GeoSmart Information

Environmental Thinking

Foul Water Drainage Strategy

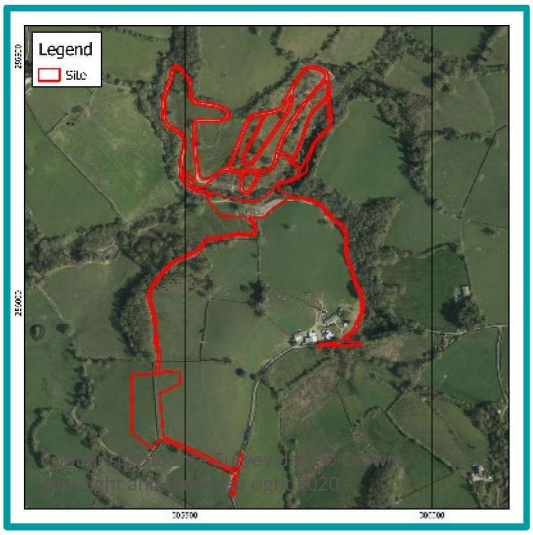
Report reference:	Report status:	Date issued:
73797R6	FINAL	February 2022

Site address: Land adjacent to Rhyd-Blawd Farm, Llandrindod Wells, Powys, LD2 3TL

Overview: A combination of non-mains foul drainage systems are proposed including package treatment plants with additional phosphate removal, coupled with reed beds.

An existing foul water system will be taken out of use.

The current annual phosphate loading from the Site is between 3,439 g and 6,878 g. The proposed annual phosphate loading from the Site is 1,835g. This is a significant reduction in phosphate loading.



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1. Executive Summary

The Site, located at Rhyd-Blawd Farm, is currently an existing Moto X track (off-road motorcycle track) including access and parking area, with the remaining areas in agricultural use. The Site has in place a certificate of lawful development since the early 1990's, to host Moto X events with riders and spectators to varying levels of attendance. There is an existing foul drainage system in-situ comprised of infiltration through a gravel filled concrete lined pit with final discharge to surface water, used to serve the catering and toilet arrangements in place.

To augment the existing facilities and developments on Site it is proposed to construct a Moto X Experience Centre (Area A) and 7 log cabins (Area B) with associated access, parking and landscaping. It is proposed that the existing foul drainage arrangements are taken out of use and new foul water treatment systems will be installed. The new foul water treatment systems will offer a significant betterment to the phosphate loadings from the Site.

Objectives

The objective of this report is to provide a review of the Site setting and present a feasible foul water drainage strategy.

Summary

Constraint	Issue	Result
Discharge route	What is the infiltration potential at the Site?	Low
	What is the potential to discharge to surface water features?	High
	What is the potential to discharge to sewers?	Low
Flooding	What is the fluvial/tidal flood risk at the Site?	Very Low
	What is the pluvial flood risk at the Site?	Very Low
	What is the groundwater flood risk at the Site?	Negligible
Pollution	Is the groundwater a protected resource?	No
	Is the surface water feature a protected resource?	Yes*

*The Site is located within the River Wye Special Area of Conservation (SAC) and the Dulas Brook, which flows through the Site, is designated under the Wye Valley Tributaries Site of Special Scientific Interest (SSSI).

Regulatory perspective

In accordance with Natural Resources Wales (NRW) advice issued on the 20th January 2021 following an assessment of phosphate levels within the River Wye SAC/SSSI it is necessary to demonstrate that foul drainage from the proposed development will not result in an adverse effect on the integrity of the River Wye SAC through further addition of phosphate. NRW's current planning position statement concludes that "any proposed new development that

might otherwise result in increasing the amount of phosphate withing the SAC either by direct or indirect discharges must be able to demonstrate phosphate neutrality or betterment".

The foul drainage strategy proposed follows the hierarchy set out in Planning Circular 008/2018 confirming that a package Treatment Plant would be appropriate due to the absence of any mains sewer connections nearby. The proposed strategy acknowledges the sensitivity of the local environment an includes additional treatment for phosphate removal and a tertiary treatment through a reed bed for final effluent polishing. It is anticipated that the phosphate concentration in the final treated effluent will be as low as technically possible from a private system – less than 1.0 mg/l. Percolation testing has confirmed that infiltration to ground is not possible due to the low permeability of the local geology, therefore discharge of treated effluent to surface water is appropriate.

Phosphate betterment

The proposal to take the existing foul water system completely out of use will, in our opinion, lead to a betterment in the overall quality of the effluent leaving the Site. There will be a reduction in the phosphate concentration entering the Dulas Brook and an overall reduction in phosphate loading from the Site.

The current annual phosphate loading from the Site is between 3,439 g and 6,878 g generated in Area A. The proposed combined annual phosphate loading from both Areas A and B lodges is 1,835g. This is a significant reduction in phosphate loading.

Summary of proposed foul drainage strategy:

Site area	Foul Drainage Strategy
Area A – Moto X Experience Centre	The existing foul drainage arrangement has been in-situ for a significant period of time and used on a daily basis, for a variety of events. The existing system has been confirmed not to conform to current design standards and as such is proposed to be taken completely out of use and replaced with a new system. The existing system offers little in the way of effluent treatment and nutrient removal. The closest public foul sewer connection point is in excess of 500m from the Site. On the basis of percolation testing undertaken in April 2021 the ground conditions are not conducive to infiltration. The daily discharge rate from the proposed development will be variable depending on use and ranges from 1.2 m^3 to 5.94 m^3 compared to the existing daily discharge rates of 0.4 m^3 to 1.98 m^3. Area A currently generates between 3,439 g and 6,878 g of phosphate loading per year. After development the proposed phosphate loading from Area A is 959 g per year. The following options would therefore be suitable to accommodate the proposed development. Primary strategy: This will be comprised of a Package Treatment Plant (PTP) with additional treatments to reduce phosphate concentrations in recognition of the sensitivity of the local hydrological environment. The PTP will incorporate

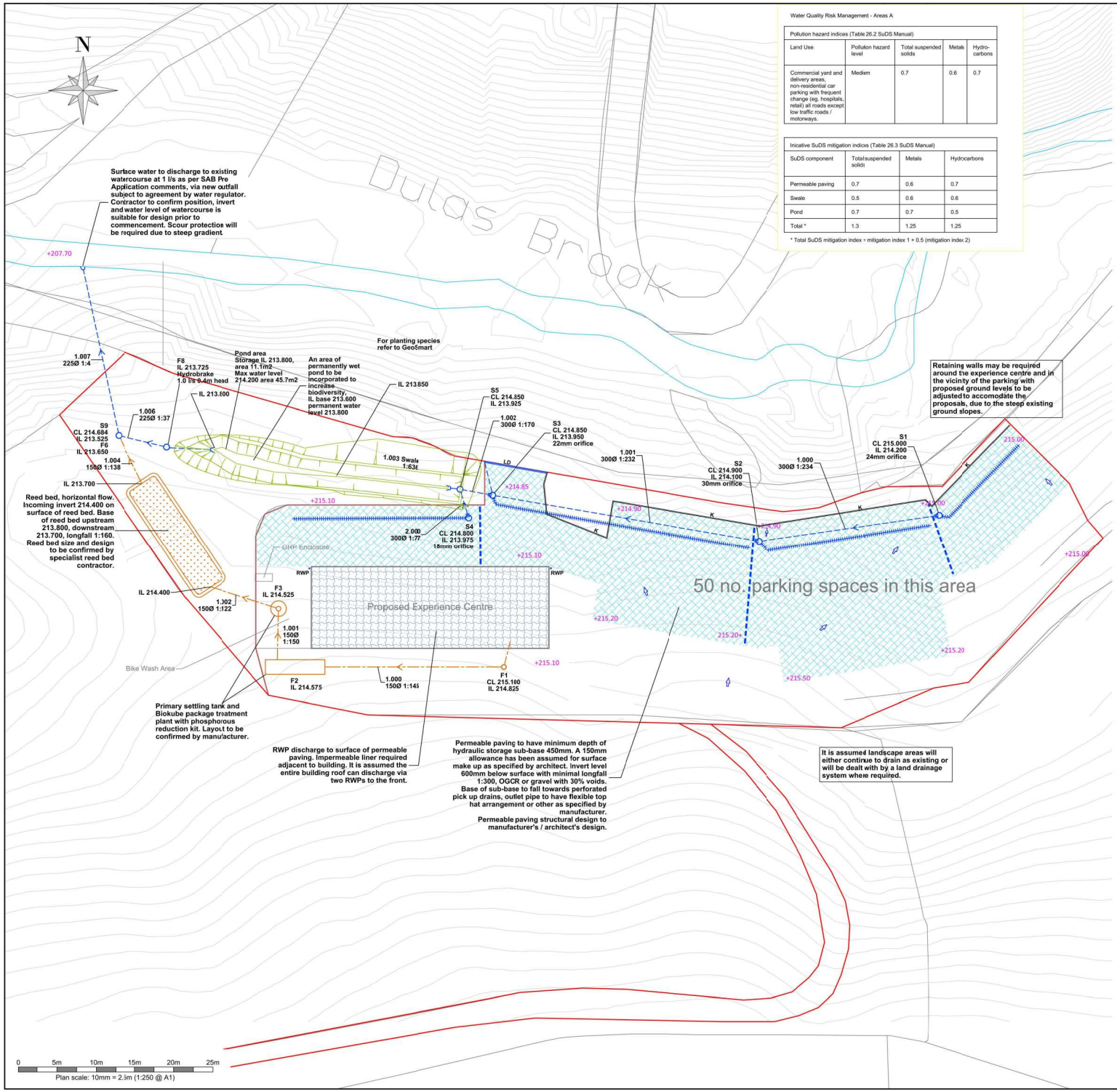
	additional phosphate removal and treated effluent will then be passed through a reed bed, with final effluent discharged to the Dulas Brook. It is anticipated that the phosphate concentration in the final treated effluent will be as low as technically possible from a private system and will be less than the existing system. Secondary strategy If final discharge to surface water of treated effluent is not acceptable by the regulatory authorities then the only available option will be to contain all foul water produced on Site in a holding tank for periodic removal by tanker with off-site treatment and disposal. This option is not considered a sustainable solution.
Area B - Lodges	There are no existing drainage systems in the area proposed for the lodges. The closest public foul sewer connection point is in excess of 500m from the Site. On the basis of percolation testing undertaken in April 2021 the ground conditions are not conducive to infiltration. The daily discharge rate from the proposed development will be 2.4 m^3 compared to the existing daily discharge rate of 0 m^3. The current phosphate loading from Area B lodges is 0 g per year. The proposed phosphate loading per year is 876 g. The following options would therefore be suitable to accommodate the proposed development. Primary strategy: There are no existing drainage systems in the area proposed for the lodges. Therefore, a new non-mains foul drainage system is proposed, this will be comprised of a PTP with additional treatments to reduce phosphate concentrations in recognition of the sensitivity of the local hydrological environment. The PTP will incorporate additional phosphate removal and treated effluent will then be passed through a reed bed, with final effluent discharged to a tributary of the Dulas Brook. It is anticipated that the phosphate concentration in the final treated effluent will be as low as technically possible from a private system. Secondary strategy If final discharge to surface water of treated effluent is not acceptable by the regulatory authorities then the only available option will be to contain all foul water produced on Site in a holding tank for periodic removal by tanker with off-site treatment and disposal. This option is not considered a sustainable solution.
Area A & B combined comment	It is noted that by taking the existing system in Area A, which offers little in the way of treatment, out of use there will be a betterment in the overall quality of the effluent leaving the Site as a whole and a reduction in the phosphate concentrations and loading to the Dulas Brook.

	An Environmental Permit may be required for the foul effluent discharge from Site, this will be confirmed through a pre-application submission to NRW.

Proposed next steps

This foul water strategy should be submitted to NRW and Powys County Council (PCC) for pre-application advice to confirm that the proposed strategy can be agreed in principle prior to detailed design.

Pre-application advice should also confirm any environmental permitting or specific risk assessment requirements for the proposed development. It is proposed that Environmental Permit applications, if applicable, would be completed following receipt of planning permission, noting that no foul water could be generated until a permit was in place.



Water Quality Risk Management - Areas A

Pollution hazard indices (Table 26.2 SuDS Manual)

Land Use	Pollution hazard level	Total suspended solids	Metals	Hydro-carbons
Commercial yard and delivery areas, non-residential car parking with frequent change (eg. hospitals, retail) all roads except low traffic roads / motorways.	Medium	0.7	0.6	0.7

Inicative SuDS mitigation indices (Table 26.3 SuDS Manual)

SuDS component	Total suspended solids	Metals	Hydrocarbons
Permeable paving	0.7	0.6	0.7
Swale	0.5	0.6	0.6
Pond	0.7	0.7	0.5
Total *	1.3	1.25	1.25

* Total SuDS mitigation index = mitigation index 1 + 0.5 (mitigation index 2)

Surface Water Drainage Strategy Area A:

- Drainage strategy is permeable paving, swale and pond, which provide sufficient treatment stages for the Medium hazard Area A, details in Water Quality Risk Management table adjacent.
- Discharge is attenuated in the permeable paving sub-base, swale and pond.
- Permeable paving is split by baffles to maximise storage potential. Each section is controlled by orifice. Permeable paving will be partial infiltrating type B to allow partial re-charge of soils beneath. (Infiltration testing provided poor results and so a low infiltration rate of 1x10-7 m/s has been used within the calcuations.)
- Surface water will discharge at 1 l/s to the existng watercourse as mentioned within the SAB Pre Application comments, subject to agreement.
- Water recycling will be utilised for the bike wash areas, details as provided by the architect.

Foul Drainage Strategy Area A:

- The foul strategy is based on the useage figures as detailed in GeoSmart Foul Water Drainage Strategy 73797R4 and Addendum. The report demonstrates an overall annual reduction in phosphate loading from the site.
- Discharges will be treated by a primary settlement tank, package treatment plant (PTP) WTE BioKube Jupiter 25 with enhanced phosphate reduction (or similar), as per specification provided by WTE Ltd. Chemical toilets to be provided for events or the tank to be emptied and refilled with water priot ot an event, as recommended by WTE Ltd.
- Design effluent quality from PTP with enhanced phosphate removal BOD5 20 mg/l, Suspended solids 30 mg/l, Ammonia 20 mg/l, Phosphate < 1.5 mg/l.
- Tertiary treatment by reed bed will further improve the discharge quality before discharge to the watercourse, subject to agreement, design as per specialist reed bed contractor.
- The foul system and discharge will be regulated via an Environmental Permit.

Key:

- Partially infiltrating permeable paving (Type B) 1002m2 (100%)
- Experience Centre roof 320m2
- Reed bed
- Pond, swale
- RWP — Rain water pipe
- Rain water harvesting butt
- Surface water drain with flow direction
- Sub-base perforated pick-up drain
- Permeable paving check dam
- Surface manhole with: Reference number, Cover level, Invert level (e.g. S3, CL 214.850, IL 213.950)
- Flow control at manhole
- Assumed falls
- Outfall
- +214.90 — Proposed spot levels, assumed, to be confirmed by landscape architect
- Foul water drain with flow direction
- Foul manhole with: Reference number, Cover level, Invert level (e.g. F1, CL 215.100, IL 214.825)
- Foul package treatment plant
- Foul primary settling tank
- K — Kerb
- LD — Linear drain

Notes:

1. Do not scale from this drawing.
2. All dimensions are in millimeters unless otherwise stated.
3. This drawing to be read in conjunction with all other relevant drawings and documents.
4. All drainage to be constructed to Civil Engineering Specification for Water Industry 7th Edition, current British standards and building regulations and other relevant standards.
5. Exact locations of rain water downpipes and other internal drainage down pipes to be confirmed by architect. Rain water pipe connections to have rodding access, sump and grated cover.
6. Contractor to confirm locations of existing services prior to commencement on site and to arrange for any necessary diversions, lowering or protection works as required.
7. All specialist drainage components such as attenuation tanks, flow control and pumping stations to be designed and installed as per manufacturers requirements.
8. Cover levels to be confirmed by landscape architect. Cover levels and invert levels are in meters unless otherwise stated. If cover levels change from assumed then drainage design should be re-assessed, especialy in regards to extreme events.
9. Extent of linear drainage channel to perimeter of building to be confirmed by architect, design as per manufacturer.
10. Private surface water pipes to be 100Ø with minimum fall of 1:100 unless otherwise stated.
11. Private foul pipes to be 100mm Ø with minimum fall of 1:40 unless a WC is connected then minimum gradient 1:80, unless otherwise stated.
12. Permeable paving and outlets to be as manufacturer design and recommendations.
13. Proposed ground levels will influence the storage capacity of the permeable paving and the position of the drainage pick up features. When proposed ground levels are complete the permeable paving design should be reviewed to ensure sufficient storage is provided and that the drainage pick up features are positioned correctly.
14. Permeable paving sub-base should fall towards the drainage pick up features.
15. Minimum cover to thermoplastic pipes in garden or patio areas 0.6m, in driveway 0.9m, in road 1.2m, otherwise concrete protection will be required.
16. Access chamber cover class A15 for garden and patio, B125 for driveway, C250 for lightly trafficked roads or small private carparks.
17. Design is for planning purposes only and not for construction. Design should be confirmed prior to construction to ensure all available information is considered and any assumed information should be verified.

Rev	Date	Detail	Drwn	Chkd
P01	10.02.22	Initial issue	MG	AW

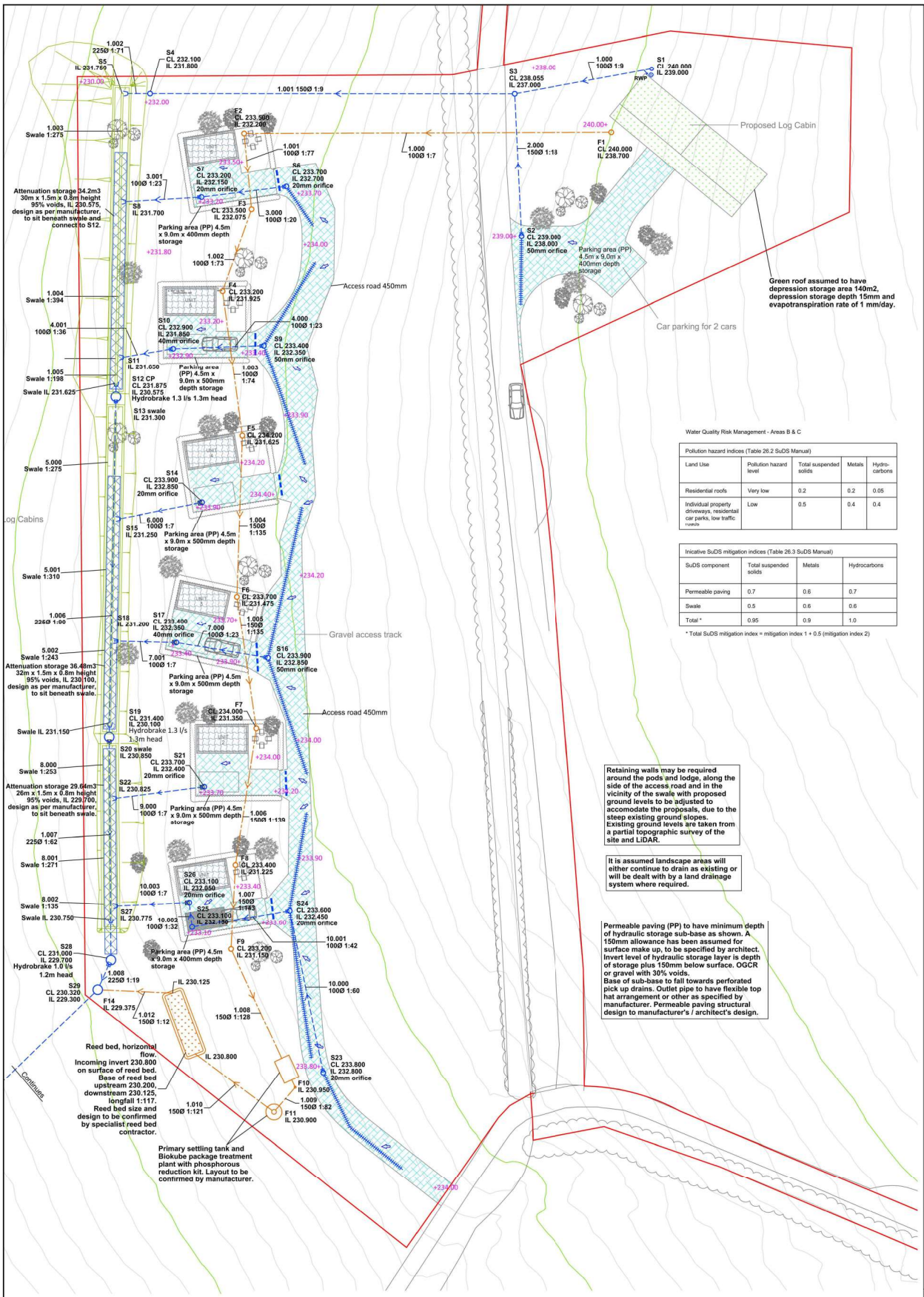
Client: Hughes Architects

Project: Land Adj Rhyd-Blawd Farm, Disserth, Builth Wells, Powys, LD2 3TL

Drawing Title: Proposed Surface and Foul Drainage Layout - Site A

GeoSmart Information
Suite 9-11, 1st Floor, Old Bank Buildings, Bellstore, Shrewsbury, SY1 1HU

Drawn by:	Checked by:	Date:
MG	MG	Feb 2022
Scale: 1:250 @ A1		Status: Preliminary
Drawing No: 73797.04 100		Issue: P01



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Water Quality Risk Management - Areas B & C

Pollution hazard indices (Table 26.2 SuDS Manual)

Land Use	Pollution hazard level	Total suspended solids	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residentail car parks, low traffic roads	Low	0.5	0.4	0.4

Inicative SuDS mitigation indices (Table 26.3 SuDS Manual)

SuDS component	Total suspended solids	Metals	Hydrocarbons
Permeable paving	0.7	0.6	0.7
Swale	0.5	0.6	0.6
Total *	0.95	0.9	1.0

* Total SuDS mitigation index = mitigation index 1 + 0.5 (mitigation index 2)

Surface Drainage Strategy Areas B & C:

- Drainage strategy is permeable paving, swale and storage attenuation tanks beneath the swale. The permeable paving and swale provide sufficient treatment stages for the Low hazard Areas B & C, details in Water Quality Risk Mangement table adjacent.
- Discharge is attenuated within the permeable paving sub-base, swale and the attenuation tanks. Due ot the steep nature of the site the swale is stepped in levels to allow maximum use of storage potential.
- Permeable paving is split by baffles to maximise storage potential. Each section is controlled by orifice. Permeable paving will be partial infiltrating type B to allow partial re-charge of soils beneath. (Infiltration testing provided poor results and so a low infiltration rate of 1x10-7 m/s has been used within the calcuations.)
- Surface water will discharge at 1 l/s to the existng watercourse as mentioned within the SAB Pre Application comments, subject to agreement.

Foul Drainage Strategy Areas B & C:

- The foul strategy is based on the useage figures as detailed in GeoSmart Foul Water Drainage Strategy 73797R4 and Addendum. The report demonstrates an overall annual reduction in phosphate loading from the site.
- Discharges will be treated by a primary settlement tank, package treatment plant (PTP) WTE BioKube Venus 2200 for 16 P with enhanced phosphate reduction (or similar) as per specification provided by WTE Ltd.
- Design effluent quality from PTP with enhanced phosphate removal BOD5 20 mg/l, Suspended solids 30 mg/l, Ammonia 20 mg/l, Phosphate < 1.5 mg/l.
- Tertiary treatment by reed bed will further improve the discharge quality before discharge to the watercourse, subject to agreement, design as per specialist reed bed contractor.
- The foul system and discharge will be regulated via an Environmental Permit.

Key:

- Partially infiltrating permeable paving (Type B) 1002m2 (100%)
- Glamping pod roof 140m2
- Log cabin green roof 140m2
- Reed bed
- Attenuation tank
- Pond, swale
- Rain water pipe
- Rain water harvesting butt
- Surface water drain with flow direction
- Sub-base perforated pick-up drain
- Permeable paving check dam
- Surface manhole with: Reference number, Cover level, Invert level (e.g. S3, CL 214.850, IL 213.950)
- Flow control at manhole
- Assumed falls
- Outfall
- +214.90 Proposed spot levels, assumed, to be confirmed by landscape architect
- Foul water drain with flow direction
- Foul manhole with: Reference number, Cover level, Invert level (e.g. F1, CL 215.100, IL 214.825)
- Foul package treatment plant
- Foul primary settling tank

Surface water to discharge to existing watercourse at 1 l/s as per SAB Pre Application comments, via new outfall subject to agreement by water regulator. Contractor to confirm position, invert and water level of watercourse is suitable for design prior to commencement. Scour protection will be required due to steep gradient.

Rev	Date	Detail	Drwn	Chkd
P01	10.02.22	Initial issue	MG	AW

Client: Hughes Architects

Project: Land Adj Rhyd-Blawd Farm, Disserth, Builth Wells, Powys, LD2 3TL

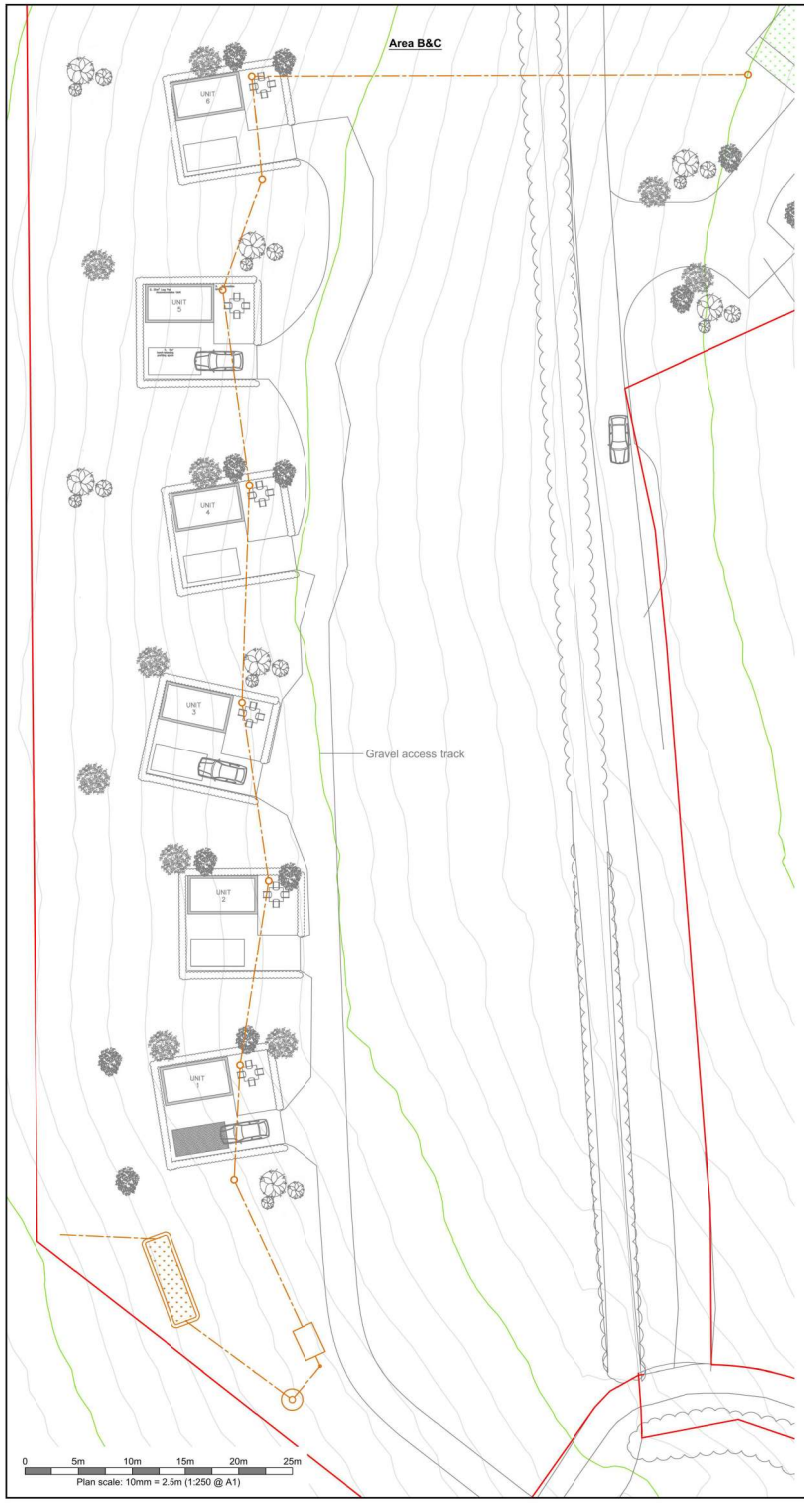
Drawing Title: Proposed Surface and Foul Drainage Layout - Sites B & C

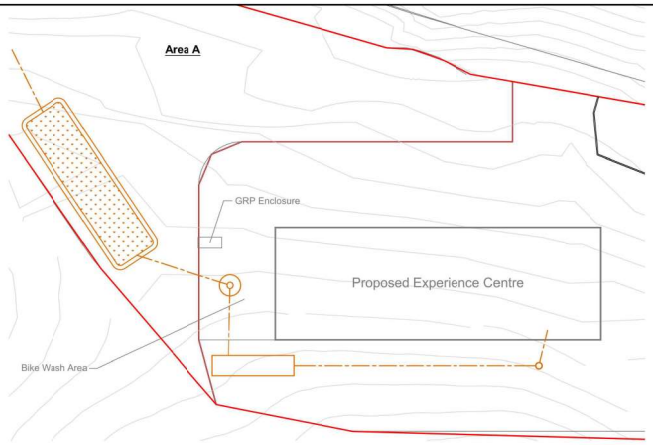
GeoSmart Information
Suite 9-11, 1st Floor, Old Bank Buildings, Bellstone, Shrewsbury, SY1 1HU

Drawn by:	Checked by:	Date:
MG	MG	Feb 2022

Scale:	Status:
1:250 @ A1	Preliminary

Drawing No.	Issue.
73797.04 101	P01





	Asset Type	Maintenance Schedule (and Frequency)	Party Responsible
	Underground drainage pipe network and manholes	Regular maintenance: • Trimming any roots that may be causing blockages (annually or as required) Monitoring: • Inspect for signs of blockages (annually or as required)	Privately owned by Nightly Ltd. Maintained by specialist and suitably qualified maintenace company, agreement as set up by Nightly Ltd.
	Package treatment plant	Regular maintenance: • Service (annually or as required / recommended by manufacturer) Monitoring: • Survey inside of tank for sludge or scum build-up and remove (annualy or as required / recommended by manufacturer) • Check the electrical components, blowers, pumps, UV-units, are operational (weekly or as required / recommended by manufacturer) • Check air vents for obstructions (weekly or as required / recommended by manufacturer) Refer to manufacturers operation and maintenance manual for further details.	
	Primary settling tank	Regular maintenance: • Remove sludge (annually or as required / recommended by manufacturer) • Survey inside of tank for sludge or scum build-up and remove (annualy or as required / recommended by manufacturer) Monitoring: • Inspect for signs of blockages (monthly or as required / recommended by manufacturer) Refer to manufacturers operation and maintenance manual for further details.	
	Reed bed	Regular maintenance: • Remove weeds and litter (monthly or as required) • Trim reeds that die back, remove cuttings (annually or as required / recommended by manufacturer) • Adjust water levels to depth as recommended by contractor (weekly or as required / recommenced by manufacturer) Monitoring: • Inspect for weeds and remove (monthly or as required) • Check the reeds for signs of over crowding, thin out as required (annually or as required / recommended by manufacturer) • Check for signs of silt build up within the reed bed and remove / replace gravel media if required (annually or as required / recommended by contractor) Refer to contractor operation and maintenance manual for further details.	

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Rev	Date	Detail	Drwn	Chkd
P01	10.02.22	Initial issue	MG	DS

Client:
Hughes Architects

Project:
Land Adj Rhyd-Blawd Farm, Disserth, Builth Wells, Powys, LD2 3TL

Drawing Title:
Foul Drainage Management and Maintenance Plan

GeoSmart Information
Suite 9-11, 1st Floor, Old Bank Buildings, Bellstore, Shrewsbury, SY1 1HU

Drawn by:	Checked by:	Date:
MG	MG	Feb 2022
Scale: 1:250 @ A1		Status: Preliminary
Drawing No: 73797.04 102		Issue: P01

2. Site Location

Report prepared for: Hughes Architects

Entire Site area:

32,890 m^2 (3.29 ha)

Current use:

Agricultural and Moto X track

Proposed use:

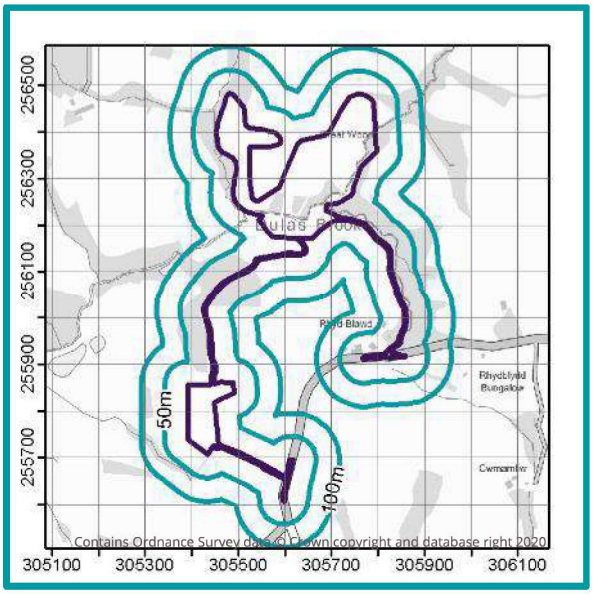
Moto X Experience Centre and lodges

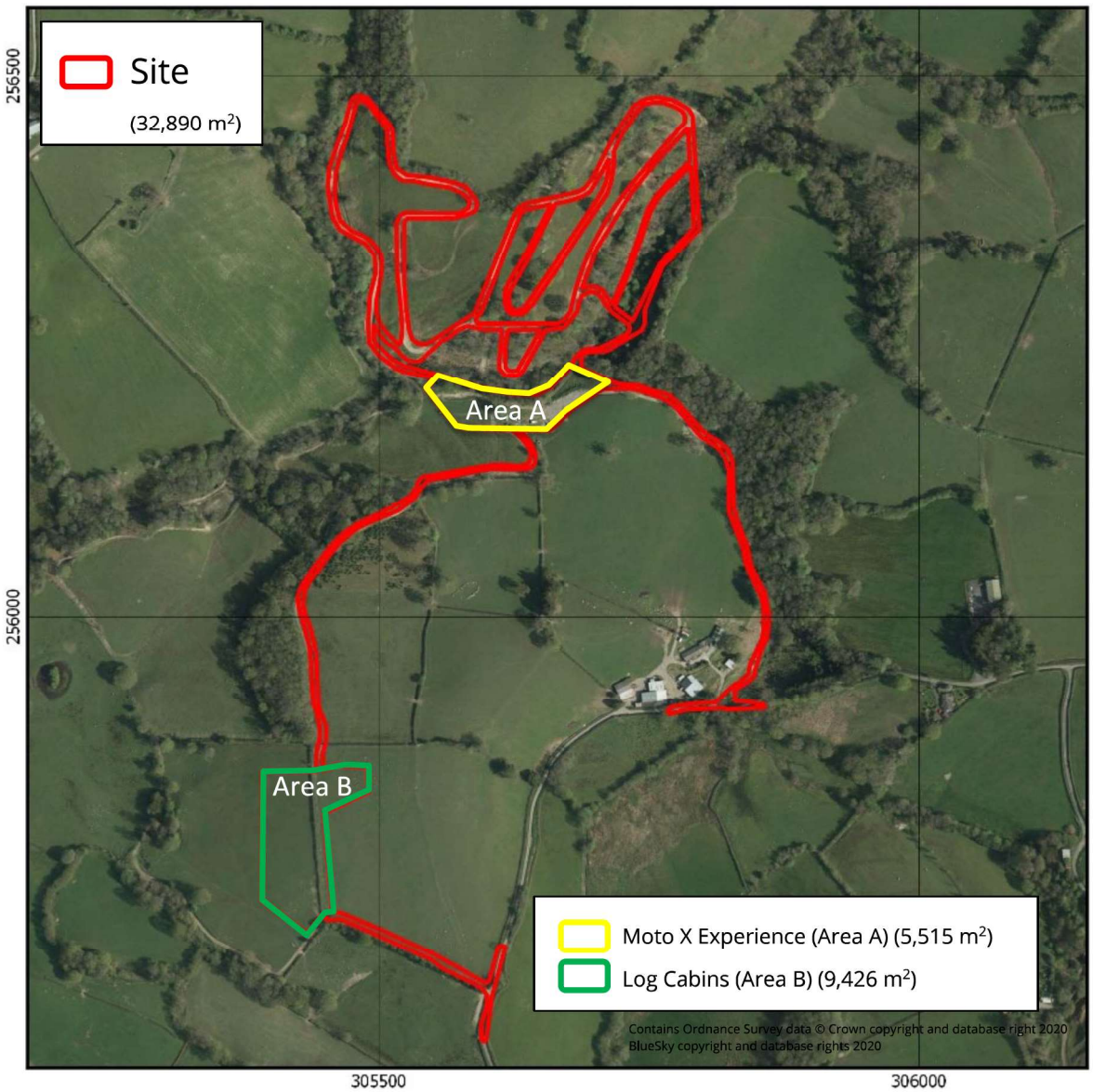
Report author:

Mike Piotrowski

Report check & review:

Alan White





3. Objective and proposed development

Objective

The purpose of this report is to provide a review of the Site setting and present a feasible foul water drainage strategy for the site of Land adjacent to Rhyd-Blawd Farm, Llandrindod Wells, Powys, LD2 3TL (the Site).

Existing development

The Site, located at Rhyd-Blawd Farm, is currently an existing Moto X track (off-road motorcycle track) including access and parking area, with the remaining areas in agricultural use. The Site has in place a certificate of lawful development, since the early 1990's, to host Moto X events with riders and spectators to varying levels of attendance.

There is an existing foul drainage system currently in-situ, marked as a foul water receptacle within the development plans in Appendix A. The existing system is used to serve the catering and toilet arrangements in Area A. There are no existing foul drainage systems in place at Area B, this area is currently agricultural greenfield space.

The existing foul drainage system comprises of a pit some 4 to 5 m deep supported with concrete drainage rings. The drainage rings are surrounded by a single land drain pipe, wrapped around multiple times, and back filled with gravel. A discharge pipe surrounded by gravel runs from the pit down through the field (as indicated on the plan in Appendix A) before discharging directly into the tributary of the Dulas Brook. The existing system and drainage field is not constructed to BS 6297:2007+A1:2008 Code of Practice for the design and installation of drainage field for use in wastewater treatment. Photographs of the existing system are provided below.

Photographs of the existing foul water system in Area A

Existing discharge pipe

Existing foul water receptacle

Discharge route down field from receptable (near base of tree)

Initial discharge at bottom of field before passing under a track

Discharge passing under the track

Final discharge into tributary of the Dulas Brook

Proposed development

To augment the existing facilities and developments on Site it is proposed to construct a Moto X Experience Centre, including car parking, access and landscaping (Area A). A total of 6 residential log cabins / pods and a larger log cabin are proposed including associated parking, access and landscaping (Area B).

The proposals seek to provide new buildings associated with the existing Moto X track which provide a more formal arrangement as an ongoing commercial use.

There will be up to 20 users (riders) a day for the majority of the time the facility is operational. It is anticipated that at other times of the year (14 events – 'race days' and 3 other events) there will be more usage of the site.

The development plans indicate the following arrangements and usage characteristics, which will be used to provide the proposed foul water drainage strategy.

Table 1 Area A – Moto X Experience Centre reception building and car parking

Facility	
Moto X Experience Centre reception building	
Car park	
Moto X bike wash area*	
Drainage feature	**Number of**
Sinks	6
Toilets	4
Showers	2
Compound (assumed to store fuel and other items)*	1

*Motorcycle washing will be undertaken in a dedicated area with no runoff into the environment and wash water will be recycled. It is also understood that any vehicle refueling and fuel storage undertaken on Site will be in a dedicated area with impermeable surfaces and appropriate mitigation measures in place to prevent fuels entering the environment or drainage systems in the event of a spill. As such these activities have not been specifically included in the drainage strategy for the Site.

Table 2 Area B - 1 Bed Log Cabins

Facility	
6 x Log Cabins access road and car parking	
Drainage feature	**Number of**
Sinks (kitchen and toilet)	12
Toilets	6
Showers	6

Table 3 Site B - 2 Bed Log Cabin

Facility	
1 x Log Cabin car parking and access	
Drainage feature	**Number of**
Sinks (Kitchen and toilet)	3
Toilets	2
Showers	2

4. Flows, loads and runoff volumes

The existing and proposed flows, loads and runoff volumes have been calculated for foul water to ensure these are managed effectively as part of the development over its lifetime.

Existing foul discharge volume (loading)

The British Water Code of Practice 4 Flows and Loads (Sizing Criteria, Treatment Capacity for Sewage Treatment Systems) document has been used to confirm the most likely usage volumes associated with the existing development for an average day to day scenario and for a 'Race Day' scenario, when the maximum number of occupants are envisaged to be using the Site. It is assumed for the purposes of the existing scenario calculations that the number of toilets already in use are the same as that which is proposed.

Existing 'Average Day' scenario

Table 4 Existing average day scenario daily discharge volumes

Area	Daily Discharge volumes (m^3)
Area A	10 l per toilet x 20 people x 2 uses /d = 400 l/d (0.4 m^3 /d)
Area B	No foul discharge volumes
Total	400 l/d (0.4 m^3 /d)

Existing 'Race Day' scenario

For the purposes of this report, and as the proposals provide 50 parking spaces to cater for the existing demand, the anticipated occupancy rate[1] of 1.58 per car will be added to the 'Average Day' Scenario to calculate the most likely occupancy for the 'Race Day' Scenario.

Table 5 Existing Race day scenario daily discharge volumes

Area	Daily Discharge volumes (m^3 per day)
Area A	10 l per toilet x 99 people x 2 uses p/d = 1,980 l/d
Area B	No foul discharge volumes
Total	1,980 l/d (1.98 m^3 /d)

[1] https://www.eea.europa.eu/data-and-maps/indicators/occupancy-rates-of-passenger-vehicles/occupancy-rates-of-passenger-vehicles

"The rate of car occupancy continues to decline, but at a slower rate than during the 1980s and 1990s. The most recent data for the average number of passengers per car (including the driver) for the countries sampled is approximately 1.45 passengers per vehicle (in the UK - 1.58; Germany - 1.42 and Netherlands - 1.38 passengers accordingly) (see Figure 1). Possible reasons for this include the greater individualisation of society, reflected by the decline in household sizes, and the increase in car ownership. The data is limited to a few countries, but the trend is likely to be representative of the whole EU."

Proposed Foul discharge volume (loading)

The British Water Code of Practice 4 Flows and Loads (Sizing Criteria, Treatment Capacity for Sewage Treatment Systems) document has been used to confirm the most likely usage volumes associated with the proposed development for an average day to day scenario and for a 'Race Day' scenario, when the maximum number of occupants are envisaged to be using the Site.

Proposed 'Average Day' scenario

Table 6 Proposed average day scenario daily discharge volumes

Area	Daily Discharge volumes (m^3)
Area A	40 l per shower x 20 people = 800 l/p/d 10 l per toilet x 20 people x 2 uses p/d = 400 l/p/d **Total: 1,200 l/p/d (1.2 m^3 per day)**
Area B	150 l x 2 per 1 bed lodge x 6 (camping pod) = 1,800 l/p/d 150 l x 4 per 2 bed lodge x 1 = 600 l/p/d **Total: 2,400 l/p/d (2.4 m^3 per day)**
Total 'Average Day' scenario volumes	3,600 l (3.60 m^3 per day)

Proposed 'Race Day' scenario

For the purposes of this report, and as the proposals provide 50 parking spaces, the anticipated occupancy rate[2] of 1.58 per car will be added to the 'Average Day' Scenario to calculate the most likely occupancy for the 'Race Day' Scenario.

[2] https://www.eea.europa.eu/data-and-maps/indicators/occupancy-rates-of-passenger-vehicles/occupancy-rates-of-passenger-vehicles

"The rate of car occupancy continues to decline, but at a slower rate than during the 1980s and 1990s. The most recent data for the average number of passengers per car (including the driver) for the countries sampled is approximately 1.45 passengers per vehicle (in the UK - 1.58; Germany - 1.42 and Netherlands - 1.38 passengers accordingly) (see Figure 1). Possible reasons for this include the greater individualisation of society, reflected by the decline in household sizes, and the increase in car ownership. The data is limited to a few countries, but the trend is likely to be representative of the whole EU."

Table 7 Proposed Race day scenario daily discharge volumes

Area	Daily Discharge volumes (m^3)
Area A	40 l per shower x 99 people = 3,960 l/p/d (this is a worst case, as it is unlikely that all visitors would have a shower) 10 l per toilet x 99 people x 2 uses p/d = 1,980 l/p/d **Total: 5,940 l/p/d (5.94 m^3 per day)**
Area B	150 l x 2 per 1 bed lodge x 6 (camping pod) = 1,800 l/p/d 150 l x 4 per 2 bed lodge x 1 = 600 l/p/d **Total: 2,400 l/p/d (2.4 m^3 per day)**
Total 'Race Day' scenario volumes	8,340 l (8.34 m^3 per day)

Table 8 Proposed change in daily discharge volumes between existing and proposed scenarios

Area A	Change in daily discharge volumes (m^3) from existing to proposed*
Average day	Proposed (1.2) minus Existing (0.4) = (+) 0.8 m^3 per day
Race day	Proposed (5.94) minus Existing (1.98) = (+) 3.96 m^3 per day
Area B	
Average day	Proposed (2.4) minus existing (0.0) = (+) 2.4 m^3 per day
Race day	Proposed (2.4) minus existing (0.0) = (+) 2.4 m^3 per day

* The (+) denotes an increase in foul discharge above the existing system.

Summary of foul flows

In summary the proposed daily discharge from Area A will be variable depending on the use and will range from 1.2 to 5.94 m^3 per day.

The daily discharge rate from Area B should be less variable, assuming full occupancy and will be 2.4 m^3 per day.

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