SHEAR design
Consulting Civil and Structural Engineers

CIVIL ENGINEERING SERVICES

DRAINAGE TECHNICAL NOTE

YSGOL GYMRAEG BRO MORGANNWG (YGBM)
COLCOT ROAD
BARRY

Date: 28th January 2019
Ref: 18136-SDL-00-XX-RP-C-00100 P1

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Issue	Prepared by	Checked by	Date
P1	DKK	MJ	28th January 2019

1.0 INTRODUCTION

Shear Design Limited (SDL) have been appointed by ISG Plc to undertake a Civil and Structural Engineering Services at Ysgol Gymraeg Bro Morgannwg (YGBM), Colcot Road, Barry. The main client for the scheme is the Vale of Glamorgan (VoG).

This Drainage Technical Note has been prepared as a supplementary document to the planning application and is intended to provide a technical overview the existing drainage infrastructure and to identify a sustainable solution for the proposed surface and foul water drainage.

The proposed development is for the renovation of Ysgol Gymraeg Bro Morgannwg, including both remodelling and new build, to expand the school by 300 pupils from its existing capacity.

The existing secondary school will undergo dramatic change involving the demolition of several buildings, the introduction of new buildings and sports facilities.

It is expected that during detailed design minor amendments to proposed catchments will occur and so precise discharge rates and volumes of storage may vary.

2.0 DRAINAGE AND FLOOD RISK

2.1 Existing Drainage

Existing Surface Water Drainage

A complete survey of the existing school drainage is still underway at the time of writing however a review of the available school information, as well as existing surface water drains, has been completed.

The site drains to surface water outfall/s in the south west corner of the site.

There is a 300mm surface water sewer that passes through the site from north to south which appears to serve Whitmore High School to the north of the site. The 300mm drain runs under the existing school and across the sports pitches before leaving the site in the south. Although this sewer is not currently shown on Welsh Water sewer records it may have been transferred over in October 2011 and further investigations are being undertaken to establish this status.

There also appears to be a 150mm surface water sewer, installed to drain the car park and access road drainage at the east of the site. This drain passes via an attenuation system and along the southern boundary of the site, before leaving the site in the south west corner of the site.

Within the site there are already pitch drainage and attenuation tank arrangements. The design drawings of some of these systems have been provided and further surveys are underway to confirm the network for detailed design purposes.

Infiltration testing has been carried out on part of the site but further testing has been commissioned for areas not previously tested. Following completion of these test the potential to use soakaways shall be investigated.

Existing Foul Water Drainage

The school foul water drainage is a gravity system to a foul water pumping station located on the southern boundary with the primary school. This pumping station lifts foul sewage beyond the site boundary and it is believed that the rising main heads north west and passes through the hospital site, however the precise route or outfall point is not known with certainty.

2.2 Proposed Surface Water Drainage

Refer to drawing no. 18136-SDL-00-XX-DR-C-SK200P2 for preliminary drainage proposals.

Detailed design is subject to additional, ongoing CCTV surveys, Soakaway testing and landscape proposals however design principles have been established.

This project is being delivered under the new January 2019 Sustainable urban drainage Approval Body (SAB) regulations as dictated by Schedule 3 of the Flood and Water Management Act 2010.

It is proposed to ensure that all surface water runoff from previously undeveloped areas is limited to greenfield runoff rates. Proposed areas of hardstanding that were previously also hardstanding will be considered as brownfield runoff and where possible a 30% betterment over existing flows shall be implemented.

The reuse the existing drainage network will be required in some areas.

It is also proposed to divert the existing 300mm diameter surface water sewer that runs from north to south around the proposed sports hall to avoid building over it. Should it be found that this existing drainage is part of Welsh Water asset then it is likely that a Section 185 Agreement will be required.

<u>Proposed Surface Water Drainage Catchments</u>

- **Bus drop up and pick up loop**
  Located on part of the existing playing field of Whitmore School northwest of the site and be constructed as an impermeable macadam surface with a positive drainage system and appropriate pollution control. A Class 1 fuel and oil bypass separator is proposed with a connection into a sub-surface attenuation tank before connection to a new SuDS conveyance and storage swale system at a controlled rate.

- **3G Sports Pitch**
  Located on the existing school playing field at the western side of the site and shall be designed in accordance with source control principles, and will contain a sub-surface drainage and storage system with flow control prior to discharge into to a new SuDS conveyance and storage swale

system at greenfield rates. Soakaway testing is underway in the area of the 3G pitch and if favourable a soakaway solution will be developed in preference to a controlled discharge.

- **New buildings and associated external areas – excluding the DT unit**
  The new buildings consist of a Sports Hall, IT and Business Studies block, offices, circulation areas and new entrance placed predominantly along the southern line of the existing school building which will be built on either the existing building footprint or external hard surfaced areas. Drainage shall be via a new gravity system a new SuDS compliant swale and ditch system. Flow from the new buildings and the external areas will be limited to ensure a 30% betterment on existing flows.

- **DT unit and external dining area**
  Located on the existing macadam staff car park the DT unit will be an extension from the north east corner of the building. The external dining area will be formed on the existing macadam area in front of the current school main entrance. It is difficult to incorporate the drainage into the SuDS system so a new attenuation tank is proposed under the adjacent external dining area. Flow from the new unit and the external dining area will be limited to ensure a 30% betterment on existing flows.

- **Multi-use Games Area (MUGA)**
  Located on the existing playing field south of the school building the MUGA will have a macadam impermeable surface which will be positively drained by gullies and drainage channels. The drainage will outfall into the swale/pond system at an uncontrolled rate for storage within the surface water swale features.

- **Car park extension**
  The existing gravel area is proposed to be surfaced by macadam and drained by gravity into the existing drain that runs along the southern boundary at greenfield runoff rate or as close to it as possible. According to record drawings provided by VoGCC there is an existing attenuation tank in this area. This area is also envisaged as the site compound area and so a precise location of this tank will need to be ascertained.

2.3 Proposed Foul Water Drainage

It is proposed to utilise parts of the existing foul drawing within the site (subject to repairs) to convey the new foul water drainage from the development.

New foul drainage runs are proposed to serve the new blocks and a foul drain will run from the proposed sports hall to the location of a new foul water pumping station.

Both the secondary school and the newer primary school are served by foul water pumping stations. The primary school pumping station has been inspected and appears to be serviceable; the rising main from this pumping station discharges across the primary school play area and car park and into a second foul water pumping station that serves both schools.

The existing secondary school currently has 1,133 pupils enrolled with a permitted capacity of 1,361 pupils and it is proposed to enrol 1,660 pupils, of which 250 are sixth form.

The existing staff numbers are a total of 91.

At a rate of 90 litres per person per day this increase in numbers represents a foul flow increase of circa 1.9l/s peak flow from 9.07 to 10.03l/s and an increase in volume from 130m^3 to 160m^3 per day.

In addition to this there is the existing base flow from the primary school which at circa 200 pupils represents a total combined proposed peak flow into the pumping station of 12.2 l/s and a volume of 175m^3 per day.

The exact size of the existing secondary school pumping station is now know but based on Aecom records a wet well volume of about 17.5m^3 can be considered unsatisfactory.

Based on existing school pupil and staff numbers of about 1300 this would convert to about 120m^3 of waste and which is about 3.5 hours storage, and on proposed numbers only 2.5 hours storage before the system overflows.

It is proposed to build a new pumping station on site, likely adjacent to the existing pumping station. This new pumping station would be fitted with new pumps and a new rising main would be installed to connect to a suitable DCWW asset.

The existing pumping station pumps and wet well will remain in situ and be used as additional storage. The 17.5m^3 provided along with 25m^3 new storage in the proposed pumping station will provide 6 hours of storage in the event of a pump or power failure.

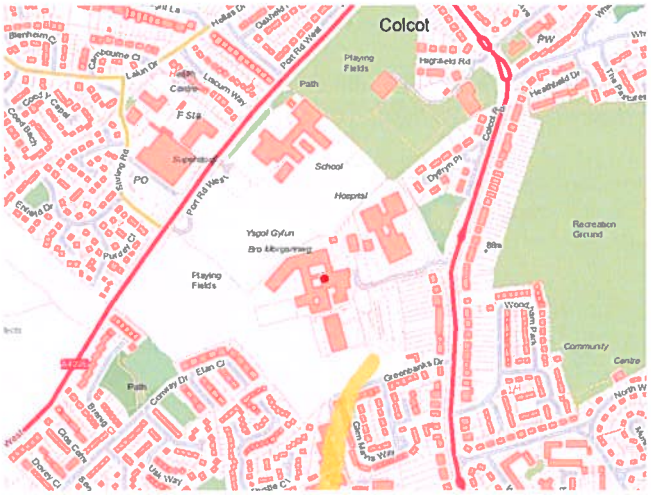
A new route been proposed to connect to a sewer in Colcot Road into the sewer in the current school access road, the formal consent of this is being sought from Welsh Water.

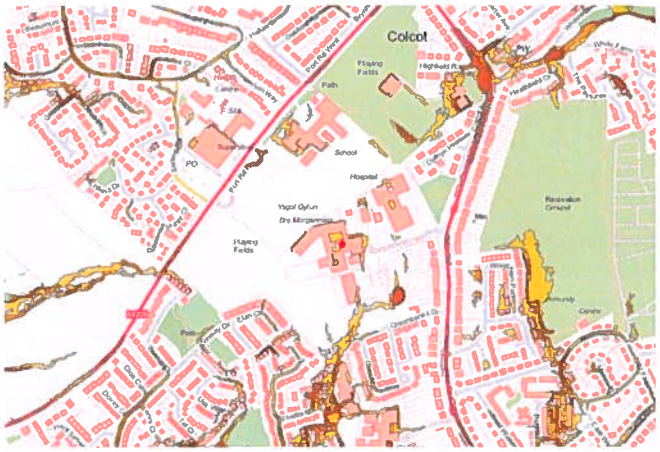
The existing school is served by a foul drainage network that is in defective condition in some locations and ground water ingress to the foul pipes is likely. This surface water flow will compromise the available storage in the pumping station and so a schedule of remedial works to the existing drains will be developed to improve the existing system.

2.4 Flood Risk

As reported in the Aecom Stage 2 report the Development Advice Map (DAM) presented on the Natural Resources Wales (NRW) website, shows that the entire site is located in DAM Zone A, with the exception of a small area on the southern site boundary which is located within DAM Zone B. Areas located in DAM Zone A are classified as being at little or no risk of fluvial or coastal/ tidal flooding. Areas located within DAM Zone B are classified as areas known to have been flooded in the past evidenced by sedimentary deposits. As the risk of flooding from rivers or seas is classified as low, the principal consideration of the FCA is surface water management and cross reference with the Natural Resources Wales (NRW) flood mapping identifies this area as overland surface water flow.

Surface water drainage proposals are identified above.





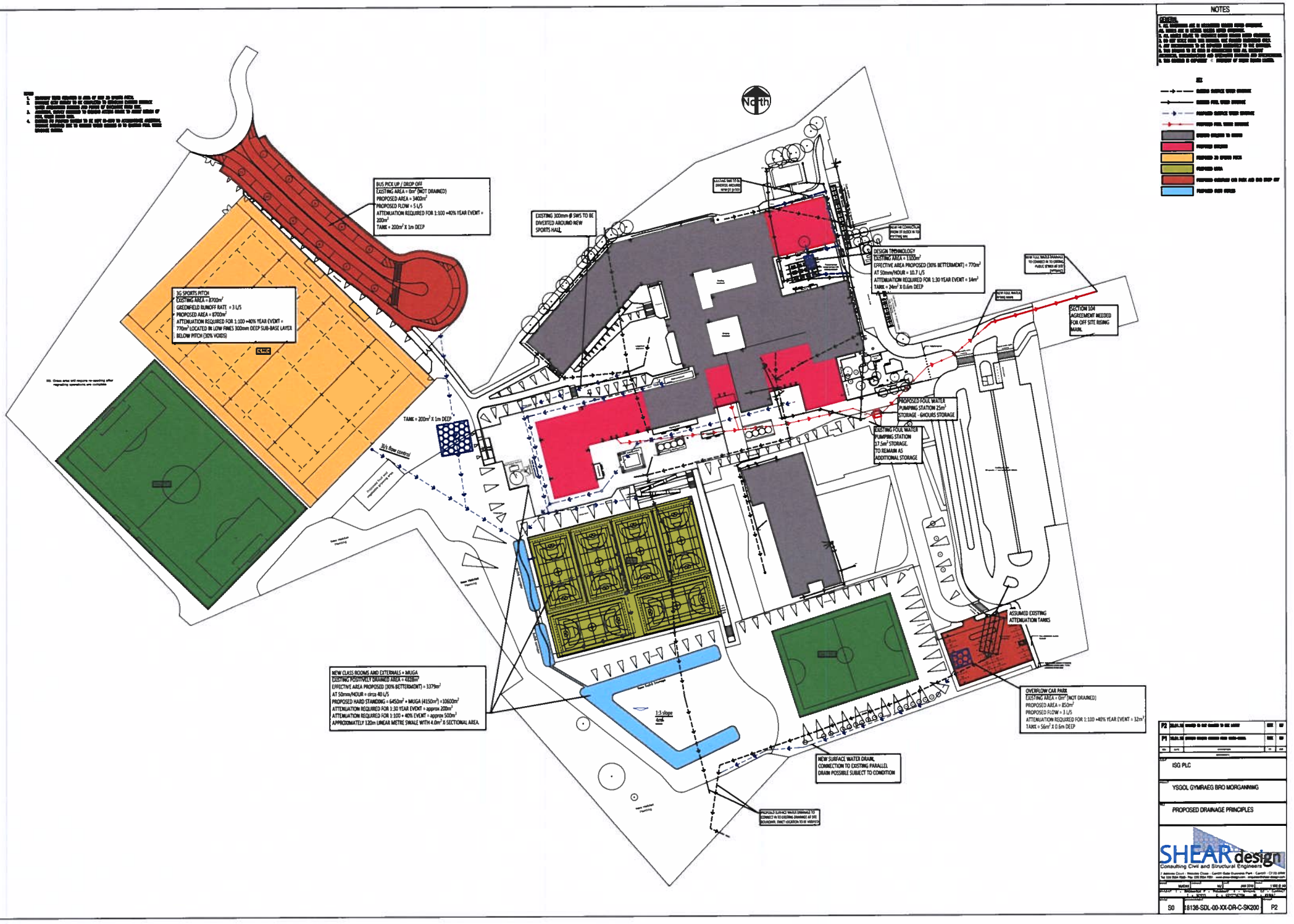
Flood risk from other sources has also been considered in the stage 2 report and work completed during stage 3 has not identified any change to this risk, which is summarised below.

Flood Source	Presence	Notes
Fluvial (River)	x	**Low risk.**
Tidal (Sea)	x	**Low risk.**
Canals	x	**Not Present**
Groundwater	x	**Low risk.**
Sewers	✓	**No evidence of flooding – Low risk. Some on site difficulties with existing pumping station surcharging but this does not constitute a significant flood risk and improvements are planned as part of the work.**
Reservoirs	x	**Not Present**
Pluvial (Rain)	✓	**There is an area of flood risk near the south and south east of the site, which appears to correlate to a localised low point which attracts surface water flow.** **This is likely attributable to natural runoff across the low areas of the site and is an existing condition that will be improved by the design proposals.**
Development Drainage	✓	**All new proposed hardstanding will be flow limited to greenfield rates, brownfield areas that are currently hardstanding and will be redeveloped will, where possible, be enhanced so as to offer 30% betterment on peak flows off site.**

Flood Risk Summary

APPENDIX

i) Preliminary Drainage Proposals Drawing


NOTES
North
BUS PICK UP / DROP OFF
EXISTING AREA = 0m² (NOT DRAINED)
PROPOSED AREA = 3400m²
PROPOSED FLOW = 5 l/s
ATTENUATION REQUIRED FOR 1:100 +40% YEAR EVENT = 200m³
TANK = 200m² X 1m DEEP
3G SPORTS PITCH
EXISTING AREA = 8700m²
GREENFIELD RUNOFF RATE = 3 l/s
PROPOSED AREA = 8700m²
ATTENUATION REQUIRED FOR 1:100 +40% YEAR EVENT = 770m³ LOCATED IN LOW FINES 300mm DEEP SUB-BASE LAYER BELOW PITCH (30% VOIDS)
EXISTING 300mm Ø SWS TO BE DIVERTED AROUND NEW SPORTS HALL
DESIGN TECHNOLOGY
EXISTING AREA = 1100m²
EFFECTIVE AREA PROPOSED (30% BETTERMENT) = 770m²
AT 50mm/HOUR = 10.7 l/s
ATTENUATION REQUIRED FOR 1:30 YEAR EVENT = 14m³
TANK = 24m² X 0.6m DEEP
SECTION 104 AGREEMENT NEEDED FOR OFF SITE RISING MAIN.
PROPOSED FOUL WATER PUMPING STATION 25m³ STORAGE - 6HOURS STORAGE
EXISTING FOUL WATER PUMPING STATION 17.5m³ STORAGE. TO REMAIN AS ADDITIONAL STORAGE
TANK = 200m² X 1m DEEP
30 l/s flow control
ASSUMED EXISTING ATTENUATION TANKS
NEW CLASS ROOMS AND EXTERNALS + MUGA
EXISTING IMPERVIOUS AREA = 4825m²
EFFECTIVE AREA PROPOSED (30% BETTERMENT) = 1379m²
AT 50mm/HOUR = circa 40 l/s
PROPOSED HARD STANDING = 6450m² + MUGA (4150m²) =10600m²
ATTENUATION REQUIRED FOR 1:30 YEAR EVENT = approx 200m³
ATTENUATION REQUIRED FOR 1:100 + 40% EVENT = approx 500m³
APPROXIMATELY 120m LINEAR METRE SWALE WITH 4.0m² X-SECTIONAL AREA.
1:3 slope
4m
OVERFLOW CAR PARK
EXISTING AREA = 0m² (NOT DRAINED)
PROPOSED AREA = 850m²
PROPOSED FLOW = 3 l/s
ATTENUATION REQUIRED FOR 1:100 +40% YEAR EVENT = 32m³
TANK = 56m² X 0.6m DEEP
NEW SURFACE WATER DRAIN, CONNECTION TO EXISTING PARALLEL DRAIN POSSIBLE SUBJECT TO CONDITION
P2
P1
ISG PLC
YSGOL GYMRAEG BRO MORGANNWG
PROPOSED DRAINAGE PRINCIPLES
SHEARdesign
Consulting Civil and Structural Engineers
S0
28138-SDL-00-XX-DR-C-SK200
P2