Development at Gorse Hill Caravan and Lodge Park

Trefriw Rd, Conwy

Drainage Statement in support of full Planning application
Document No: 23160/E03
Aug 2023

Document No: **23160/E01**

Date: **August 2023**

Contents Page

Appendices

1. INTRODUCTION

Datrys have been commissioned by Gorse Hill Caravan Park to prepare a drainage statement in support of a planning application for the scheme creation of 22 lodges and associated infrastructure. The proposal site is located to the eastern side of the Gorse Hill Caravan and Lodge Park at grid reference SH 78136 74960 and is split over three areas. Areas A (7 lodges) & B (4 lodges) are brownfield containing two existing bungalows with hardstanding areas while area C (11 lodges) is greenfield. Areas A and B are in close proximity near the western site boundary while Area C is located near the site boundary along Baclaw Lane. The proposed location plan with architectural site plan can be found within **Appendix A.**

This document will set out the possible solutions to address the surface water runoff associated with the development whilst also offering solution for the foul drainage.

2. DESIGN CRITERIA

The topography of the site consists of a fall of over 60m from west to east and consequently determines the required layout of drainage serving the site. Permeability tests were undertaken in June 2023 by Datrys which concluded that infiltration might not be possible for the whole extent of any of the three areas. The soakaway testing report can be found within **Appendix C.** Previously, RBA Ltd. also prepared a soakaway testing report in June 2019 which also can be found within **Appendix C** having the reference of 5597/RPT1.

All three proposed development areas will have a separate surface water system and will deal with the surface water flow as close as possible to the source.

Each individual soakaway and segments of the filter drains was modelled based on the lowest infiltration rate achieved within the closest trial pits as detailed in the attenuation calculations in **Appendix E.**

As a result of the lack of capacity for infiltration for the lower part of Area C, a connection would be required to the ditch running on the adjacent field on the eastern side of Baclaw Lane with the rate of discharge determined from an assessment of existing greenfield runoff. The difference between the design storm flow and the outflow would be stored temporarily in below ground storage (i.e geocellular tanks). To avoid uncontrolled surface flooding, the attenuation features are to be designed to accommodate the full 1 in 100-year event plus climate change effects.

The system is to be designed to the following criteria:

Design element	Criterion
Rate of discharge	Discharge rate of reflect equivalent greenfield runoff rate or a minimum of 2l/s. (rate to be agreed with SAB/LLFA)
Climate change effects	+ 30%
Urban Creep	+ 10%
No uncontrolled surface flooding or off-site run-off	Up to 1 in 100 Year Return Period + 30% Climate Change

Table 1 - Storm water design criteria

The calculation of the storm water run-off is to be derived from the Wallingford Modified Rational method and in compliance with BS EN 752-4 *Drain and sewer systems outside buildings.*

The following design criteria will apply for the foul drainage and surface water runoff of the site:

- Approved Document H, Building Regulations
- Sewers for Adoption, 7th Edition
- Rainfall runoff management for developments (SC030219)
- BRE Digest 365
- Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems.
- SuDS manual
- Non-Statutory SuDS Technical Standards for Sustainable Drainage: Practical Guidance

Further consultation with the LLFA will be required to confirm the acceptability of a connection to the ditch. A S23 Ordinary Watercourse Consent application may be required for the discharge into the ditch.

3. SUSTAINABLE DRAINAGE (SURFACE WATER)

Sustainable Drainage Philosophy

The design for surface water disposal from the site will be considered in line with the CIRIA SuDS manual. This approach seeks to manage the quantity and quality of surface water runoff on or as close to the surface and as close to the source of the runoff as possible as well as providing amenity and biodiversity to the end users, flora and fauna.

In order for the surface water design to be approved by SAB (SuDS Approval Body), the design has to show compliance with Statutory National Standards for Sustainable Drainage Systems.

These Standards are:

S1 – Surface water runoff destination

S2 – Surface water runoff hydraulic control

S3 – Water quality

S4 – Amenity

S5 – Biodiversity

S6 – Design of drainage for Construction and Maintenance and Structural Integrity

S1 – Surface water runoff destination

The surface water design will be undertaken in accordance with the SuDS drainage hierarchy given in the SuDS Manual published by CIRIA and accepted and adopted by the Lead Local Flood Authority (LLFA).

The drainage hierarchy is:

SuDS Priority Level	Design approach
Level 1	Surface water runoff is collected for re-use
Level 2	Surface water runoff is infiltrated to ground
Level 3	Surface water runoff is discharged to a surface water body
Level 4	Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system
Level 5	Surface water runoff is discharged to a combined sewer

Table 2 - SuDS drainage hierarchy

Priority Level 1 is the preferred (highest priority) and that 4 and 5 should only be used in exceptional circumstances.

The following considerations are relevant to the application of the above to the proposed development.

- Priority Level 1 – Re-use

Water butts and rain gardens will be incorporated where possible for re-use. Given the development consists of lodges, Rainwater Harvesting has been ruled out due to its costly ongoing maintenance requirements and the financial implication of having to install individual tank systems for the lodges. It cannot be assumed that the storage tanks would offer any spare capacity for attenuation of surface water run-off during a storm event as the antecedent conditions would be unknown. As such, assuming spare capacity in the tanks during a storm event would be an unsafe assumption that could lead to an unacceptable level of flood risk from the inadequate provision of attenuation storage capacity. The potential re-use of water is ignored in the design of the storm water system under the design rainfall events.

- Priority Level 2 – Infiltration to ground

The infiltration testing identified the site is partially suitable for soakaways, hance this is proposed wherever possible. Infiltration is proposed for Area A, Area B and partially for Area C. A secondary solution will be required to address the runoff for the lower end of Area C.

- Priority Level 3 – Discharge to surface water body

There is an existing ditch on land 150m from the southeastern boundary and on the opposite side from land across Baclaw Lane of the site which flows into River Conwy. A connection to this ditch will be sought though the discharge rate will need to be agreed with the Lead Local Flood Authority and SAB Authority.

- Priority Level 4 – Surface water sewer or highway drain

There are no highway drains near the site.

- Priority Level 5 – Disposal to combined sewer

There is no combined sewer in the vicinity of the site.

S2 – Surface water runoff hydraulic control

The runoff from the roofs and parking areas will be directed through porous paving. This will allow for total infiltration at the zones with suitable infiltration values via soakaways and filter drains. Within Areas A and B where the infiltration tests failed it will allow for partial infiltration and will be directed towards the filter drains which directs the runoff towards the box and trench soakaways while it will collect the surface water runoff from the roads along the way. For the lower part of area C a hydrobrake will restrict flows entering the offsite ditch with flows to match the equivalent greenfield runoff rate. The mean annual peak flow, Qbar has been estimated to be lower than 2l/s hence a discharge rate of 2l/s will be proposed to minimise the long-term risk of blockages. The discharge rate will be agreed with LLFA / SAB Authority in advance of detailed design. An onsite below ground attenuation storage will address the excess volume created by restricting the flows while the proposed network will consist of various other SUDS features to slow the conveyance of flows and maximise the opportunity for evapotranspiration. The attenuation will be large enough to accommodate onsite all storms up to the threshold event (1 in 100-year event + 30% for climate change effects). Due to the nature of the development an allowance for urban creep will not be factored into the attenuation calculations.

The various SuDS features will slow the rate of conveyance and ensure there will be no discharge from the proposed site that results from the first 5mm of any rainfall event.

S3 – Water quality

A pollution risk may arise from petrol or oil spillage from vehicles using the development site. The drainage from the car parking and access road will form a part of the general site surface water drainage system and will need to be subjected to some form of treatment.

The risk of pollution is considered to be low, and methods of control suggested in the SuDS Manual are used. Table 26.2 of the SuDS Manual identifies this site as a low

pollution hazard level with indices varying between 0.4 – 0.5. Table 26.3 suggests permeable paving offers a mitigation index of 0.6 - 0.7, while the other SuDS features also offer the following mitigation indices; swale (0.5 – 0.6) and filter drain/ swales (0.4-0.6).

Porous paving will be incorporated within the design using a Type A and B (total and partial infiltration) arrangement with an unlined underlying storage reservoir from which water will be afforded the opportunity to percolate into the substrata or into the individual trench soakaways which also collects the runoff from the roofs. The sub-base of the permeable paving provides an effective measure to trap suspended solids and hydrocarbons thus improving the water quality before discharging into the onsite pipe network and at the lower end of Area C subsequently the ditch. Construction details of the SuDS features including linings, geotextile filters etc. are to be included upon the detail design drawings.

The SuDS features in the scheme will be connected in series to achieve a robust surface water management train providing effective treatment for contaminants by offering the chance for settlement of sediments and interception of hydrocarbons.

S4 – Amenity

SuDS features together with the planting proposed by the Architect to further revitwill provide aesthetically pleasing vegetated corridors and will improve the amenity of the site, as well as serving other purposes. The use of permeable paving within the site promotes multi-functionality, whilst the allowance of climate change will aid the developments resilience to future change.

The various SuDS features along with the extended green areas offer the opportunity for wildlife to thrive whilst conveying waters through the site. The SuDS features will be considered further within the landscaping design which will determine suitable vegetation for incorporation.

S5 - Biodiversity

The proposals promote surface conveyance where possible providing opportunities for wildlife and potentially increase the number of species. Soft landscaping within the

SuDS features will include a variety of planting of known wildlife value local to the area – providing habitat and food for insects, invertebrates and birds. A landscape plan will be produced to account for appropriate vegetation with the features.

The use of raingardens where suitable, in combination with the vegetation within the swales will provide food, shelter and habitat for birds, small mammals and insects and will act as bridges, maintaining connectivity for certain species.

S6 - Design of drainage for Construction and Maintenance and Structural Integrity

All SuDS features will be installed by a competent contractor and will be situated in locations and at shallow depths where they can be easily maintained.

A maintenance plan will state the maintenance requirements for the SuDS features in order for them to remain at their optimum capacity.

All materials and components, where possible, will have a minimum design life equivalent to the design life of the development, including an appropriate factor of safety.

4. SURFACE WATER DESIGN

The site consists of a mixture of proposed lodges and hardstanding consisting of tarmac and permeable pavement.

SuDS features will take the form of raingardens, swales below ground cellular storage and the reservoir layer of porous paving which offers opportunity for infiltration.

The development continues the enhancement strategy started over the last 10 years which was developed by the ecological consultants and the landscape design team. There has been significant investment in planting, estate management and habitat creation which includes retention of existing trees, shrubs, hedgerows, landscape and ecological features for their intrinsic nature conservation and ecological value and to provide visual enclosure and to screen and filter views of the lots from vantage points around the area. These improvements contribute to the local ecology and the designated SSSI Aber Afon Conwy which is of special interest for its marine and terrestrial invertebrate biology and located adjacent to the east of the site. Additional planting including woodlands are proposed for further enhancement to the local ecology and to enhance the landscape character of the development.

As the site is spread across a wider area the current proposal will deal with the areas separately.

Area A:

The upper part of area A will have an individual soakaway placed outside the shallow rock and will deal the individual lodge, associated access road and parking.
It is understood that no kerbs are proposed to the road edge and hence soakaway trenches/ filter drains are proposed running along the lower side of the road with diagonal upstand stone channel kerbs where the steepness of the road would not allow this naturally. Surface water from the road will discharge freely into the filter drain to infiltrate into the gravel strata where it is possible to. Where the infiltration is not feasible or limited the gravel within the trenches will slow down the conveyance rate. Orifice plates are proposed within the catchpit chambers to reduce the conveyance rate where

the steepness of the road requires it to avoid accumulation and overflow at the low spots.

Each unit within the feasible areas as shown on "23160-DAT-XX-ZZ-DR-C-SK501 Drainage Scheme" attached within **Appendix B,** will discharge to individual trench soakaways or planar soakaways placed below the permeable pavement of the driveways. These soakaways will have a high-level connection with the nearby filter drains and will allow any excess water resulting from extreme events to flow downstream.

Due to the impermeable clay and the shallow rock along the southwestern boundary it is proposed that the surface water from the road and the upper 4 lodges to be collected within the filter drain system as described above connecting into a cellular soakaway where good infiltration rates were achieved in the underlying gravel (TP6 within soakaway testing report by RBA Ltd with reference 5597/RPT 1). The excess will overflow into the downstream trench soakaway while in case of an extreme event will overflow along the +47-contour line and will follow the natural flow path. Area C will have a filter drain along the road to collect any excess water and will discharge to its own system.

Each individual soakaway and segments of the filter drains have been modelled based on the lowest infiltration rate achieved within the closest trial pits as detailed in the attenuation calculations in **Appendix E.**

Area B:

The infiltration tests showed that Area B is suitable for infiltration.

It is understood that no kerbs are proposed to the road edge therefore the surface water discharged from the road will be collected via the infiltration trenches and infiltrated along the lower side of the access road.

The lodges will discharge into the individual trench soakaways below the parking bays.

Each individual soakaway and the filter drain have been modelled based on the lowest infiltration rate achieved within the closest trial pits as detailed in the attenuation calculations in **Appendix E.**

Area C:

The infiltration tests showed that Area C is partially suitable for infiltration. The area north of the proposed woodland where the first 5 lodges will be installed is feasible for infiltration. The area south of the proposed woodland is not suitable for infiltration due to the underlying clay.

Similar to Area A and B it is understood that no kerbs are proposed along the access road allowing free discharge towards the infiltration trenches proposed along the access road and will be infiltrated along the length where the ground is suitable for infiltration.

The lodges will discharge into the individual trench soakaways below the parking bays. Each individual soakaway and the filter drain have been modelled based on the lowest infiltration rate achieved within the closest trial pits as detailed in the attenuation calculations in **Appendix E.**

As a result of the lack of capacity for infiltration and to address the site runoff as close to the source for the southern part of area C a connection will be required to the adjacent site across Baclaw Lane where it can be collected by the existing ditch discharging to River Conwy.

Flood maps for the locality suggest there is no risk of surface water flooding to the ditch in immediate proximity to the site. As such, the proposed discharge rate to be applied is based upon the existing greenfield runoff assessment as determined using hydraulic modelling software (Causeway Flow). Mean annual peak flow, Qbar has been determined to be less than 2 l/s for the lower part of Area C which cannot be infiltrated (**Appendix D**). Agreement with the LLFA will be sought for the proposed discharge rate.

Given the aforementioned greenfield assessment for Qbar, the proposals will incorporate a flow control designed for a peak discharge of 2.0l/s in the threshold design event. The initial scheme calculations include an allowance for climate change. The difference between the design storm flow and the restricted outflow will be stored temporarily in below ground storage. To avoid uncontrolled surface flooding, the attenuation feature is to be designed to accommodate the full 1 in 100 year event plus climate change effects of 30%. Initial estimates ascertain that a storage provision of 64 m^3 is required for this part of the development (**Appendix E**). Further detailed modelling will allow an accurate storage provision to be determined and then

accommodated within the detailed design. The preliminary surface water arrangement is illustrated upon drawing '23160-DAT-XX-ZZ-DR-C-SK501 Drainage Scheme' attached within **Appendix B**.

Extreme Event

The site is to be designed to contain a 1 in 100-year storm event + climate change effects within its boundary. If an extreme flood event occurred (which may be generated from offsite sources) the surface water is to be directed toward the adjacent site and ditch via controlled overflow routes and continue to follow existing flood routing.

5. FOUL WATER DESIGN

The following design criteria will apply for the foul discharge design of the site:

- Approved Document H, Building Regulations
- Sewers for Adoption 7th Edition
- BS EN 12056 Part 2.

The development already possesses a sewage treatment plant northeast to the upper part of Area C.

There is a fairly new foul treatment plant adjacent to Bryn-siri Road which was recently constructed to improve treatment of foul from the existing caravan site and it allows for the additional capacity required for future development on the site, including the current extension at Area A, B and C.
It is proposed to discharge the foul flows from the proposed lodges within these areas to the existing sewage treatment plant on site.

Due to the existing topography and the location of the treatment plant within the site it is not feasible to discharge via a gravity network from all of the proposed plots, hence it is proposed to install a private package pumping station within a 3.5m deep and 2.1m diameter chamber to allow for temporary holding (refer drawing '23160-DAT-XX-ZZ-DR-C-SK501 Drainage Scheme' attached within **Appendix B)**

The package treatment plant has been designed to allow for all the lodges across the proposed development indicating an estimated peak flow of 5.08 l/s. The existing treatment plant shall be verified if it can accommodate this peak flow, otherwise a larger holding tank is required with a reduced flow rate.

APPENDICES

APPENDIX A –

LOCATION PLAN, SITE PLANS

Rev	Details	Date	Drawn

Key

- Ownership Boundary
- Site Area Boundary

General notes:

1. All dimensions are in metres unless noted otherwise.
2. All dimensions shall be verified on site before proceeding with the work.
3. Environmental Associates shall be notified in writing of any discrepancies.
4. All dimensions are nominal dimensions.
5. Environmental Associates accept no liability for any expense loss or damage of whatever nature and however arising from any variation made to this drawing or in the execution of the work to which has not been referred to them and prior approval obtained.
6. This drawing is for planning purposes only

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Client: Gorse Hill Caravan and Lodge Park

Project Address: Trefriw Road, Conwy LL32 8HJ

Project: **22 Proposed Lots, Associated PInfrastructure & Planting**

Title: **Red Line Plan**

Project No:	Drawing No:	Revision:
EA-5862	000	
Scale: 1:2000 A1		Date: 23/06/23

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NORTH
WEST
EAST
SOUTH

0m 50m 100m

Native Plant Mix for Woodland Area
- 1765m2

species	common name	% mix	size (height)	specification	number
Viburnum opulus	Guelder Rose	10%	40-60cm	BR	177
Corylus avellana	Hazel	15%	40-60cm	BR	265
Crataegus monogyna	Hawthorn	10%	40-60cm	BR	177
Ilex aquifolium	Holly	10%	40-60cm	3L pot	177
Acer campestre	Field Maple	10%	40-60cm	BR	177
Prunus avium	Bird Cherry	20%	40-60cm	BR	353
Castanea sativa	Sweet Chestnut	10%	125-150cm	Feathered	177
Quercus robur	English Oak	15%	125-150cm	Feathered	265
	total	100%			

Hedge plants - 75 lin. m (@5 plants per lin. m; 2 staggered rows; 450mm apart)
- 375no.

species	Common name	% mix	size (height)	specification	number
Crataegus monogyna	Hawthorn	45%	40-60cm	BR; min 3 brks	169
Fagus sylvatica	Beech	15%	40-60cm	BR; min 3 brks	56
Ilex aquifolium	Holly	5%	2lt CG	leader and lateral	19
Prunus spinosa	blackthorn	5%	40-60cm	BR; min 3 brks	19
Rosa canina	Dog Rose	5%	40-60cm	BR; min 3 brks	19
Sambucus nigra	Elder	5%	40-60cm	BR; min 3 brks	19
Corylus avellana	Hazel	20%	40-60cm	BR; min 3 brks	75
	total	100%			375

Wildflower mixture
- 941m2
From Emorsgate seed or similar approved

Trees & shrubs - whips
- as shown

species	common name	% mix	size (height)	specification	number
Acer campestre	Field Maple	As Shown	2.5-3.0m	Standard, BR; min 3 brks	10
Alnus glutinosa	Alder	As Shown	2.5-3.0m	Feathered, BR; min 3 brks	3
Fagus sylvatica	Beech	As Shown	2.5-3.0m	Feathered, BR; min 3 brks	6
Liquidambar styraciflua	Liquidamber	As Shown	3.0-3.5m	Feathered, RB; 10-120, min 4 brks	8
Prunus avium	Wild Cherry/Gean	As Shown	2.5-3.0m	Standard, BR; min 3 brks	21
Quercus robur	Oak	As Shown	2.5-3.0m	Feathered, BR; min 3 brks	19
Quercus rubra	Red Oak	As Shown	3.0-3.5m	Feathered, RB; 10-120, min 4 brks	4
	total				71

Ground Cover Plants - (@ 5 plants per m2)
- 189m2

species	Common name	density	size (height)	specification	number
Hedera 'Chlaygu'	Chlaygu' Ivy	5/m2	2ltr pot	min 7 brks	350
Hedera 'Pittsburgh'	Pittsburgh' Ivy	5/m2	2ltr pot	min 7 brks	175
Vinca minor atropurpurea	Atropurpurea Periywinkle	5/m2	2ltr pot	min 7 brks	195
Vinca minor 'Gerrirude Jekyll'	Gerrirude Jekyll' Periywinkle	5/m2	2ltr pot	min 7 brks	225
	total				945

HeC Hedera 'Chlaygu'
HeP Hedera 'Pittsburgh'
Vma Vinca minor atropurpurea
VmGJ Vinca minor 'Gerrirude Jekyll'

NORTH
WEST EAST
SOUTH

0 5 10 20 30 40 m

KEY

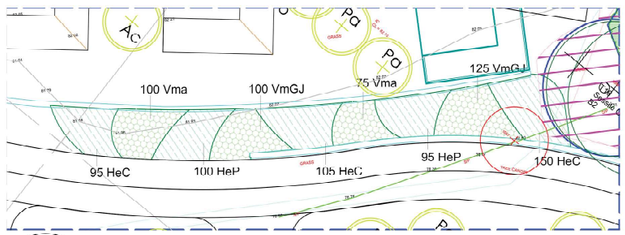
- proposed roads & centre line
- existing contours at one metre intervals
- proposed decking around lodge
- Steps and hard paving to lodges
- Special road construction over tree root protection zones
- proposed retaining wall 0.0-1.0 m high (Refer outline for type)
- proposedretaining wall 1.0-2.0 m high (Refer outline for type)
- proposed retaining wall 2.0-3.0 m high (Refer outline for type)
- proposed retaining wall 3.0-4.0 m high (Refer outline for type)
- proposed local limestone gabion wall
- proposed cribwall retention
- existing trees
- existing woodland
- structural woodland planted in 2018
- 2017-18 structural hedge planted in 2018
- 2017-18 individual trees planted in 2018
- Amenity Grassland
- FSL 139.15 proposed finished slab level
- TOW 61.00 Top of Retaining Wall Height
- 55.60 + proposed finished surface level

Lodge Schedule:

1no. 60' x 22'
6no. 55' x 22'
4no. 45' x 22'

Area A

Area B



1 / 103-02 **Planting Detail**
Scale 1:250 @ A1

NOTE:
Levels in metres. All retaining structures, drainage and roadway design to be detailed by engineers. All levels, retaining structure heights and drainage setting out TBC on site by project engineer before construction

Illustrative 60' x 22' Lodge (to NW Corner of Site)

Rev	Details	Date	Drawn

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6. This drawing is for planning purposes only

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Client: Gorse Hill Caravan and Lodge Park
Project Address: Trefriw Road, Conwy LL32 8HJ
Project: **22 Proposed Lots, Associated Infrastructure & Planting**
Title: **Areas A & B: Landscape Proposals**

Project No:	Drawing No:	Revision:
EA-5862	013	
Scale: 1:500 A1		Date: 23/06/23

Chapel House, City Road, Chester, CH1 3AE, UK
Tel. 01244 311666
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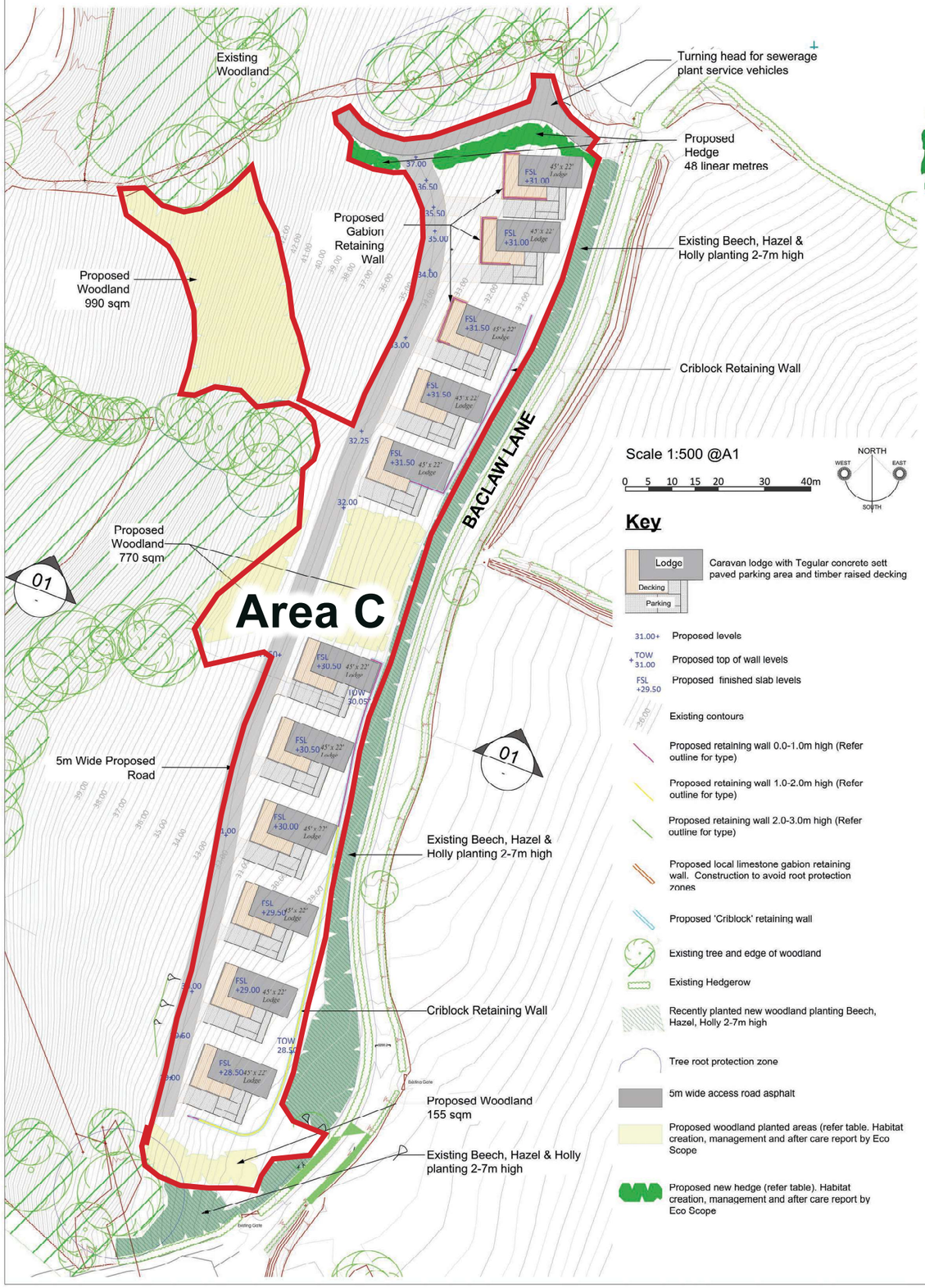
web: www.environmentalassociates.net

Figure 16: Areas A & B - Landscape Proposals



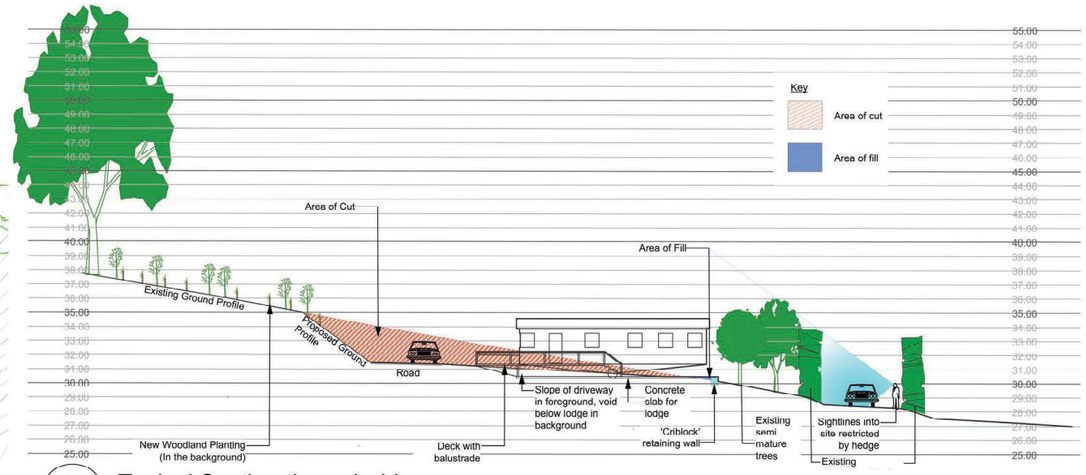
Scale 1:500 @A1

0 5 10 15 20 30 40m

NORTH WEST EAST SOUTH

Key

- Lodge / Decking / Parking — Caravan lodge with Tegular concrete sett paved parking area and timber raised decking
- 31.00+ — Proposed levels
- TOW 31.00 — Proposed top of wall levels
- FSL +29.50 — Proposed finished slab levels
- Existing contours
- Proposed retaining wall 0.0-1.0m high (Refer outline for type)
- Proposed retaining wall 1.0-2.0m high (Refer outline for type)
- Proposed retaining wall 2.0-3.0m high (Refer outline for type)
- Proposed local limestone gabion retaining wall. Construction to avoid root protection zones
- Proposed 'Criblock' retaining wall
- Existing tree and edge of woodland
- Existing Hedgerow
- Recently planted new woodland planting Beech, Hazel, Holly 2-7m high
- Tree root protection zone
- 5m wide access road asphalt
- Proposed woodland planted areas (refer table. Habitat creation, management and after care report by Eco Scope
- Proposed new hedge (refer table). Habitat creation, management and after care report by Eco Scope



01 -

Typical Section through driveway

Scale 1:200 @A1

NATIVE PLANT MIX FOR WOODLAND AREAS (1915 sqm total)

SPECIES	FORM	HEIGHT	RT	% mix	NOS
Viburnum opulus (Guelder Rose)	Transplant	40-60cm	B	10	190
Corylus avellana (Hazel)	Transplant	40-60cm	B	15	290
Crataegus monogyna (Hawthorn)	Transplant	40-60cm	B	10	190
Ilex aquifolium (Holly)	3L pot	40-60cm	C	10	190
Acer campestre (Field Maple)	Transplant	40-60cm	B	10	190
Prunus aviurn (Bird Cherry)	Transplant	40-60cm	B	20	385
Castanea sativa (Sweet Chestnut)	Feathered	125-150cm	B	10	190
Quercus robur (English Oak)	Feathered	125-150cm	B	15	290

Hedgerow Specification (48 linear Metres)

Species	% Mix	NOS
Corylus avellana (Hazel)	30	72
Crataegus monogyna (Hawthorn)	10	24
Cornus sanguinea (Dogwood)	5	12
Quercus robur (Oak)	5	12
Ilex auifolium (Holly)	10	24
Acer campestre (Field Maple)	15	36
Malus sylvestris (Crab Apple)	15	36
Prunus spinosa (Blackthorn)	10	24

All planted bare root 1+1 stock.
5/linear m, planted in 2 staggered rows, 450mm apart
240 No. Plants

GENERAL
THESE NOTES APPLY TO ALL PLANTING ON THIS PROJECT

PLANT MATERIAL
All Plants shall conform to relevant British Standards: BS 3936 and 5326. All plants shall be true to form, type & size. They shall be healthy, vigorous, pest and weed free. No substitutes in size or species shall be made without the written consent of the landscape architect.

TOPSOIL & SUBSOIL
Topsoil and subsoil can be recovered from site stockpiles subject to the approval of the CA. The subsoil shall be ripped prior to spreading the topsoil layer.

PLANTING AREAS GENERALLY
Planted areas to be marked out and then sprayed with a glyphosate based weed killer prior to planting works. Allow sufficient time for weedkiller to take effect before planting.

WOODLAND PLANTING
The woodland planting will be mix of native trees and shrubs (see table) planted in groups of between 3 to 9 nos. Planting will be in grass with an area of 1m bare earth minimum maintained around each tree.

MAINTENANCE
The trees and shrubs will be kept in a weed free zone until established (approx 1m circle around each tree/shrub) through chemical application. The tree/shrub guards and supports will be checked twice annually and replaced if required, until the trees/shrubs are established. All planting areas will be checked annually and replacement trees/shrubs used to replace any dead trees/shrubs for the first three years. Any weed vegetation on the mounds will be cut at least twice annually to encourage a grass sward to form in between the trees.

NOTE:
Levels in metres. All retaining structures, drainage and roadway design to be detailed by engineers. All levels, retaining structure heights and drainage setting out TBC on site by project engineer before construction.

Rev Details Date Drawn

General notes:
1. All dimensions are in metres unless noted otherwise.
2. All dimensions shall be verified on site before proceeding with the work.
3. Environmental Associates shall be notified in writing of any discrepancies.
4. All dimensions are nominal dimensions.
5. Environmental Associates accept no liability for any expense loss or damage of whatever nature and however arising from any variation made to this drawing or in the execution of the work to which has not been referred to them and prior approval obtained.
6. This drawing is for planning purposes only

environmental associates
landscape architects • urban designers • environmental planners

Client: Gorse Hill Caravan and Lodge Park

Project Address: Trefriw Road, Conwy LL32 8HJ

Project: **22 Proposed Lots, Associated Infrastructure & Planting**

Title: **Area C: Proposal & Sections**

Project No:	Drawing No:	Revision:
EA-5862	021	
Scale: 1:500 A1		Date: 23/06/23

Chapel House, City Road, Chester, CH1 3AE, UK
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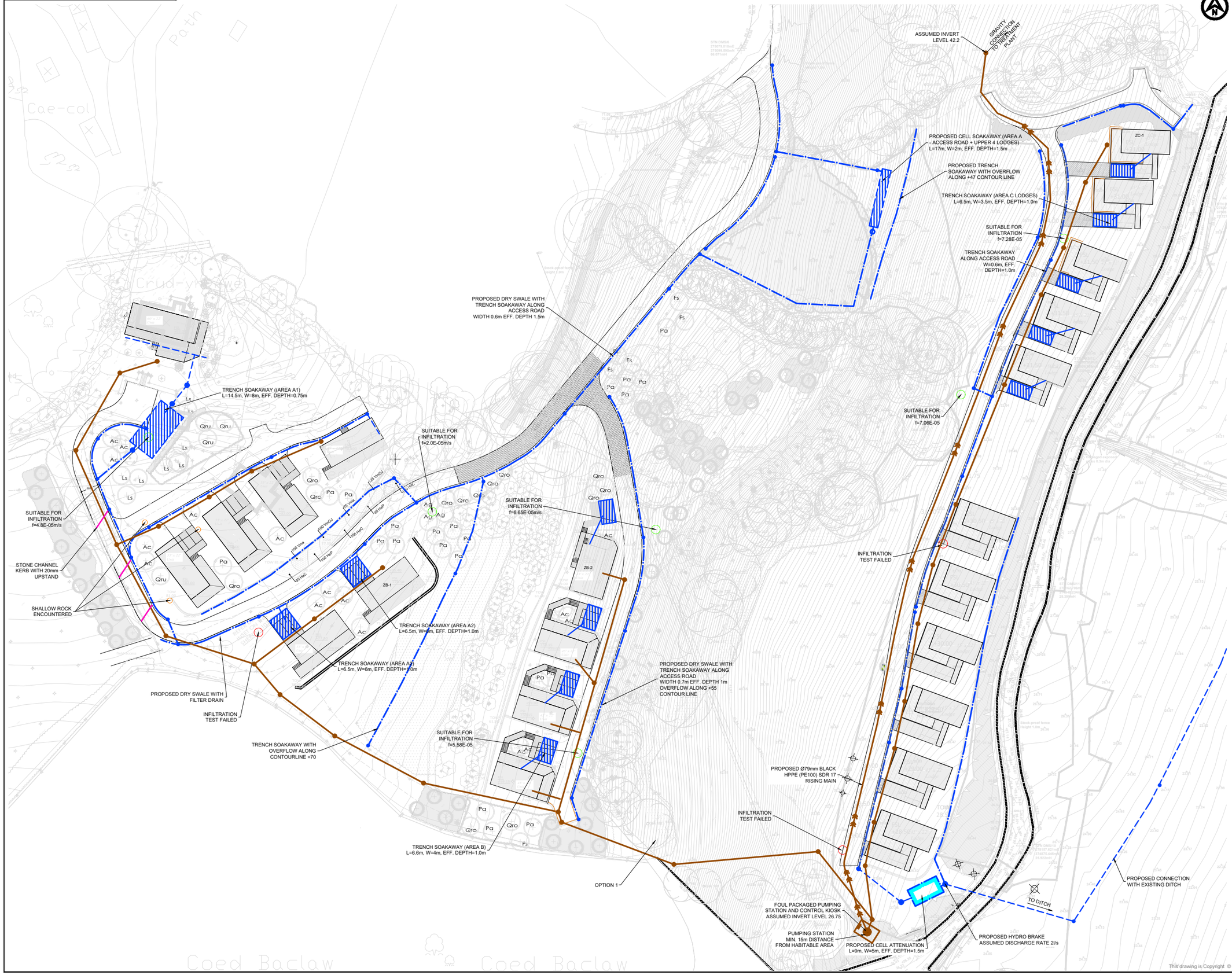
email: ea@environmentalassociates.net
web: www.environmentalassociates.net

Figure 18: Areas C - Landscape Proposals

APPENDIX B –
PROPOSED DRAINAGE SCHEME

DRG No. 23160-DAT-XX-ZZ-DR-C-SK501

DO NOT SCALE



NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S, ENGINEER'S AND OTHER SPECIALISTS' DRAWINGS.
2. PLEASE REFER TO ARCHITECTS DRAWINGS FOR FINAL BUILDING LOCATION
3. REFER TO DATRYS DRAWING 23160-DAT-XX-xx-DR-C-502 AND 503 FOR DRAINAGE DETAILS.
4. ALL DRAINAGE COMPONENTS ARE TO COMPLY WITH CURRENT BRITISH STANDARDS & BUILDING REGULATIONS REQUIREMENTS
5. **AT ALL OUTFALL POINTS TO AN EXISTING NETWORK, THE POSITION AND INVERT LEVEL OF EXISTING DRAINS MUST BE CONFIRMED WELL IN ADVANCE OF THE PROGRAMMED DATE FOR INSTALLING ANY OF THE UPSTREAM DRAINAGE, OR ORDERING ANY MATERIALS IN ORDER TO ALLOW TIME FOR ANY NECESSARY REVISIONS TO THE HYDRAULIC DESIGN.**
6. ALL GRAVITY PVC-U PIPEWORK TO BE TO BS 4660:2000 OR BS EN 1401-1:2009 WHERE RELEVANT UNLESS NOTED OTHERWISE
7. ALL CONCRETE SHALL BE GEN3 WITH SULPHATE RESISTING IN ACCORDANCE WITH BS8500 U.N.O.
8. FINAL LOCATIONS AND DETAILS OF SOIL & VENT PIPE, STUB STACKS, RAINWATER DOWN PIPES, GULLYS etc. TO BE CONFIRMED BY REFERENCE TO ARCHITECTS' DRAWINGS
9. ALL PIPES INTO MH's TO BE SOFFIT TO SOFFIT LVL U.N.O.
10. WHERE CHAMBERS ARE POSITIONED ON 90° CORNERS, ALWAYS USE THE MAIN CHANNEL BY FITTING A 45° BEND ON THE INLET AND OUTLET
11. ALL NON ADOPTABLE DOMESTIC FOUL AND SURFACE WATER PIPE RUNS SHALL CONSIST OF 100mm Ø PIPES LAID AT A MINIMUM FALL OF 1 IN 80 U.N.O
12. ALL CONNECTIONS FROM HIGHWAY GULLIES TO BE 150mmØ LAID AT FALLS OF BETWEEN 1:20 & 1:100 WITH TYPE S BED & SURROUND TO ALL CONNECTIONS WHERE MIN 1.2m COVER IS ACHIEVED, TYPE Z BED & SURROUND TO ALL OTHER CONNECTIONS.
13. COVER LEVELS ARE APPROXIMATE AND SHOULD MATCH PROPOSED SURROUNDING LEVELS. CONTRACTOR TO USE OFFICIAL TBM'S FOR SETTING OUT.
14. CLAUSES (e.g E2.32) REFER TO SEWER FOR ADOPTION 7 OR CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY

NOTES FOR PIPE BEDDING & SURROUND

1. BACKFILLING TO PIPE TRENCHES BENEATH ROADS, CAR PARKING AND STRUCTURES TO BE D.O.T. TYPE 1 GRANULAR MATERIAL UP TO FORMATION LEVEL FROM THE TOP OF THE SPECIFIED PIPE SURROUND (WELL COMPACTED IN 150mm MAX LAYERS).
2. OPTIMUM TRENCH WIDTH = PIPE+300mm. CONTRACTOR TO ENSURE TRENCH WALLS ARE SUITABLY PROPPED
3. BACKFILL MUST NOT BE PLACED ON CONCRETE BEDDING OR SURROUND UNTIL THE CONCRETE COMPRESSIVE STRENGTH HAS REACHED 15N/mm²
4. BRICKS OR BLOCKS MUST NOT BE PLACED IN THE BEDDING MORTAR FOR SETTING THE PIPES TO LEVEL
5. ALL ROCKER PIPE LENGTHS : 600mm
6. MAX DISTANCE FROM FACE OF CONC SURROUND TO FIRST FLEXIBLE JOINT TO BE 150mm

KEY

- PROPOSED FOUL DRAIN AND INSPECTION CHAMBER
- PROPOSED RISING MAIN
- PROPOSED SURFACE WATER DRAIN AND INSPECTION CHAMBER
- PROPOSED FILTER DRAIN AND CATCHPIT CHAMBER
- PROPOSED BELOW GROUND ATTENUATION
- PROPOSED TRENCH AND CELLULAR SOAKAWAY

REV	DATE	DESCRIPTION	BY	CHK	APP
P02	18.07.23	LAYOUT AMENDED	LI	EPW	EPW

REVISIONS

CLIENT
Gorse Hill Caravan Park

FOR PLANNING

PROJECT
Proposed Development at Gorse Hill Caravan Park

TITLE
Drainage Scheme

DATRYS

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DRAWN	LI	CHECKED	PASSED
DATE	12.07.23	DATRYS REF.	
SCALE AT A1	1:500	AUTOCAD REF.	SK501

DRAWING No. 23160-DAT-XX-ZZ-DR-C-SK501

REVISION P02

APPENDIX C –
SOAKAWAY TEST RESULTS

INFILTRATION TEST LOCATIONS AND LOWEST RATES AT LOCATION:

Porosity Results Summary

Porosity Results			
	Soil Infiltration Rate (m/s)	Vp Rate (s/mm)	Comments
TP1	**FAILED**	**-**	**No Water Movement**
TP2	**FAILED**	**-**	**No Water Movement**
TP3	**7.06E-05**	**4.72**	
TP4	**7.28E-05**	**4.58**	
TP5	**4.80E-05**	**6.95**	
TP6	**FAILED**	**-**	**No Water Movement**
TP7	**2.00E-05**	**16.70**	**2 tests due to time taken**
TP8	**6.65E-05**	**5.01**	
TP9	**5.58E-05**	**5.71**	**2 Tests due to hole collapsing during 2nd test**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 1, Porosity Test 1
Test Date: 14/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
3	0.050	0.01667	0.250
6	0.050	0.00000	0.250
23	0.050	0.00000	0.250
36	0.060	0.00077	0.240
59	0.070	0.00043	0.230
92	0.090	0.00061	0.210
146	0.110	0.00046	0.190

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	-	m3
Surface Area, ap50	-	m2
Time Taken, tp75-25	-	min
Soil Infiltration Rate, f	**FAILED**	**m/s**

75% depth (m)	0.23	Calc 75% time (min)	67
25% depth (m)	0.08	Calc 25% time (min)	14

Vp	**FAILED**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 2, Porosity Test 1
Test Date: 14/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.25

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.250
14	0.010	0.00071	0.240
28	0.020	0.00071	0.230
45	0.030	0.00059	0.220
82	0.030	0.00000	0.220
132	0.030	0.00000	0.220

Max effective storage depth	0.25	m
Volume Outflow, Vp75-25	-	m3
Surface Area, ap50	-	m2
Time Taken, tp75-25	-	min
Soil Infiltration Rate, f	**FAILED**	**m/s**

75% depth (m)	0.19	Calc 75% time (min)	180
25% depth (m)	0.06	Calc 25% time (min)	263

Vp	**FAILED**	**s/mm**

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Project: 23160
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Date: 19/06/2023
Ref: Trial Pit 3, Porosity Test 1
Test Date: 14/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
10	0.210	0.02100	0.090
14	0.240	0.00750	0.060
17	0.280	0.01333	0.020
20	0.300	0.00667	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	7	min
Soil Infiltration Rate, f	**1.23E-04**	**m/s**

75% depth (m) 0.23 Calc 75% time (min) 4

25% depth (m) 0.08 Calc 25% time (min) 11

Vp	**2.71**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 3, Porosity Test 2
Test Date: 14/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
4	0.060	0.01500	0.240
6	0.080	0.01000	0.220
9	0.110	0.01000	0.190
12	0.140	0.01000	0.160
15	0.150	0.00333	0.150
17	0.170	0.01000	0.130
19	0.180	0.00500	0.120
26	0.200	0.00286	0.100
31	0.230	0.00600	0.070
34	0.230	0.00000	0.070
39	0.230	0.00000	0.070
46	0.250	0.00286	0.050
50	0.260	0.00250	0.040
54	0.270	0.00250	0.030
59	0.290	0.00400	0.010
64	0.300	0.00200	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	11	min
Soil Infiltration Rate, f	**7.68E-05**	**m/s**

75% depth (m) 0.23 Calc 75% time (min) 4

25% depth (m) 0.08 Calc 25% time (min) 15

Vp	**4.34**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 3, Porosity Test 3
Test Date: 14/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
4	0.050	0.01250	0.250
11	0.140	0.01286	0.160
15	0.160	0.00500	0.140
19	0.180	0.00500	0.120
26	0.200	0.00286	0.100
36	0.240	0.00400	0.060
47	0.280	0.00364	0.020
51	0.300	0.00500	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	12	min
Soil Infiltration Rate, f	**7.06E-05**	**m/s**

75% depth (m)	0.23	Calc 75% time (min)	6
25% depth (m)	0.08	Calc 25% time (min)	18

Vp	**4.72**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 4, Porosity Test 1
Test Date: 14/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
11	0.200	0.01818	0.100
14	0.230	0.01000	0.070
17	0.270	0.01333	0.030
19	0.290	0.01000	0.010
23	0.300	0.00250	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	8	min
Soil Infiltration Rate, f	**1.02E-04**	**m/s**

75% depth (m) 0.23 Calc 75% time (min) 4

25% depth (m) 0.08 Calc 25% time (min) 12

Vp	**3.25**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 4, Porosity Test 2
Test Date: 14/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
3	0.070	0.02333	0.230
6	0.120	0.01667	0.180
8	0.170	0.02500	0.130
12	0.210	0.01000	0.090
14	0.240	0.01500	0.060
16	0.260	0.01000	0.040
19	0.300	0.01333	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	6	min
Soil Infiltration Rate, f	**1.37E-04**	**m/s**

75% depth (m) 0.23 Calc 75% time (min) 4

25% depth (m) 0.08 Calc 25% time (min) 10

Vp	**2.43**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 4, Porosity Test 3
Test Date: 14/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
3	0.040	0.01333	0.260
6	0.060	0.00667	0.240
9	0.120	0.02000	0.180
11	0.140	0.01000	0.160
12	0.170	0.03000	0.130
14	0.180	0.00500	0.120
17	0.210	0.01000	0.090
21	0.230	0.00500	0.070
24	0.240	0.00333	0.060
29	0.250	0.00200	0.050
33	0.280	0.00750	0.020
36	0.300	0.00667	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	11	min
Soil Infiltration Rate, f	**7.28E-05**	**m/s**

75% depth (m) 0.23 Calc 75% time (min) 5

25% depth (m) 0.08 Calc 25% time (min) 17

Vp	**4.58**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 5, Porosity Test 1
Test Date: 15/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
1	0.030	0.03000	0.270
2	0.070	0.04000	0.230
3	0.100	0.03000	0.200
4	0.120	0.02000	0.180
4.5	0.150	0.06000	0.150
5	0.160	0.02000	0.140
6	0.180	0.02000	0.120
8	0.210	0.01500	0.090
9	0.240	0.03000	0.060
12	0.250	0.00333	0.050
13	0.260	0.01000	0.040
15	0.270	0.00500	0.030
17	0.280	0.00500	0.020
18	0.300	0.02000	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	6	min
Soil Infiltration Rate, f	**1.51E-04**	**m/s**

75% depth (m)	0.23	Calc 75% time (min)	2
25% depth (m)	0.08	Calc 25% time (min)	8

Vp	**2.21**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 5, Porosity Test 2
Test Date: 15/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
1	0.020	0.02000	0.280
3	0.040	0.01000	0.260
5	0.050	0.00500	0.250
6	0.080	0.03000	0.220
7	0.100	0.02000	0.200
8	0.120	0.02000	0.180
9	0.130	0.01000	0.170
10	0.150	0.02000	0.150
12	0.170	0.01000	0.130
15	0.200	0.01000	0.100
17	0.220	0.01000	0.080
18	0.230	0.01000	0.070
21	0.240	0.00333	0.060
22	0.260	0.02000	0.040
23	0.270	0.01000	0.030
25	0.280	0.00500	0.020
26	0.290	0.01000	0.010
28	0.300	0.00500	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	6	min
Soil Infiltration Rate, f	**1.43E-04**	**m/s**

75% depth (m) 0.23 Calc 75% time (min) 5

25% depth (m) 0.08 Calc 25% time (min) 11

Vp	**2.33**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 5, Porosity Test 3
Test Date: 15/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
1	0.010	0.01000	0.290
2	0.030	0.02000	0.270
3	0.050	0.02000	0.250
4	0.060	0.01000	0.240
6	0.100	0.02000	0.200
8	0.120	0.01000	0.180
10	0.160	0.02000	0.140
12	0.170	0.00500	0.130
13	0.180	0.01000	0.120
16	0.210	0.01000	0.090
19	0.230	0.00667	0.070
21	0.240	0.00500	0.060
28	0.260	0.00286	0.040
29	0.280	0.02000	0.020
32	0.290	0.00333	0.010
34	0.300	0.00500	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	17	min
Soil Infiltration Rate, f	**4.80E-05**	**m/s**

75% depth (m) 0.23 Calc 75% time (min) 5

25% depth (m) 0.08 Calc 25% time (min) 23

Vp	**6.95**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 6, Porosity Test 1
Test Date: 15/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
2	0.020	0.01000	0.280
241	0.020	0.00000	0.280

Max effective storage depth		0.30	m
Volume Outflow, Vp75-25	-		m3
Surface Area, ap50	-		m2
Time Taken, tp75-25	-		min
Soil Infiltration Rate, f	**FAILED**		**m/s**

75% depth (m)	0.23	Calc 75% time (min)	456
25% depth (m)	0.08	Calc 25% time (min)	23

Vp	**#VALUE!**	**s/mm**

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Gwynedd
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Tel 01286 671027

Project:	23160
Title:	*Gorse Hill Caravan Park*
Date:	19/06/2023
Ref:	Trial Pit 7, Porosity Test 1
Test Date:	15/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
3	0.030	0.01000	0.270
6	0.060	0.01000	0.240
12	0.080	0.00333	0.220
22	0.100	0.00200	0.200
30	0.110	0.00125	0.190
39	0.160	0.00556	0.140
45	0.180	0.00333	0.120
56	0.200	0.00182	0.100
67	0.210	0.00091	0.090
81	0.220	0.00071	0.080
86	0.230	0.00200	0.070
94	0.240	0.00125	0.060
106	0.250	0.00083	0.050
112	0.270	0.00333	0.030
120	0.280	0.00125	0.020
135	0.290	0.00067	0.010
142	0.300	0.00143	0.000

Max effective storage depth		0.30	m
Volume Outflow, Vp75-25		0.01	m3
Surface Area, ap50		0.27	m2
Time Taken, tp75-25		7	min
Soil Infiltration Rate, f		**1.15E-04**	**m/s**
75% depth (m)	0.23	Calc 75% time (min)	15
25% depth (m)	0.08	Calc 25% time (min)	23
Vp		**2.89**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 7, Porosity Test 2
Test Date: 15/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
29	0.090	0.00310	0.210
47	0.140	0.00278	0.160
83	0.180	0.00111	0.120
115	0.200	0.00063	0.100
151	0.210	0.00028	0.090
170	0.220	0.00053	0.080
187	0.230	0.00059	0.070

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	42	min
Soil Infiltration Rate, f	**2.00E-05**	**m/s**

75% depth (m) 0.23 Calc 75% time (min) 31

25% depth (m) 0.08 Calc 25% time (min) 73

Vp	**16.70**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 8, Porosity Test 1
Test Date: 15/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
1	0.030	0.03000	0.270
2	0.080	0.05000	0.220
3	0.120	0.04000	0.180
4	0.150	0.03000	0.150
4.5	0.170	0.04000	0.130
5	0.210	0.08000	0.090
6	0.240	0.03000	0.060
7	0.250	0.01000	0.050
8	0.260	0.01000	0.040
9	0.270	0.01000	0.030
11	0.290	0.01000	0.010
13	0.300	0.00500	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	6	min
Soil Infiltration Rate, f	**1.45E-04**	**m/s**

75% depth (m)	0.23	Calc 75% time (min)	2
25% depth (m)	0.08	Calc 25% time (min)	8

Vp	**2.30**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 8, Porosity Test 2
Test Date: 15/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
1	0.020	0.02000	0.280
2	0.080	0.06000	0.220
3	0.100	0.02000	0.200
4	0.140	0.04000	0.160
5	0.180	0.04000	0.120
6	0.200	0.02000	0.100
7	0.240	0.04000	0.060
8	0.250	0.01000	0.050
8.5	0.260	0.02000	0.040
9	0.270	0.02000	0.030
10	0.290	0.02000	0.010
12	0.300	0.00500	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	9	min
Soil Infiltration Rate, f	**9.15E-05**	**m/s**

75% depth (m)	0.23	Calc 75% time (min)	2
25% depth (m)	0.08	Calc 25% time (min)	11

Vp	**3.64**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 8, Porosity Test 3
Test Date: 15/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
2	0.030	0.01500	0.270
3	0.100	0.07000	0.200
4	0.130	0.03000	0.170
5	0.160	0.03000	0.140
6	0.210	0.05000	0.090
7	0.230	0.02000	0.070
8	0.250	0.02000	0.050
9	0.270	0.02000	0.030
10	0.290	0.02000	0.010
11	0.300	0.01000	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	13	min
Soil Infiltration Rate, f	**6.65E-05**	**m/s**

75% depth (m) 0.23 Calc 75% time (min) 2

25% depth (m) 0.08 Calc 25% time (min) 15

Vp	**5.01**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 9, Porosity Test 1
Test Date: 15/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
5	0.100	0.02000	0.200
10	0.130	0.00600	0.170
15	0.140	0.00200	0.160
20	0.140	0.00000	0.160
25	0.150	0.00200	0.150
30	0.180	0.00600	0.120
36	0.210	0.00500	0.090
41	0.220	0.00200	0.080
48	0.240	0.00286	0.060
56	0.260	0.00250	0.040
67	0.280	0.00182	0.020
74	0.300	0.00286	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	7	min
Soil Infiltration Rate, f	**1.18E-04**	**m/s**

75% depth (m)	0.23	Calc 75% time (min)	4
25% depth (m)	0.08	Calc 25% time (min)	11

Vp	**2.82**	**s/mm**

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Project: 23160
Title: *Gorse Hill Caravan Park*
Date: 19/06/2023
Ref: Trial Pit 9, Porosity Test 2
Test Date: 15/06/2023

Trial Pit Dimensions: Length (m) 0.3 Width (m) 0.3 Depth (m) 0.3

Time (mins)	Depth to water (m)	Rate of change (m/min)	Actual Water Depth (m)
0	0.000		0.300
1	0.010	0.01000	0.290
2	0.030	0.02000	0.270
4	0.050	0.01000	0.250
6	0.080	0.01500	0.220
12	0.120	0.00667	0.180
17	0.150	0.00600	0.150
22	0.180	0.00600	0.120
27	0.200	0.00400	0.100
32	0.230	0.00600	0.070
37	0.250	0.00500	0.050
42	0.290	0.00800	0.010
49	0.300	0.00143	0.000

Max effective storage depth	0.30	m
Volume Outflow, Vp75-25	0.01	m3
Surface Area, ap50	0.27	m2
Time Taken, tp75-25	14	min
Soil Infiltration Rate, f	**5.84E-05**	**m/s**

75% depth (m) 0.23 Calc 75% time (min) 8

25% depth (m) 0.08 Calc 25% time (min) 23

Vp	**5.71**	**s/mm**

APPENDIX D –
GREENFIELD RUN-OFF CALCULATION

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	10	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.300	1 year (l/s)	0.7
Summer CV	0.750	2 year (l/s)	0.7
Winter CV	0.840	30 year (l/s)	1.4
Analysis Speed	Normal	100 year (l/s)	1.7
Skip Steady State	x	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	30	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.80
Greenfield Method	IH124	Growth Factor 100 year	2.18
Positively Drained Area (ha)	0.280	Betterment (%)	0
SAAR (mm)	988	QBar	0.8
Soil Index	2	Q 1 year (l/s)	0.7
SPR	0.30	Q 2 year (l/s)	0.7
Region	9	Q 30 year (l/s)	1.4
Growth Factor 1 year	0.88	Q 100 year (l/s)	1.7
Growth Factor 2 year	0.93		

APPENDIX E –
OUTLINE SURFACE WATER CALCULATION

Soakaway calculations to BRE Digest 365

DATRYS

Project	Gorse Hill		
Ref	23160		
Description	Zone A 1- Bungalow	**By**	LI
Calculation Sheet	1	**Chkd**	EPW

1 in 100 year return period design

M5-60min	20
r	0.3

Volumetric Runoff Coefficient		**Area**
Green	0	0.0
Impermeable	1	484.0
Permeable	0.35	0.0
Total Effective Area		484

Duration	Z1	M5-D	Z2	M100-D	30% c.c	I	Area	Inflow	Outflow (cu	Storage
5.0	0.34	6.80	1.8332	12.5	16.2	194.5	484.0	7.8	0.2	7.60
10.0	0.495	9.90	1.9076	18.9	24.6	147.3	484.0	11.9	0.5	11.40
15.0	0.59	11.80	1.9388	22.9	29.7	119.0	484.0	14.4	0.7	13.67
30.0	0.78	15.60	1.9948	31.1	40.5	80.9	484.0	19.6	1.5	18.12
60.0	1	20.00	2.03	40.6	52.8	52.8	484.0	25.5	2.9	22.63
120.0	1.24	24.80	2.0108	49.9	64.8	32.4	484.0	31.4	5.8	25.54
240.0	1.55	31.00	1.962	60.8	79.1	19.8	484.0	38.3	11.7	26.61
360.0	1.8	36.00	1.922	69.2	89.9	15.0	484.0	43.5	17.5	26.04
600.0	2.13	42.60	1.8692	79.6	103.5	10.4	484.0	50.1	29.2	20.94
1440.0	2.79	55.80	1.77056	98.8	128.4	5.4	484.0	62.2	70.0	-7.82
2880.0	3.5	70.00	1.674	117.2	152.3	3.2	484.0	73.7	140.0	-66.24

Percolation factor	**(m/s)**	4.80E-05

Trench: Outflow and storage based on:

Length of soakaway	**(m)**	14.5
Width of soakaway	**(m)**	8
Effective depth	**(m)**	0.75

Eff Area of soakaways at 50%	(sq m)	16.88
Base not included in calcs		
Storage per soakaway	**(cu m)**	26.1

Soakaway Check

Peak required storage	**(m3)**	27
Time for soakaway to lower to 50% volume	(hrs)	4.63

Soakaway calculations to BRE Digest 365

DATRYS

Project	Gorse Hill		
Ref	23160		
Description	Area A2- individual	**By**	LI
Calculation Sheet	2	**Chkd**	EPW

1 in 100 year return period design

M5-60min	20
r	0.3

Volumetric Runoff Coefficient		**Area**
Green	0	0.0
Impermeable	1	172.0
Permeable	0.35	43.0
Total Effective Area		187.05

Duration	Z1	M5-D	Z2	M100-D	30% c.c	I	Area	Inflow	Outflow (cu	Storage
5.0	0.34	6.80	1.8332	12.5	16.2	194.5	187.1	3.0	0.1	2.96
10.0	0.495	9.90	1.9076	18.9	24.6	147.3	187.1	4.6	0.2	4.44
15.0	0.59	11.80	1.9388	22.9	29.7	119.0	187.1	5.6	0.2	5.34
30.0	0.78	15.60	1.9948	31.1	40.5	80.9	187.1	7.6	0.5	7.12
60.0	1	20.00	2.03	40.6	52.8	52.8	187.1	9.9	0.9	8.97
120.0	1.24	24.80	2.0108	49.9	64.8	32.4	187.1	12.1	1.8	10.33
240.0	1.55	31.00	1.962	60.8	79.1	19.8	187.1	14.8	3.6	11.19
360.0	1.8	36.00	1.922	69.2	89.9	15.0	187.1	16.8	5.4	11.43
600.0	2.13	42.60	1.8692	79.6	103.5	10.4	187.1	19.4	9.0	10.36
1440.0	2.79	55.80	1.77056	98.8	128.4	5.4	187.1	24.0	21.6	2.42
2880.0	3.5	70.00	1.674	117.2	152.3	3.2	187.1	28.5	43.2	-14.71

Percolation factor	**(m/s)**	2.00E-05

Trench: Outflow and storage based on:

Length of soakaway	**(m)**	6.5
Width of soakaway	**(m)**	6
Effective depth	**(m)**	1

Eff Area of soakaways at 50%	(sq m)	12.50
Base not included in calcs		
Storage per soakaway	**(cu m)**	11.7

Soakaway Check

Peak required storage	**(m3)**	11.45
Time for soakaway to lower to 50% volume	(hrs)	6.36

Soakaway calculations to BRE Digest 365

DATRYS

Project	Gorse Hill		
Ref	23160		
Description	Area A filter drain	**By**	LI
Calculation Sheet	3	**Chkd**	

1 in 100 year return period design

M5-60min	20
r	0.3

Volumetric Runoff Coefficient		**Area**
Green	0	0.0
Impermeable	1	2613.0
Permeable	0.35	133.0
Total Effective Area		2659.55

Duration	Z1	M5-D	Z2	M100-D	30% c.c	I	Area	Inflow	Outflow (cu	Storage
5.0	0.34	6.80	1.8332	12.5	16.2	194.5	2659.6	43.1	1.5	41.56
10.0	0.495	9.90	1.9076	18.9	24.6	147.3	2659.6	65.3	3.1	62.22
15.0	0.59	11.80	1.9388	22.9	29.7	119.0	2659.6	79.1	4.6	74.49
30.0	0.78	15.60	1.9948	31.1	40.5	80.9	2659.6	107.6	9.2	98.38
60.0	1	20.00	2.03	40.6	52.8	52.8	2659.6	140.4	18.4	121.95
120.0	1.24	24.80	2.0108	49.9	64.8	32.4	2659.6	172.4	36.8	135.56
240.0	1.55	31.00	1.962	60.8	79.1	19.8	2659.6	210.3	73.7	136.59
360.0	1.8	36.00	1.922	69.2	89.9	15.0	2659.6	239.2	110.5	128.68
600.0	2.13	42.60	1.8692	79.6	103.5	10.4	2659.6	275.3	184.2	91.06
1440.0	2.79	55.80	1.77056	98.8	128.4	5.4	2659.6	341.6	442.2	-100.61
2880.0	3.5	70.00	1.674	117.2	152.3	3.2	2659.6	405.1	884.4	-479.25

Percolation factor	**(m/s)**	2.00E-05

Trench: Outflow and storage based on:

Length of soakaway	**(m)**	170
Width of soakaway	**(m)**	0.6
Effective depth	**(m)**	1.5
Eff Area of soakaways at 50%	(sq m)	255.90
Base not included in calcs		
Storage per soakaway	**(cu m)**	45.9

Soakaway Check

Peak required storage	**(m3)**	136
Time for soakaway to lower to 50% volume	(hrs)	3.69

Soakaway calculations to BRE Digest 365

DATRYS

Project	Gorse Hill
Ref	23160
Description	
Calculation Sheet	3.2
By	LI
Chkd	

1 in 100 year return period design

M5-60min	20
r	0.3

Volumetric Runoff Coefficient		Area
Green	0	0.0
Impermeable	1	2613.0
Permeable	0.35	133.0
Total Effective Area		2659.55

Duration	Z1	M5-D	Z2	M100-D	30% c.c	I	Area	Inflow	Outflow (cu	Storage
5.0	0.34	6.80	1.8332	12.5	16.2	194.5	2659.6	43.1	1.9	41.16
10.0	0.495	9.90	1.9076	18.9	24.6	147.3	2659.6	65.3	3.9	61.41
15.0	0.59	11.80	1.9388	22.9	29.7	119.0	2659.6	79.1	5.8	73.28
30.0	0.78	15.60	1.9948	31.1	40.5	80.9	2659.6	107.6	11.6	95.95
60.0	1	20.00	2.03	40.6	52.8	52.8	2659.6	140.4	23.3	117.08
120.0	1.24	24.80	2.0108	49.9	64.8	32.4	2659.6	172.4	46.6	125.83
240.0	1.55	31.00	1.962	60.8	79.1	19.8	2659.6	210.3	93.2	117.13
360.0	1.8	36.00	1.922	69.2	89.9	15.0	2659.6	239.2	139.7	99.48
600.0	2.13	42.60	1.8692	79.6	103.5	10.4	2659.6	275.3	232.9	42.40
1440.0	2.79	55.80	1.77056	98.8	128.4	5.4	2659.6	341.6	559.0	-217.38
2880.0	3.5	70.00	1.674	117.2	152.3	3.2	2659.6	405.1	1117.9	-712.79

Percolation factor	**(m/s)**	2.27E-04

Stormbloc: Outflow and storage based on:

Length of soakaway	**(m)**	17
Width of soakaway	**(m)**	2
Effective depth	**(m)**	1.5
Eff Area of soakaways at 50%	(sq m)	28.50
Base not included in calcs		
Storage per soakaway	**(cu m)**	48.45

Soakaway Check

Peak required storage	**(m3)**	125
Time for soakaway to lower to 50% volume	(hrs)	2.68

Soakaway calculations to BRE Digest 365

DATRYS

Project	Gorse Hill		
Ref	23160		
Description	Area A Trench soakaway	**By**	LI
Calculation Sheet	3.3	**Chkd**	EPW

1 in 100 year return period design

M5-60min	20
r	0.3

Volumetric Runoff Coefficient		**Area**
Green	0	0.0
Impermeable	1	2613.0
Permeable	0.35	133.0
	Total Effective Area	2659.55

Duration	Z1	M5-D	Z2	M100-D	30% c.c	I	Area	Inflow	Outflow (cu	Storage
5.0	0.34	6.80	1.8332	12.5	16.2	194.5	2659.6	43.1	5.1	37.99
10.0	0.495	9.90	1.9076	18.9	24.6	147.3	2659.6	65.3	10.2	55.08
15.0	0.59	11.80	1.9388	22.9	29.7	119.0	2659.6	79.1	15.3	63.78
30.0	0.78	15.60	1.9948	31.1	40.5	80.9	2659.6	107.6	30.6	76.95
60.0	1	20.00	2.03	40.6	52.8	52.8	2659.6	140.4	61.3	79.08
120.0	1.24	24.80	2.0108	49.9	64.8	32.4	2659.6	172.4	122.6	49.83
240.0	1.55	31.00	1.962	60.8	79.1	19.8	2659.6	210.3	245.2	-34.87
360.0	1.8	36.00	1.922	69.2	89.9	15.0	2659.6	239.2	367.7	-128.51
600.0	2.13	42.60	1.8692	79.6	103.5	10.4	2659.6	275.3	612.9	-337.59
1440.0	2.79	55.80	1.77056	98.8	128.4	5.4	2659.6	341.6	1471.0	-1129.38
2880.0	3.5	70.00	1.674	117.2	152.3	3.2	2659.6	405.1	2941.9	-2536.78

Percolation factor	**(m/s)**	2.27E-04

Trench: Outflow and storage based on:

Length of soakaway	**(m)**	49	
Width of soakaway	**(m)**	1	
Effective depth	**(m)**	1.5	
Eff Area of soakaways at 50%	(sq m)		75.00
Base not included in calcs			
Storage per soakaway	**(cu m)**		22.05

Soakaway Check

Peak required storage	**(m3)**	99.7
Time for soakaway to lower to 50% volume	(hrs)	0.81

Soakaway calculations to BRE Digest 365

DATRYS

Project	Gorse Hill		
Ref	23160		
Description	Area B access road	**By**	LI
Calculation Sheet	4	**Chkd**	EPW

1 in 100 year return period design

M5-60min	20
r	0.3

Volumetric Runoff Coefficient		**Area**
Green	0	0.0
Impermeable	1	641.0
Permeable	0.35	0.0
	Total Effective Area	641

Duration	Z1	M5-D	Z2	M100-D	30% c.c	I	Area	Inflow	Outflow (cu	Storage
5.0	0.34	6.80	1.8332	12.5	16.2	194.5	641.0	10.4	1.4	9.00
10.0	0.495	9.90	1.9076	18.9	24.6	147.3	641.0	15.7	2.8	12.97
15.0	0.59	11.80	1.9388	22.9	29.7	119.0	641.0	19.1	4.2	14.91
30.0	0.78	15.60	1.9948	31.1	40.5	80.9	641.0	25.9	8.3	17.62
60.0	1	20.00	2.03	40.6	52.8	52.8	641.0	33.8	16.6	17.22
120.0	1.24	24.80	2.0108	49.9	64.8	32.4	641.0	41.6	33.2	8.33
240.0	1.55	31.00	1.962	60.8	79.1	19.8	641.0	50.7	66.5	-15.77
360.0	1.8	36.00	1.922	69.2	89.9	15.0	641.0	57.7	99.7	-42.02
600.0	2.13	42.60	1.8692	79.6	103.5	10.4	641.0	66.4	166.1	-99.77
1440.0	2.79	55.80	1.77056	98.8	128.4	5.4	641.0	82.3	398.7	-316.38
2880.0	3.5	70.00	1.674	117.2	152.3	3.2	641.0	97.6	797.4	-699.77

Percolation factor	**(m/s)**	5.58E-05

Trench: Outflow and storage based on:

Length of soakaway	**(m)**	82
Width of soakaway	**(m)**	0.7
Effective depth	**(m)**	1

Eff Area of soakaways at 50%	(sq m)	82.70
Base not included in calcs		
Storage per soakaway	**(cu m)**	17.22

Soakaway Check

Peak required storage	**(m3)**	1.6
Time for soakaway to lower to 50% volume	(hrs)	0.05

Soakaway calculations to BRE Digest 365

DATRYS

Project	Gorse Hill		
Ref	23160		
Description	Area B individual soakaways	**By**	LI
Calculation Sheet	5	**Chkd**	EPW

1 in 100 year return period design

M5-60min	20
r	0.3

Volumetric Runoff Coefficient		**Area**
Green	0	0.0
Impermeable	1	160.0
Permeable	0.35	79.0
Total Effective Area		187.65

Duration	Z1	M5-D	Z2	M100-D	30% c.c	I	Area	Inflow	Outflow (cu	Storage
5.0	0.34	6.80	1.8332	12.5	16.2	194.5	187.7	3.0	0.2	2.86
10.0	0.495	9.90	1.9076	18.9	24.6	147.3	187.7	4.6	0.4	4.25
15.0	0.59	11.80	1.9388	22.9	29.7	119.0	187.7	5.6	0.5	5.05
30.0	0.78	15.60	1.9948	31.1	40.5	80.9	187.7	7.6	1.1	6.53
60.0	1	20.00	2.03	40.6	52.8	52.8	187.7	9.9	2.1	7.77
120.0	1.24	24.80	2.0108	49.9	64.8	32.4	187.7	12.2	4.3	7.91
240.0	1.55	31.00	1.962	60.8	79.1	19.8	187.7	14.8	8.5	6.32
360.0	1.8	36.00	1.922	69.2	89.9	15.0	187.7	16.9	12.8	4.10
600.0	2.13	42.60	1.8692	79.6	103.5	10.4	187.7	19.4	21.3	-1.87
1440.0	2.79	55.80	1.77056	98.8	128.4	5.4	187.7	24.1	51.1	-27.00
2880.0	3.5	70.00	1.674	117.2	152.3	3.2	187.7	28.6	102.2	-73.62

Percolation factor	**(m/s)**	5.58E-05

Trench: Outflow and storage based on:

Length of soakaway	**(m)**	4
Width of soakaway	**(m)**	6.6
Effective depth	**(m)**	1
Eff Area of soakaways at 50%	(sq m)	10.60
Base not included in calcs		
Storage per soakaway	**(cu m)**	7.92

Soakaway Check

Peak required storage	**(m3)**	115
Time for soakaway to lower to 50% volume	(hrs)	27.00

Soakaway calculations to BRE Digest 365

DATRYS

Project	Gorse Hill		
Ref	23160		
Description	Area C Lodges	**By**	LI
Calculation Sheet	6	**Chkd**	EPW

1 in 100 year return period design

M5-60min	20
r	0.3

Volumetric Runoff Coefficient		**Area**
Green	0	0.0
Impermeable	1	139.0
Permeable	0.35	116.0
Total Effective Area		179.6

Duration	Z1	M5-D	Z2	M100-D	30% c.c	I	Area	Inflow	Outflow (cu	Storage
5.0	0.34	6.80	1.8332	12.5	16.2	194.5	179.6	2.9	0.2	2.69
10.0	0.495	9.90	1.9076	18.9	24.6	147.3	179.6	4.4	0.4	3.97
15.0	0.59	11.80	1.9388	22.9	29.7	119.0	179.6	5.3	0.7	4.69
30.0	0.78	15.60	1.9948	31.1	40.5	80.9	179.6	7.3	1.3	5.96
60.0	1	20.00	2.03	40.6	52.8	52.8	179.6	9.5	2.6	6.86
120.0	1.24	24.80	2.0108	49.9	64.8	32.4	179.6	11.6	5.2	6.40
240.0	1.55	31.00	1.962	60.8	79.1	19.8	179.6	14.2	10.5	3.72
360.0	1.8	36.00	1.922	69.2	89.9	15.0	179.6	16.2	15.7	0.43
600.0	2.13	42.60	1.8692	79.6	103.5	10.4	179.6	18.6	26.2	-7.62
1440.0	2.79	55.80	1.77056	98.8	128.4	5.4	179.6	23.1	62.9	-39.83
2880.0	3.5	70.00	1.674	117.2	152.3	3.2	179.6	27.4	125.8	-98.44

Percolation factor	**(m/s)**	7.28E-05

Trench: Outflow and storage based on:

Length of soakaway	**(m)**	3.5	
Width of soakaway	**(m)**	6.5	
Effective depth	**(m)**	1	
Eff Area of soakaways at 50%		(sq m)	10.00
Base not included in calcs			
Storage per soakaway		**(cu m)**	6.825

Soakaway Check

Peak required storage	**(m3)**	6.9
Time for soakaway to lower to 50% volume	(hrs)	1.32

Soakaway calculations to BRE Digest 365

Project	Gorse Hill		
Ref	23160		
Description	Area C access road to woodland	**By**	LI
Calculation Sheet	7	**Chkd**	EPW

1 in 100 year return period design

M5-60min	20
r	0.3

Volumetric Runoff Coefficient		**Area**
Green	0	0.0
Impermeable	1	652.0
Permeable	0.35	0.0
Total Effective Area		652

Duration	Z1	M5-D	Z2	M100-D	30% c.c	I	Area	Inflow	Outflow (cu	Storage
5.0	0.34	6.80	1.8332	12.5	16.2	194.5	652.0	10.6	2.1	8.44
10.0	0.495	9.90	1.9076	18.9	24.6	147.3	652.0	16.0	4.3	11.75
15.0	0.59	11.80	1.9388	22.9	29.7	119.0	652.0	19.4	6.4	13.00
30.0	0.78	15.60	1.9948	31.1	40.5	80.9	652.0	26.4	12.8	13.59
60.0	1	20.00	2.03	40.6	52.8	52.8	652.0	34.4	25.6	8.84
120.0	1.24	24.80	2.0108	49.9	64.8	32.4	652.0	42.3	51.1	-8.87
240.0	1.55	31.00	1.962	60.8	79.1	19.8	652.0	51.6	102.3	-50.72
360.0	1.8	36.00	1.922	69.2	89.9	15.0	652.0	58.6	153.4	-94.76
600.0	2.13	42.60	1.8692	79.6	103.5	10.4	652.0	67.5	255.7	-188.19
1440.0	2.79	55.80	1.77056	98.8	128.4	5.4	652.0	83.7	613.6	-529.90
2880.0	3.5	70.00	1.674	117.2	152.3	3.2	652.0	99.3	1227.3	-1127.97

Percolation factor	**(m/s)**	7.06E-05

Trench: Outflow and storage based on:

Length of soakaway	**(m)**	100	
Width of soakaway	**(m)**	0.6	
Effective depth	**(m)**	1	
Eff Area of soakaways at 50%	(sq m)		100.60
Base not included in calcs			
Storage per soakaway	**(cu m)**		18

Soakaway Check

Peak required storage	**(m3)**	13.6
Time for soakaway to lower to 50% volume	(hrs)	0.27

CALCULATION SHEET

Project	Gorse Hill	By	LI
Project No	23160	Chkd	EPW
Sheet No	8		
Description	Attenuation for lower part of Area C		

STORAGE VOLUME
100 Year Return Period

Return Period	100	years
M5-60min	20	mm
r	0.3	

Permissible outflow 2 l/s

PROPOSED NEW DEVELOPMENT			Grass	P.Paving	Impermeable
Volumetric runoff coefficient			0	0.6	1
Grass	0	sqm			
Permeable paving	300	sqm			
Impermeable	1129	sqm			

Urban Creep Allowance: 0

TOTAL EFFECTIVE AREA 1309 sqm

Duration min	Z1	M5-D mm	Z2	M100-D mm	(+) 30% c.c	Total Vol cu m	Total out cu m	Storage cu m
5	0.34	6.80	1.83	12.47	16.21	21.21	0.60	20.61
10	0.50	9.90	1.91	18.89	24.55	32.14	1.20	30.94
15	0.59	11.80	1.94	22.88	29.74	38.93	1.80	37.13
30	0.78	15.60	1.99	31.12	40.45	52.95	3.60	49.35
60	1.00	20.00	2.03	40.60	52.78	69.09	7.20	61.89
120	1.24	24.80	2.01	49.87	64.83	84.86	14.40	70.46
240	1.55	31.00	1.96	60.82	79.07	103.50	28.80	74.70
360	1.80	36.00	1.92	69.19	89.95	117.74	43.20	74.54
600	2.13	42.60	1.87	79.63	103.52	135.50	72.00	63.50
1440	2.79	55.80	1.77	98.80	128.44	168.12	172.80	0.00
2880	3.50	70.00	1.67	117.18	152.33	199.41	345.60	0.00

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