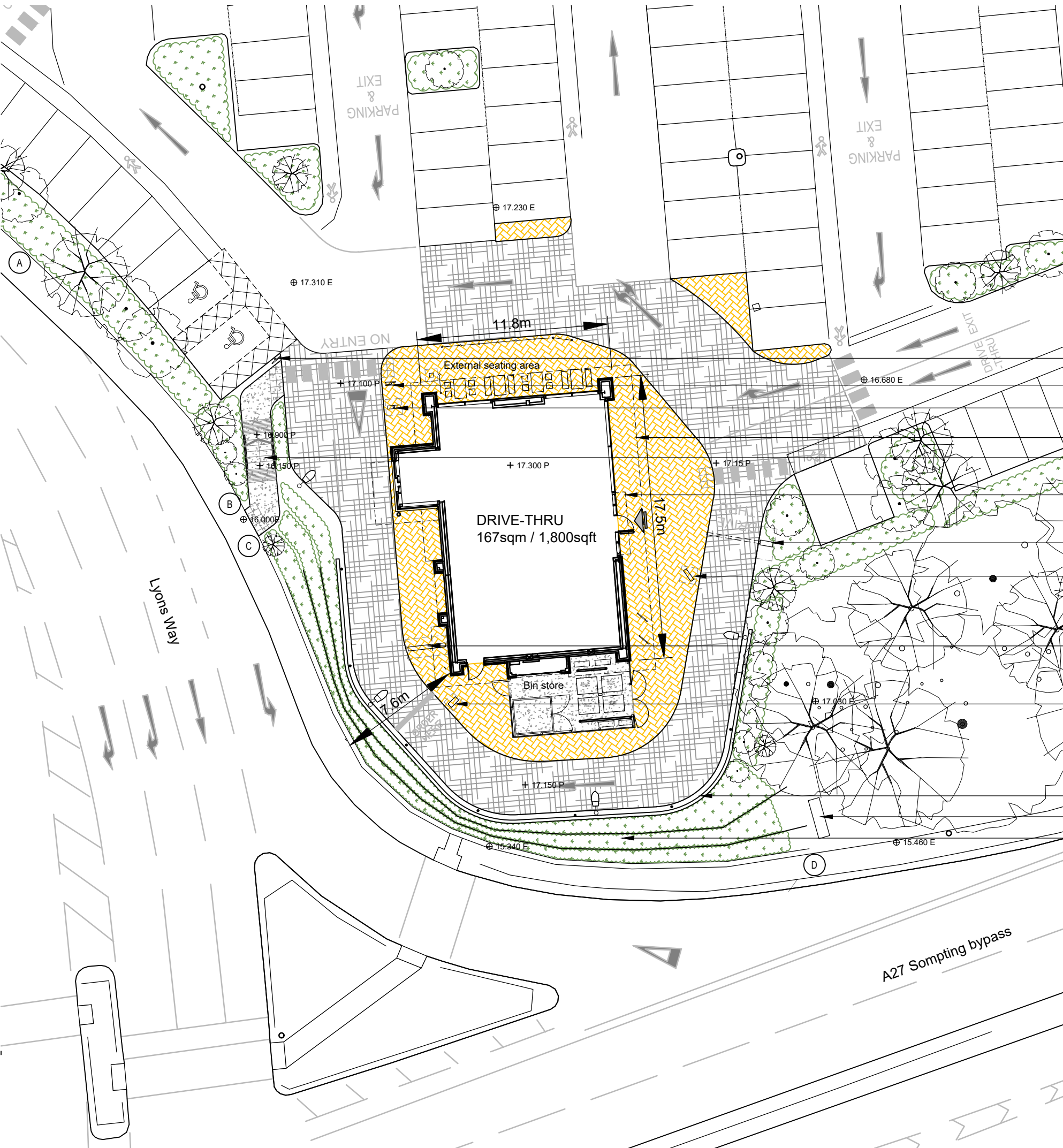
 0-4 = Foul/Combined

 5-9 = Surface Water

4th digit: next sequential node

Drawn by:	duttaai	
Title:	Downlands Retail Park Lyons Wa	
Date:	02/07/2020	

Appendix B – Development Proposals



Boundary Schedule	
A-B	No treatment - back of pavement
B-C	Tactile paving
C-D	No treatment - back of pavement

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LIST OF INFORMANTS :
OS MAP LICENCE CM-1172427-1681-131021
P20691-L-00-001 - ENVISION
1283-201 Planting Plan - MCGREGOR SMITH
-
-
-
REVISIONS
-
DATE
-
DRN
-
REV
-

- Waiting bay sign
- Road sign
- Thank you sign
- Roof overhang
- New steps
- Canopy over entrance
- Height restriction barrier
- Key seller sign
- Digital menu sign
- Ordering point
- Retaining wall
- Relocated existing signage totem
- New gabion structure with planting (see McGregor Smith drawing 1283-201 Planting Plan for further detail)

Key

- Block Paving
- Tarmac
- Brushed concrete
- New planting
- Column lights
- Bollard lights
- $\oplus$ 17.310 E Existing levels
- + 17.100 P Proposed levels

North

0 2m 4m 6m 8m 10m

Note:
Signage locations and
appearance subject to
future application

Appendix C – Drainage Strategy & Calculations

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations	Date: 07/03/2025			
Report Details: Type: Stormwater Controls Storm Phase: Phase	Designed by: SD	Checked by: OD	Approved By: PK	
Company: Evolve				



Drive Thru

Type : Tank

Dimensions

Exceedance Level (m)	17.100
Depth (m)	0.530
Base Level (m)	16.570
Freeboard (mm)	130
Initial Depth (m)	0.000
Porosity (%)	30
Average Slope (1:X)	0.00
Total Volume (m³)	47.520

Depth (m)	Area (m²)	Volume (m³)
0.000	396.00	0.000
0.400	396.00	47.520

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area - Drive Thru
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Pipe
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.018
Safety Factor	3.0
Perimeter	Rectangular
Length (m)	12.504

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations	Date: 07/03/2025			
Report Details: Type: Stormwater Controls Storm Phase: Phase	Designed by: SD	Checked by: OD	Approved By: PK	
Company: Evolve				



Porous Paving - Store, External Seating & Paths

Type : Porous Paving

Dimensions	
Exceedance Level (m)	17.100
Depth (m)	0.480
Base Level (m)	16.620
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	205.0
Porosity (%)	30
Length (m)	23.200
Long. Slope (1:X)	10000.00
Width (m)	10.000
Total Volume (m³)	24.360

Inlets	
Inlet (1)	
Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area - Store, Seating & Paths
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets	
Outlet	
Outgoing Connection	Pipe
Outlet Type	Free Discharge

Advanced	
Base Infiltration Rate (m/hr)	0.018
Safety Factor	3.0
Conductivity (m/hr)	10000.0

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
Report Details: Type: Inflow Summary Storm Phase: Phase		Designed by: SD	Checked by: OD	Approved By: PK	
		Company: Evolve			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area - Drive Thru	Drive Thru		Time of Concentration	0.040	100	0	100	0.040
Catchment Area - Store, Seating & Paths	Porous Paving - Store, External Seating & Paths		Time of Concentration	0.046	100	0	100	0.046
Existing Area	Existing Runoff Rates		Time of Concentration	0.082	100	0	100	0.082
TOTAL		0.0		0.168				0.168

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
Report Title: UK and Ireland Rural Runoff Calculator		Designed by: SD	Checked by: OD		Approved By: PK
		Company: Evolve			

ICP SUDS / IH 124

Details

Method	ICP SUDS
Area (ha)	0.086
SAAR (mm)	756.0
Soil	0.1
Region	Region 7
Urban	0
Return Period (years)	0

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 7	0.0	0.0	0.0	0.0	0.1

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025		EVOLVE	
Report Details: Type: Inflows Summary Storm Phase: Phase		Designed by: SD	Checked by: OD		Approved By: PK
		Company: Evolve			



FEH: 2 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area - Store, Seating & Paths	FEH: 2 years: +45 %: 15 mins: Summer	0.05	14.8	6.423
Catchment Area - Drive Thru	FEH: 2 years: +45 %: 15 mins: Summer	0.04	12.9	5.583
Existing Area	FEH: 2 years: +45 %: 15 mins: Summer	0.08	26.4	11.451

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			EVOLVE
Report Details: Type: Inflows Summary Storm Phase: Phase		Designed by: SD	Checked by: OD	Approved By: PK	
		Company: Evolve			



FEH: 30 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area - Store, Seating & Paths	FEH: 30 years: +45 %: 15 mins: Summer	0.05	33.2	14.403
Catchment Area - Drive Thru	FEH: 30 years: +45 %: 15 mins: Summer	0.04	28.8	12.528
Existing Area	FEH: 30 years: +45 %: 15 mins: Summer	0.08	59.1	25.674

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
Report Details: Type: Inflows Summary Storm Phase: Phase		Designed by: SD	Checked by: OD		Approved By: PK
		Company: Evolve			



FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area - Store, Seating & Paths	FEH: 100 years: +45 %: 15 mins: Summer	0.05	41.7	18.108
Catchment Area - Drive Thru	FEH: 100 years: +45 %: 15 mins: Summer	0.04	36.3	15.747
Existing Area	FEH: 100 years: +45 %: 15 mins: Summer	0.08	74.3	32.271

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025		EVOLVE	
Report Details: Type: Inflows Summary Storm Phase: Phase		Designed by: SD	Checked by: OD		Approved By: PK
		Company: Evolve			



FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area - Store, Seating & Paths	FEH: 2 years: +0 %: 15 mins: Summer	0.05	10.2	4.431
Catchment Area - Drive Thru	FEH: 2 years: +0 %: 15 mins: Summer	0.04	8.9	3.849
Existing Area	FEH: 2 years: +0 %: 15 mins: Summer	0.08	18.2	7.899

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
		Designed by: SD	Checked by: OD		Approved By: PK
Report Details: Type: Inflows Summary Storm Phase: Phase		Company: Evolve			



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area - Store, Seating & Paths	FEH: 30 years: +0 %: 15 mins: Summer	0.05	22.9	9.933
Catchment Area - Drive Thru	FEH: 30 years: +0 %: 15 mins: Summer	0.04	19.9	8.640
Existing Area	FEH: 30 years: +0 %: 15 mins: Summer	0.08	40.8	17.706

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025		EVOLVE	
Report Details: Type: Inflows Summary Storm Phase: Phase		Designed by: SD	Checked by: OD		Approved By: PK
		Company: Evolve			



FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area - Store, Seating & Paths	FEH: 100 years: +0 %: 15 mins: Summer	0.05	28.8	12.489
Catchment Area - Drive Thru	FEH: 100 years: +0 %: 15 mins: Summer	0.04	25.0	10.857
Existing Area	FEH: 100 years: +0 %: 15 mins: Summer	0.08	51.3	22.257

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
		Designed by: SD	Checked by: OD	Approved By: PK	
Report Details: Type: Junctions Summary Storm Phase: Phase		Company: Evolve			



FEH: 2 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Existing Runoff Rates	FEH: 2 years: +45 %: 15 mins: Summer	1.000	0.000	0.000	0.000	26.4	0.000	0.000	26.4	11.451	OK

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
		Designed by: SD	Checked by: OD	Approved By: PK	
Report Details: Type: Junctions Summary Storm Phase: Phase		Company: Evolve			



FEH: 30 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Existing Runoff Rates	FEH: 30 years: +45 %: 15 mins: Summer	1.000	0.000	0.000	0.000	59.1	0.000	0.000	59.1	25.674	OK

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations	Date: 07/03/2025			
	Designed by: SD	Checked by: OD	Approved By: PK	
Report Details: Type: Junctions Summary Storm Phase: Phase	Company: Evolve			



FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Existing Runoff Rates	FEH: 100 years: +45 %: 15 mins: Summer	1.000	0.000	0.000	0.000	74.3	0.000	0.000	74.4	32.271	OK

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
		Designed by: SD	Checked by: OD	Approved By: PK	
Report Details: Type: Junctions Summary Storm Phase: Phase		Company: Evolve			



FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Existing Runoff Rates	FEH: 2 years: +0 %: 15 mins: Summer	1.000	0.000	0.000	0.000	18.2	0.000	0.000	18.2	7.899	OK

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
		Designed by: SD	Checked by: OD	Approved By: PK	
Report Details: Type: Junctions Summary Storm Phase: Phase		Company: Evolve			



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Existing Runoff Rates	FEH: 30 years: +0 %: 15 mins: Summer	1.000	0.000	0.000	0.000	40.8	0.000	0.000	40.8	17.706	OK

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
		Designed by: SD	Checked by: OD	Approved By: PK	
Report Details: Type: Junctions Summary Storm Phase: Phase		Company: Evolve			



FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Existing Runoff Rates	FEH: 100 years: +0 %: 15 mins: Summer	1.000	0.000	0.000	0.000	51.3	0.000	0.000	51.3	22.257	OK

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
		Designed by: SD	Checked by: OD	Approved By: PK	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company: Evolve			



FEH: 2 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Drive Thru	FEH: 2 years: +45 %: 240 mins: Winter	16.704	16.704	0.134	0.134	5.0	15.912	0.000	18.212	0.0	0.000	66.514	OK
Porous Paving - Store, External Seating & Paths	FEH: 2 years: +45 %: 120 mins: Summer	16.786	16.693	0.164	0.073	7.0	7.780	0.000	5.155	3.7	7.019	68.063	OK

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations				Date: 07/03/2025			EVOLVE
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase				Designed by:	Checked by:	Approved By:	
				SD	OD	PK	
				Company: Evolve			



FEH: 30 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max.
Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Drive Thru	FEH: 30 years: +45 %: 240 mins: Winter	16.870	16.870	0.300	0.300	8.1	35.611	0.000	18.741	0.0	0.000	25.061	OK
Porous Paving - Store, External Seating & Paths	FEH: 30 years: +45 %: 240 mins: Winter	16.876	16.870	0.254	0.250	6.3	17.493	0.000	10.687	3.1	13.596	28.188	OK

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
		Designed by: SD	Checked by: OD	Approved By: PK	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company: Evolve			



FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By:
 Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Drive Thru	FEH: 100 years: +45 %: 360 mins: Winter	16.958	16.958	0.388	0.388	7.1	46.152	0.000	28.119	0.0	0.000	2.879	OK
Porous Paving - Store, External Seating & Paths	FEH: 100 years: +45 %: 360 mins: Winter	16.963	16.959	0.340	0.339	5.7	23.598	0.000	16.160	2.3	17.561	3.127	OK

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
		Designed by: SD	Checked by: OD	Approved By: PK	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company: Evolve			



FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max.
Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Drive Thru	FEH: 2 years: +0 %: 240 mins: Summer	16.651	16.651	0.081	0.081	3.9	9.621	0.000	17.489	0.0	0.000	79.753	OK
Porous Paving - Store, External Seating & Paths	FEH: 2 years: +0 %: 120 mins: Summer	16.748	16.659	0.126	0.039	4.8	5.787	0.000	4.706	2.1	5.416	76.245	OK

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations		Date: 07/03/2025			
		Designed by: SD	Checked by: OD	Approved By: PK	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company: Evolve			



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max.
Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Drive Thru	FEH: 30 years: +0 %: 180 mins: Winter	16.761	16.761	0.191	0.191	8.0	22.706	0.000	14.006	0.0	0.000	52.218	OK
Porous Paving - Store, External Seating & Paths	FEH: 30 years: +0 %: 60 mins: Summer	16.841	16.731	0.219	0.111	13.5	10.861	0.000	2.565	5.8	7.563	55.416	OK

Project: 3453 Downlands Retail Park Costa Melford Capital Partners Preliminary Hydraulic Calculations				Date: 07/03/2025			
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase				Designed by:	Checked by:	Approved By:	
				SD	OD	PK	
				Company: Evolve			



FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max.
Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Drive Thru	FEH: 100 years: +0 %: 240 mins: Winter	16.818	16.818	0.248	0.248	7.5	29.493	0.000	18.699	0.0	0.000	37.936	OK
Porous Paving - Store, External Seating & Paths	FEH: 100 years: +0 %: 240 mins: Winter	16.826	16.818	0.204	0.198	5.4	13.937	0.000	10.639	3.0	11.994	42.787	OK

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