Cambois Data Centre Campus

Proposed Drainage Strategy Phase 1

Renaissance Land Limited

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Executive summary

This report provides responses to planning conditions 25, 34 and 40 for the Phase 1 of the data centre campus.

Contents

1.0

Introduction

1.0 Introduction

Reserved Matters Application for (access, appearance, landscaping, layout and scale) pursuant to outline planning permission 24/04112/OUTES, for two data centre buildings, ancillary office space (Use Class E(g)(ii)), and associated landscaping and infrastructure on Phase 1 of the data centre campus.

This report provides responses to planning conditions 25, 34 and 40 for the Phase 1 of the data centre campus.

2.0

Conditions

2.0 Conditions

2.1 Condition 25

2.1.1 Condition Wording

Prior to any phase of the development, as defined by the approved Phasing Plan under Condition 13 of this permission that is adjacent to the public highway being brought into use, details of surface water drainage to manage run off from private land within that phase onto the public highway shall be submitted to and approved in writing by the Local Planning Authority. The approved surface water drainage scheme for that phase shall be implemented in accordance with the approved details before that phase of the development is occupied and thereafter maintained in accordance with the approved details.

2.1.2 Response

The development in Phase 1 does not change the runoff from private land to public highway.

2.2 Condition 34

2.2.1 Condition Wording

"When submitting Condition 34 for future phases, the applicant must:

• Provide hydraulic calculations detailing what will be drained upon completion of the future phase.

• Include a cross-section of the Cow Gut Pond confirming the top water level.

• Confirm the discharge rate following construction of the phase in question (e.g., Phase A is 43.1 l/s; Phase B would be XXX l/s)"

2.2.2 Response

2.2.2.1 Provide hydraulic calculations detailing what will be drained upon completion of the future phase.

Please refer to Appendix E and Appendix F for the hydraulic modelling calculations.

The extent of these models is shown in *Figure 2-1.*

	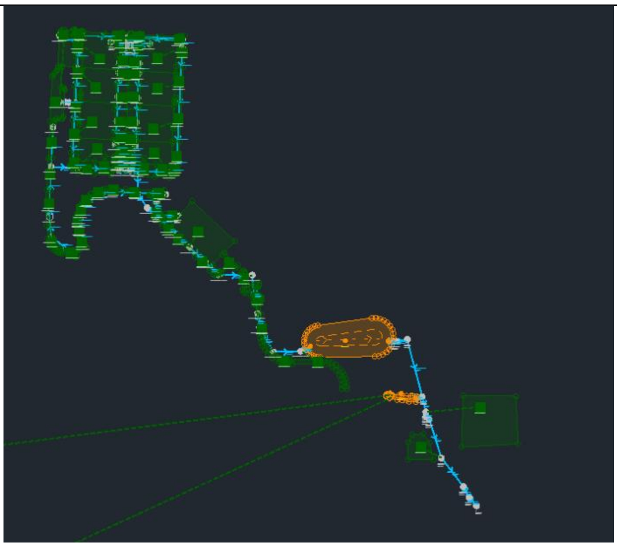
RMAP1 Full Site Drainage 250814	RMAP1 Phase 1 Drainage 250814

Figure 2-1 Extent of surface water drainage models

In addition to the hydraulic calculations, the Simple Index Approach as per the SuDS manual has been used to verify the water treatment regime for phase 1 works. Different surface water treatment techniques have been used in different areas of the site, illustrated in *Figure 2-2*.

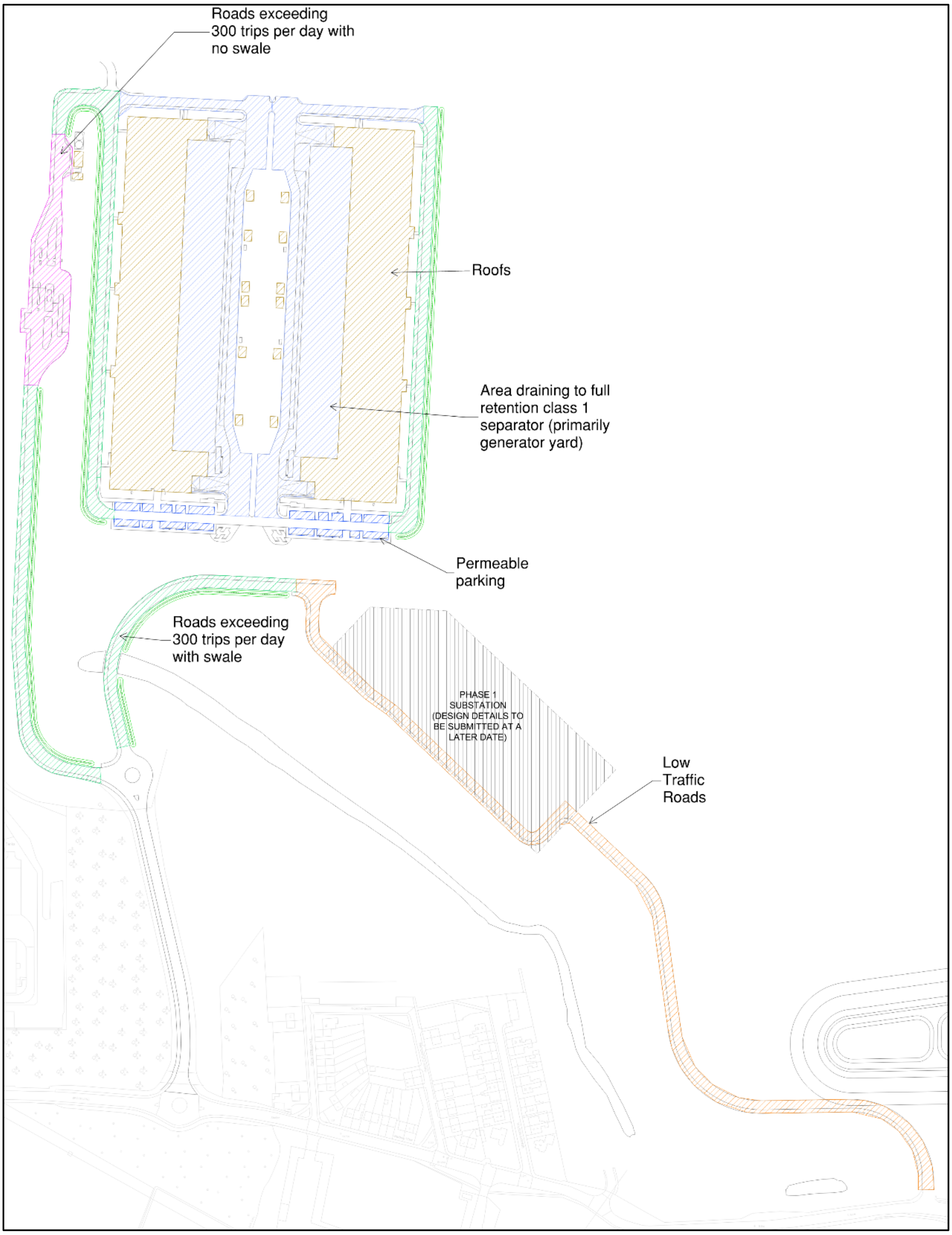

Figure 2-2 Surface water treatment types

The different treatment regimes are discussed below;

Roads – Exceeding 300 trips per day, with swales

On roads with greater than 300 trips per day, a swale has been used where practicable. See *Table 2-1* for the simple index approach summary, demonstrating that this provides a sufficient level of treatment.

Pollution Hazard Index for the Runoff Area discharging to the proposed SuDS Scheme		
	Hazard Level	Pollution Hazard Indices

Runoff Area Land Use Description		Suspended Solids	Metals	Hydrocarbons
Roads (Excluding low traffic roads)	Medium	**0.7**	**0.6**	**0.7**
Pollution Mitigation Index for the proposed SuDS components				
SuDS Component Description		Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons
Swale		0.5	0.6	0.6
Pond or Wetland		0.7	0.7	0.5
Aggregated Surface Water Pollution Mitigation Index		**0.85**	**0.95**	**0.85**
Sufficiency of Pollution Mitigation Indices				
		Suspended Solids	Metals	Hydrocarbons
		Sufficient	**Sufficient**	**Sufficient**

Table 2-1 SIA Summary for roads (>300 trips per day) with swales

Roads – Exceeding 300 trips per day, no swale

Where there are roads that exceed 300 trips per day, but a swale is not practical – namely at the area around the guard house, a hydrodynamic vortex separator is to be used as treatment in place of a swale. A hydrodynamic vortex separator with the following mitigation indices will be specified;

TSS – 0.5

Metals – 0.4

Hydrocarbons – 0.5

Pollution Hazard Index for the Runoff Area discharging to the proposed SuDS Scheme				
Runoff Area Land Use Description	Hazard Level	Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons
Roads (Excluding low traffic roads)	Medium	**0.7**	**0.6**	**0.7**
Pollution Mitigation Index for the proposed SuDS components				
SuDS Component Description		Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons
Hydrodynamic vortex separator		0.5	0.4	0.5
Pond or Wetland		0.7	0.7	0.5
Aggregated Surface Water Pollution Mitigation Index		**0.85**	**0.75**	**0.75**
Sufficiency of Pollution Mitigation Indices				
		Suspended Solids	Metals	Hydrocarbons
		Sufficient	**Sufficient**	**Sufficient**

Table 2-2 SIA Summary for roads (>300 trips per day) without swales

Low Traffic Roads

On roads where there are fewer than 300 trips per day, the surface water discharges through the gravity network to the attenuation pond. Refer to *Table 2-3* for a summary of the simple index approach, demonstrating that this approach provides a sufficient level of treatment.

Pollution Hazard Index for the Runoff Area discharging to the proposed SuDS Scheme				
Runoff Area Land Use Description	Hazard Level	Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons
Low Traffic Roads	Low	**0.5**	**0.5**	**0.4**
Pollution Mitigation Index for the proposed SuDS components				
SuDS Component Description		Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons
Pond or Wetland		0.7	0.7	0.5
Aggregated Surface Water Pollution Mitigation Index		**0.7**	**0.7**	**0.5**
Sufficiency of Pollution Mitigation Indices				
		Suspended Solids	Metals	Hydrocarbons
		Sufficient	**Sufficient**	**Sufficient**

Table 2-3 SIA Summary for low traffic roads (<300 trips per day) with swales

Area draining to full retention class 1 separator (primarily generator yard)

At the generator yards, there will be fuel deliveries. The fuel tanks will be integrally bunded for secondary containment. Surface water from the yards will be discharged to the gravity drainage network and discharged to a full retention class 1 separator with the following mitigation indices;

TSS – 0.8

Metals – 0.6

Hydrocarbons – 0.9

Refer to *Table 2-4* for the simple index approach summary for the generator yard, demonstrating that this level of treatment is sufficient.

Pollution Hazard Index for the Runoff Area discharging to the proposed SuDS Scheme				
Runoff Area Land Use Description	Hazard Level	Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons
Generator Yard	High	**0.8**	**0.8**	**0.9**
Pollution Mitigation Index for the proposed SuDS components				
SuDS Component Description		Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons

Full retention class 1 separator	0.8	0.6	0.9
Pond or Wetland	0.7	0.7	0.5
Aggregated Surface Water Pollution Mitigation Index	**>0.95**	**0.95**	**>0.95**
Sufficiency of Pollution Mitigation Indices			
	Suspended Solids	Metals	Hydrocarbons
	Sufficient	**Sufficient**	**Sufficient**

Table 2-4 SIA Summary for Generator Yard

Roofs

Roofs will discharge to the gravity drainage network and discharge to the attenuation pond.

Pollution Hazard Index for the Runoff Area discharging to the proposed SuDS Scheme				
Runoff Area Land Use Description	Hazard Level	Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons
Commercial roofing with low potential for metal leaching	Low	**0.3**	**0.4**	**0.05**
Pollution Mitigation Index for the proposed SuDS components				
SuDS Component Description		Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons
Pond or Wetland		0.7	0.7	0.5
Aggregated Surface Water Pollution Mitigation Index		**0.7**	**0.7**	**0.5**
Sufficiency of Pollution Mitigation Indices				
		Suspended Solids	Metals	Hydrocarbons
		Sufficient	**Sufficient**	**Sufficient**

Table 2-5 SIA Summary – Roofing

Permeable Parking

Refer to Table 2-6 for the simple index approach summary for the permeable parking.

Pollution Hazard Index for the Runoff Area discharging to the proposed SuDS Scheme				
Runoff Area Land Use Description	Hazard Level	Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons
Roads (Excluding low traffic roads)	Medium	**0.7**	**0.6**	**0.7**
Pollution Mitigation Index for the proposed SuDS components				
SuDS Component Description		Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons

Pervious pavement (where the pavement is not designed as an infiltration component)	0.7	0.6	0.7
Pond or Wetland	0.7	0.7	0.5
Aggregated Surface Water Pollution Mitigation Index	**>0.95**	**0.95**	**0.95**
Sufficiency of Pollution Mitigation Indices			
	Suspended Solids	Metals	Hydrocarbons
	Sufficient	**Sufficient**	**Sufficient**

Table 2-6 SIA Summary - Permeable parking

2.2.2.2 Include a cross-section of the Cow Gut Pond confirming the top water level.

Please refer to detail sheet 3 in the appendix. Also refer to Figure 2-3.

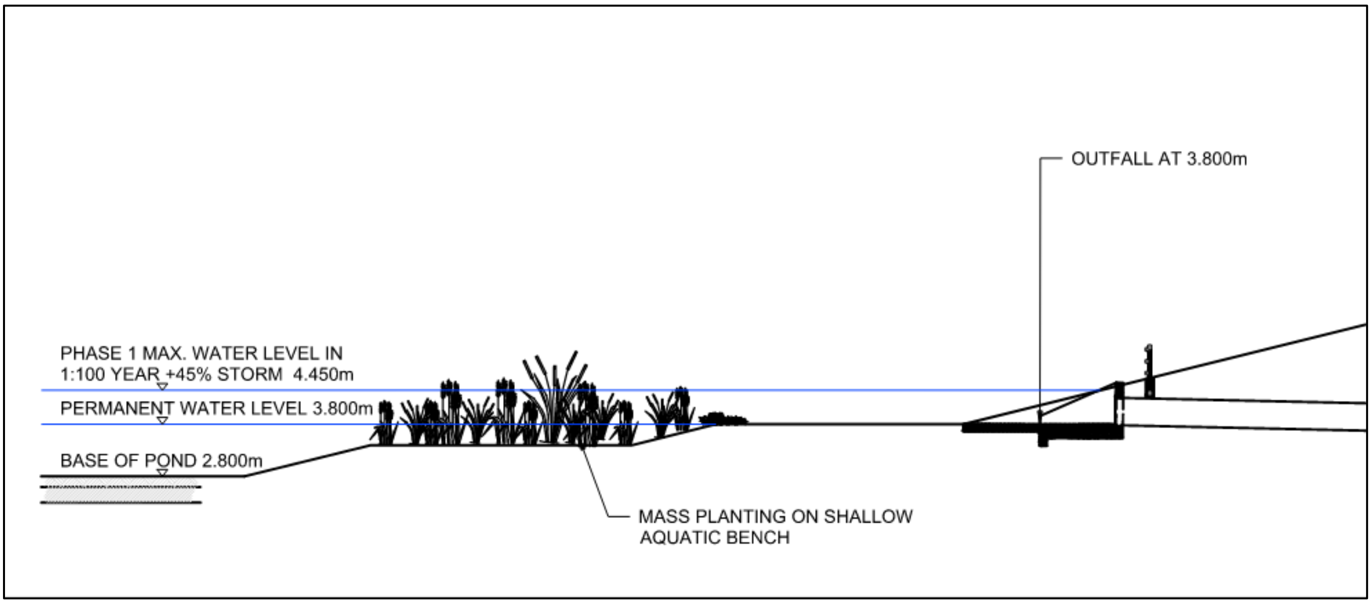

Figure 2-3 Maximum water level in Cow Gut Pond after Phase 1, 1 in 100 year +45% storm event

2.2.2.3 Confirm the discharge rate following construction of the phase in question

Two models have been prepared to ensure that discharge to the relevant watercourse is limited to the greenfield runoff flows for an equivalent catchment and return period. One model has been prepared for the full campus including future phases, and one for phase 1.

The results are summarised below

Full Campus including future phases

Table 2-7 shows the comparison between catchment areas (onsite and offsite) pre and post development, to the point at which Maw Burn and Cow Gut discharge from the site. These are the areas used in the infodrainage model. As per the table, and as a validation of the areas used in the model, the total catchment pre and post development are the same.

Catchment Area (ha)				
Existing				
	Offsite	Onsite		Total

Maw Burn	47.34	25.6		72.94
Cow Gut	52.65	76.6		129.25
Total				202.19
Proposed				
	Offsite	Onsite - Impermeable	Onsite - Permeable	Total
Maw Burn	47.34	12.67	12.93	72.94
Cow Gut	52.65	35.23	41.37	129.25
Total				202.19

Table 2-7 Comparison of catchment areas - full campus

Table 2-8 shows the discharge flows from the attenuation ponds to Maw Burn and Cow Gut for various return periods. In all instances, the discharge flow is limited to less than the greenfield flow for an equivalent catchment and return period.

Comparison of Greenfield Runoff		
Maw Burn		
Return Period (years)	Greenfield runoff for proposed onsite impermeable area (l/s)	Discharge flow from pond to watercourse (Proposed) (l/s)
1	47	16.1
10	79.3	24.2
30	95.7	28.5
100	113.7	35.5
100+45%		48.9
Cow Gut		
Return Period (years)	Greenfield runoff for proposed onsite impermeable area (l/s)	Discharge flow from pond to watercourse (Proposed) (l/s)
1	130.5	77.4
10	220	94.3
30	265.6	103.7

100	315.7	148.8
100+45%		235.1

Table 2-8 Comparison of Greenfield Runoff - Full Campus

Phase 1

Table 2-9 shows a comparison of catchment areas discharging to Cow Gut, pre and post development, for phase 1 only. These are the areas modelled in infodrainage. As per the table, and as a validation of the areas used in the model, the pre and post development total catchment area is the same.

Catchment Area (ha)				
Existing				
	Offsite	Onsite		Total
Cow Gut	52.65	76.6		129.25
Total				129.25
Proposed				
	Offsite	Onsite - Impermeable	Onsite - Permeable	Total
Cow Gut	52.65	12.23	64.37	129.25
Total				129.25

Table 2-9 Comparison of catchment areas - phase 1

Table 2-10 shows the discharge to Cow Gut, pre and post development. As per the table, flows are restricted to less than the equivalent greenfield runoff for the same catchment area and return period.

Comparison of Greenfield Runoff		
Cow Gut		
Return Period (years)	Greenfield runoff for proposed onsite impermeable area (l/s)	Discharge flow from pond to watercourse (Proposed) (l/s)
1	45.3	29.6
10	76.4	33.6
30	92.2	35.9
100	109.6	38.9
100+45%		44.7

Table 2-10 Comparison of Greenfield Runoff - Phase 1

2.3 Condition 40

2.3.1 Condition Wording

Development shall not commence beyond any enabling works, until a detailed scheme for the disposal of foul water from the development hereby approved has been submitted to and approved in writing by the Local Planning Authority in consultation with Northumbrian Water and the Lead Local Flood Authority. Thereby the development shall take place in accordance with the approved details.

2.3.2 Response

2.3.2.1 Proposed point of discharge

Foul water is proposed to discharge to Manhole 4705 on the 525mm diameter combined sewer close to the wastewater treatment works. Refer to appendix D for the relevant NWL planning enquiry response.

2.3.2.2 Proposed foul water regime

There are two separate foul drain runs from each building – a domestic foul run, and a run picking up gullies in the building (referred to as proposed foul water sewer - sprinkler).

The domestic drain picks up foul drainage from toilets, sinks and showers. The other drain line, referred to as “Proposed foul water sewer- Sprinkler” on the drainage plan, picks up gullies inside the datacentre. The primary function of these gullies is to drain the sprinkler water in the building, in the event of a fire. Additionally, in the event of a leak of the internal cooling system, there is a risk of ethylene glycol being discharged to the gullies. In normal day to day use these gullies may also be used to drain away water when cleaning floors.

The domestic foul water lines and sprinkler foul water lines are kept separate, until they reach a pumping station where these lines combine and are discharged off site. On the sprinkler line, and upstream of the pumping station, there is an actuated valve. In the event of a fire or a rupture in the cooling system, the valve will be closed to prevent discharge to the pump station and off-site. Water in this drainage system is then attenuated in buried storage. Once the fire or leak has been resolved, the water in the tanks can be disposed of.

Refer to Figure 2-4 for an outline of the foul water drainage strategy

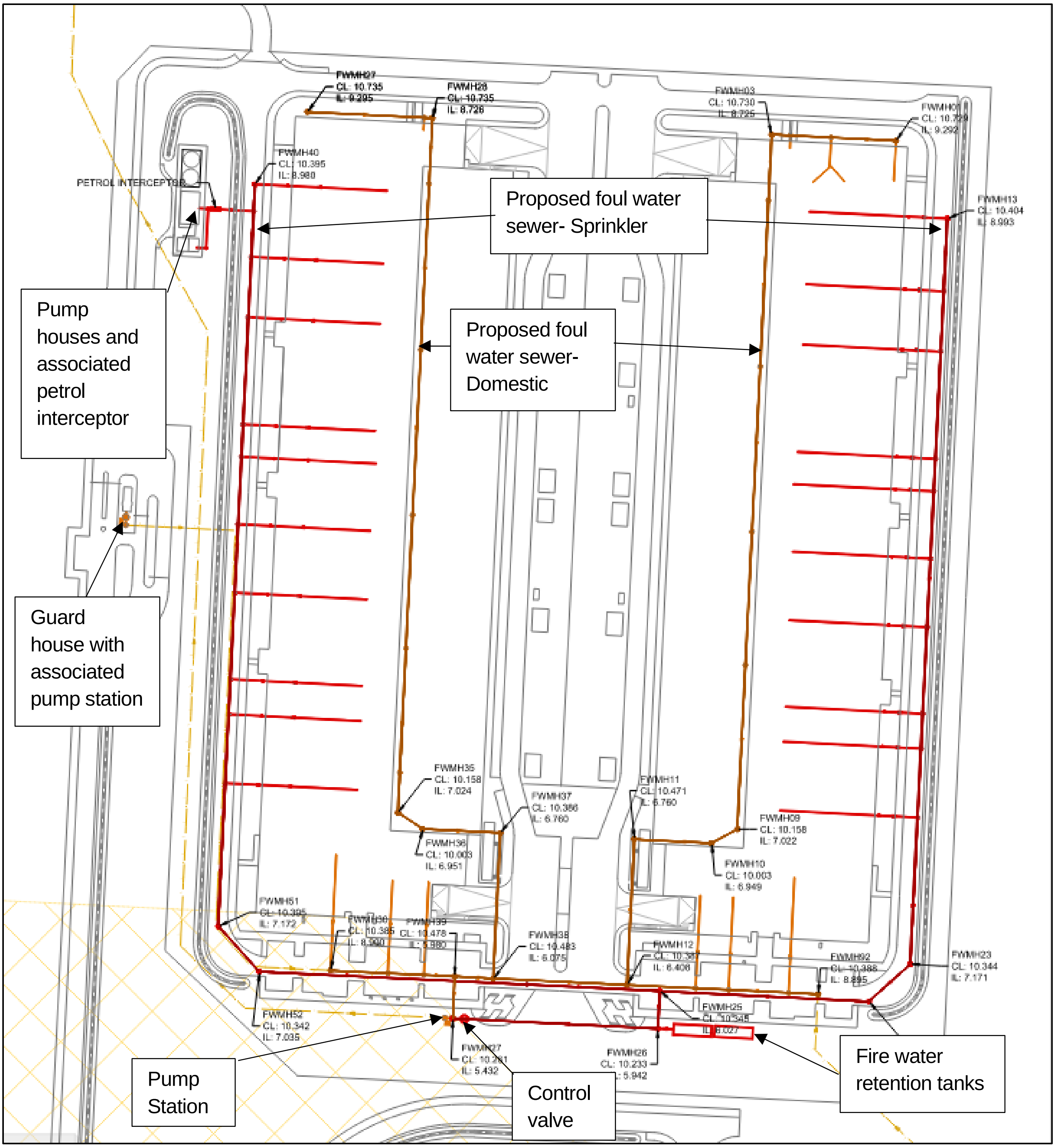

Figure 2-4 Foul Water Drainage Strategy

2.3.2.3 Fire Water Retention Tanks

The buried attenuation tanks have been sized, considering two different scenarios;

1. In the event of a fire; There are storage tanks on the campus dedicated to supplying the hydrant and sprinkler network. These tanks provide 360m³ of storage. For the sprinklers, these will discharge at a flow of 1350 L/min (22.5L/s), and will continue to do so until the water supply is exhausted. If there was to be no intervention on the

sprinkler system and no use of the local hydrant network, then the sprinkler system can theoretically discharge the entire 360m³ capacity.

2. In the event of a failure of the cooling system, up to 100m³ of 25% ethylene glycol could drain to the gullies.

On this basis, the attenuation tanks are sized at 360m³, to ensure they provide sufficient storage for both scenarios.

2.3.2.4 Guardhouse

There is a toilet at the guardhouse. To avoid increasing the depth of the foul drainage network to pick this up, there is a pump station to pick up the drainage from the guardhouse, and this discharges to the gravity drainage network before being pumped off site.

2.3.2.5 Pump House Complex

There is an internal gully inside a pump room to the pump house complex. There is fuel storage inside this building, and as such the gully drains through a petrol interceptor prior to discharge to the foul water network.

Appendices

Appendices

Appendix A Drainage Plans

Appendix B Drainage Details

Appendix C Greenfield Runoff Calculations

Appendix D Communications with Northumbrian Water

Appendix E Infodrainage Results – Full Campus

Appendix F Infodrainage Results – Phase 1

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