Hydrock now Stantec

Llantrisant Health Park

Drainage Strategy

For *MTX on behalf of Cym Taf Morgannwg University Health Board*

Date	*15 May 2025*
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Issued by	Hydrock Consultants Limited Wharton Place 13 Wharton Street Cardiff CF10 1GS United Kingdom	T +44 (0)2920 023 665 E cardiff@hydrock.com hydrock.com
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Prepared by		Stephanie Parry
Checked by		Meurig Hughes
Approved by		Chris Dolecki

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1. Introduction

Initially commissioned by Cwm Taf Morgannwg University Health Board to provide a drainage strategy report and preliminary design for the proposed redevelopment of the former British Airways Avionics Engineering for Llantrisant Health Park located at Ely Meadow, Talbot Green, Pontyclun. Hydrock now Stantec have subsequently been novated to the project delivery team which was awarded to MTX Contracts Ltd and will be part of the design team taking the project to construction and completion. This report is required to support the developments planning application and SAB approval submissions.

The objectives of the report are to;

- Review the existing drainage arrangements on site for both surface and foul water;
- Assess the feasibility of Sustainable Drainage Systems (SuDS) features within the development to control and discharge surface water runoff in line with the requirements of the statutory National Standards for Sustainable Drainage Systems;
- Assess the options for the disposal of foul water from the development; and
- Provide a preliminary design for surface water (SuDS) systems including indicative sizing of storage/attenuation features.

The following tasks have been undertaken to complete this report;

- A desktop investigation of the site's existing foul and surface water drainage arrangements;
- Outlining anticipated solutions for foul sewage disposal, and the sustainable management of surface water runoff. This includes preliminary calculations, in order that the conceptual designs may be agreed with the relevant authorities. In preparing the surface water drainage strategy, we have considered inundation of the floodplain and assessed flood levels in the location of proposed attenuation features;
- Determined the area of impermeable surfaces added by the proposed development and estimated the equivalent greenfield run-off rates for this area;
- Assessed the feasibility of using infiltration as a disposal method, based on available information for the ground and site conditions;
- Estimated the size of storm water storage needed to manage run-off from the site post-development, using industry standard drainage design software (MicroDrainage & Infodrainage);
- Identified areas of the site for SuDS and provided general information on their maintenance; and
- Given consideration to drainage exceedance. In particular, via the use topographic information to identify areas susceptible to surface water ponding or use as overland flow routes.

A number of sources of information have been used to compile this drainage strategy. Whilst Hydrock, now Stantec believe them to be trustworthy we are unable to guarantee the accuracy of the information that has been provided by others.

This report is based on information available at the time of preparation. Consequently, there is potential for further information to become available. These changes may lead to future alteration to the conclusions drawn in this report for which Hydrock Now Stantec cannot be held responsible.

2. Existing Site

2.1 Site Location

Figure 2-1 indicates the site location within the red circle, which is located at Ely Meadow, Talbot Green, Pontyclun, CF75 8XL (Approximate Grid Reference X- 303645, Y- 183587). ©OpenStreetMap contributors.

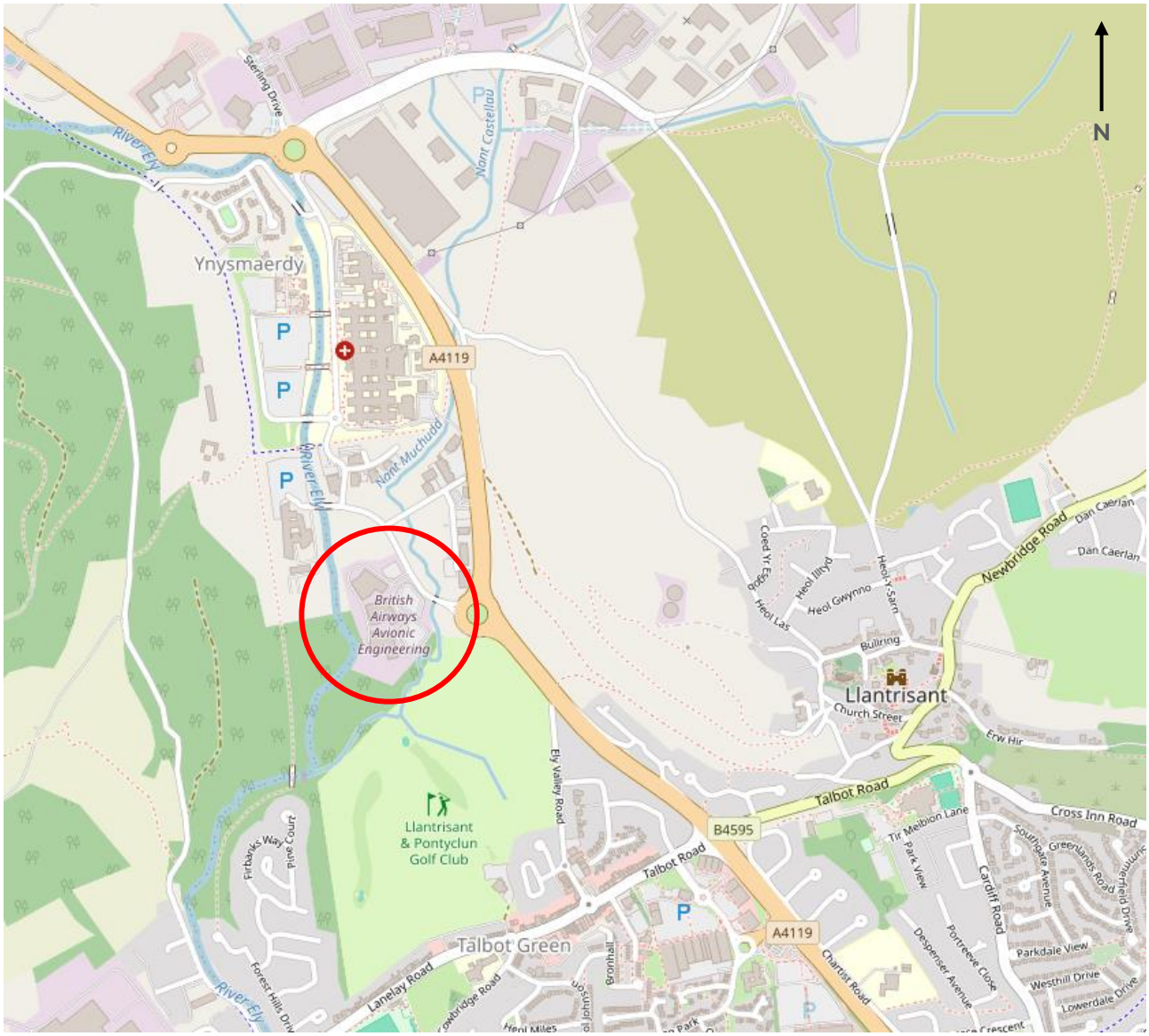

Figure 2-1: Site Location Plan

2.2 Site Description

The site is approximately 4 hectares (ha) in area and is a mix of brownfield and greenfield. The site currently houses the 3 former British Airways Avionics Engineering buildings with associated car parking, plant areas and greenfield space. It is anticipated all existing buildings within the development site will be demolished however the car parks and main access road are to be maintained for reuse.

To the north and west the site is bound by woodland with the Welsh Blood Service beyond, to the east is Heol Gwaun Eli road and to the south is Llantrisant and Pontyclun golf club. The site is situated on the confluence between the River Ely and the Nant Muchudd.

2.3 Flood Risk

From available mapping information, the majority of the site is located within Flood Zone 1, which is land defined as having less than 0.1% (AEP). However, there are two small areas within the North-East of the site within the carpark areas that are located in the Flood Zone 2, which is land defined as having a 0.1-1% AEP. As a result, it has been determined that the proposed development is at "low" risk of fluvial flooding.

For TAN15 developments classified as Emergency Services and highly vulnerable, if site levels are greater than the flood levels used to define the adjacent extreme flood outline there is no need to consider flood risk further in line with TAN15 requirements. . & 2-3 contains extracts of the National Resources Wales (NRW) development advice maps with the site boundary shown in red.

Please refer to Hydrock Llantrisant Health Park Flood Consequence Assessment (29762-HYD-XX-XX-RP-WENV-002-P02) for full Flood Consequence Assessment Report.

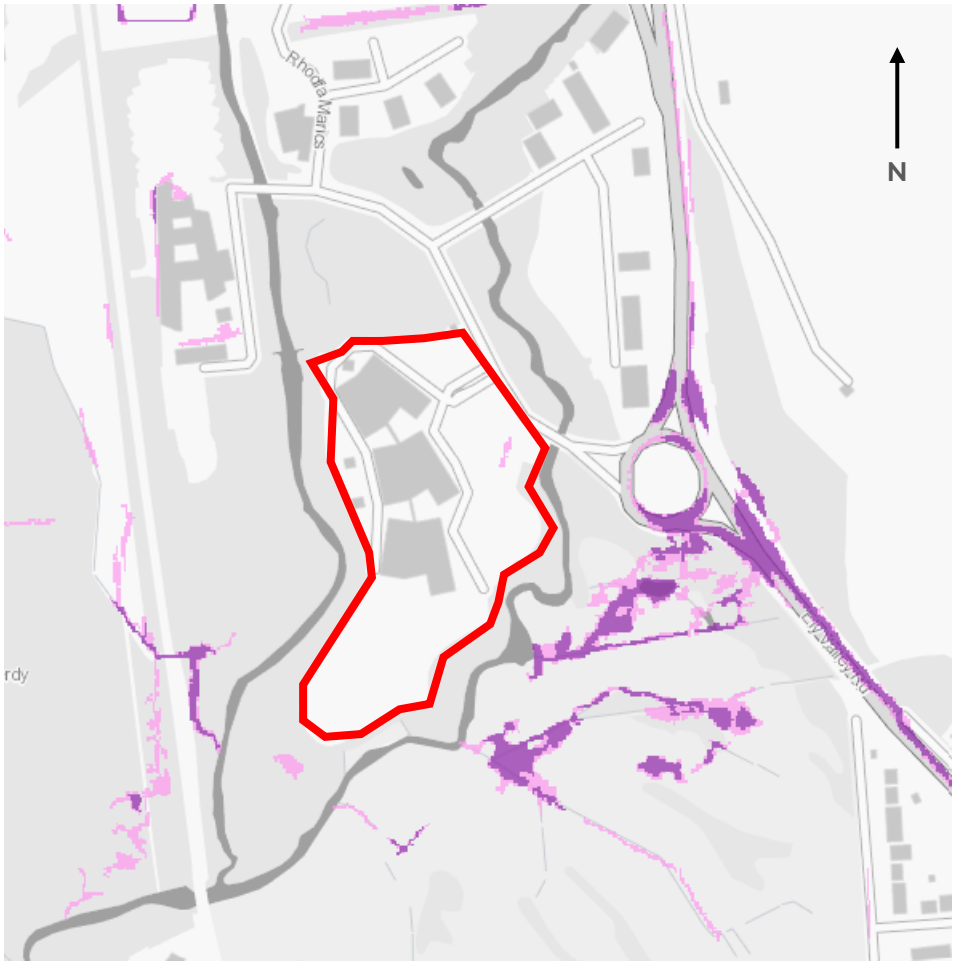

Figure 2-22: Extract from NRW Surface Water Flood Risk Map

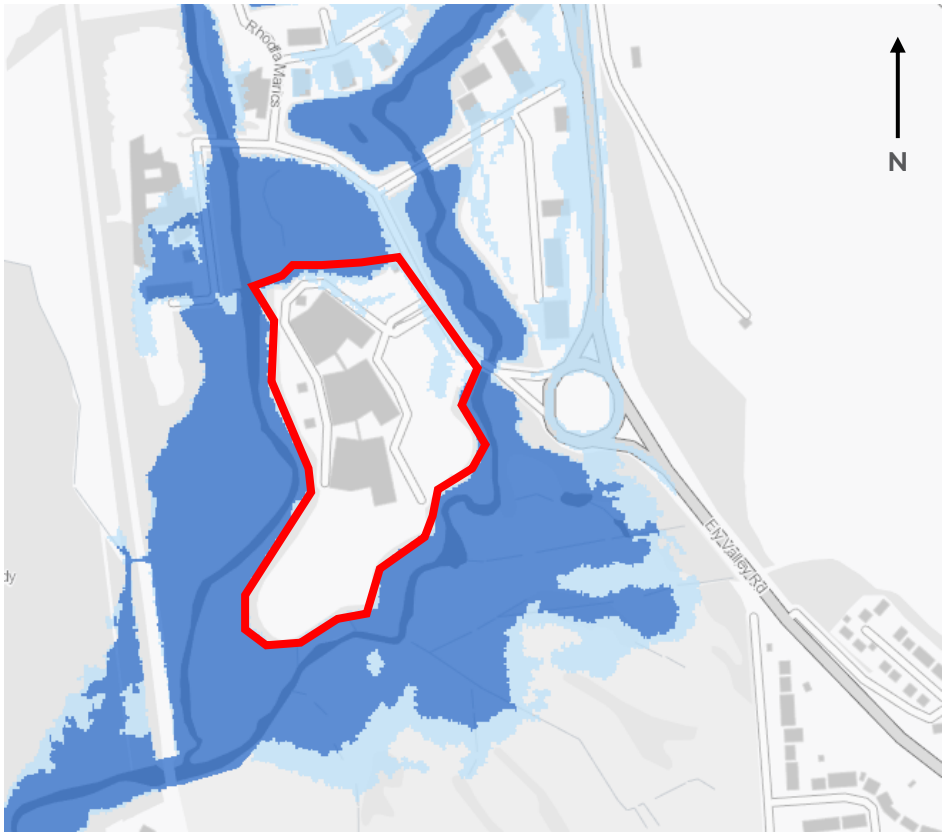

Figure 2-3: Extract from NRW River Flood Risk Map

3. Existing Drainage

An existing drainage plan can be found in Appendix A.

3.1 Public Sewers/Assets

From available Dwr Cymru Welsh Water (DCWW) asset mapping information (Figure 3-1) it has been established that there is an existing combined public sewer situated in the vicinity of the site serving all foul water flows from the site. Just outside the eastern site boundary is a combined water concrete 450mm diameter sewer running north to south.

A Pre-Planning Application was submitted to DCWW to check on the sewers capacity for the development and their response can be found in Appendix B. Notably at the time of the response, DCWW had no objection to an estimated 10l/s domestic foul flows generated from this development. DCWW have separately also stipulated that a 4.5m easement applies to either side of the centreline of the public sewer.

There are no public dedicated surface water sewers within the vicinity of the site.

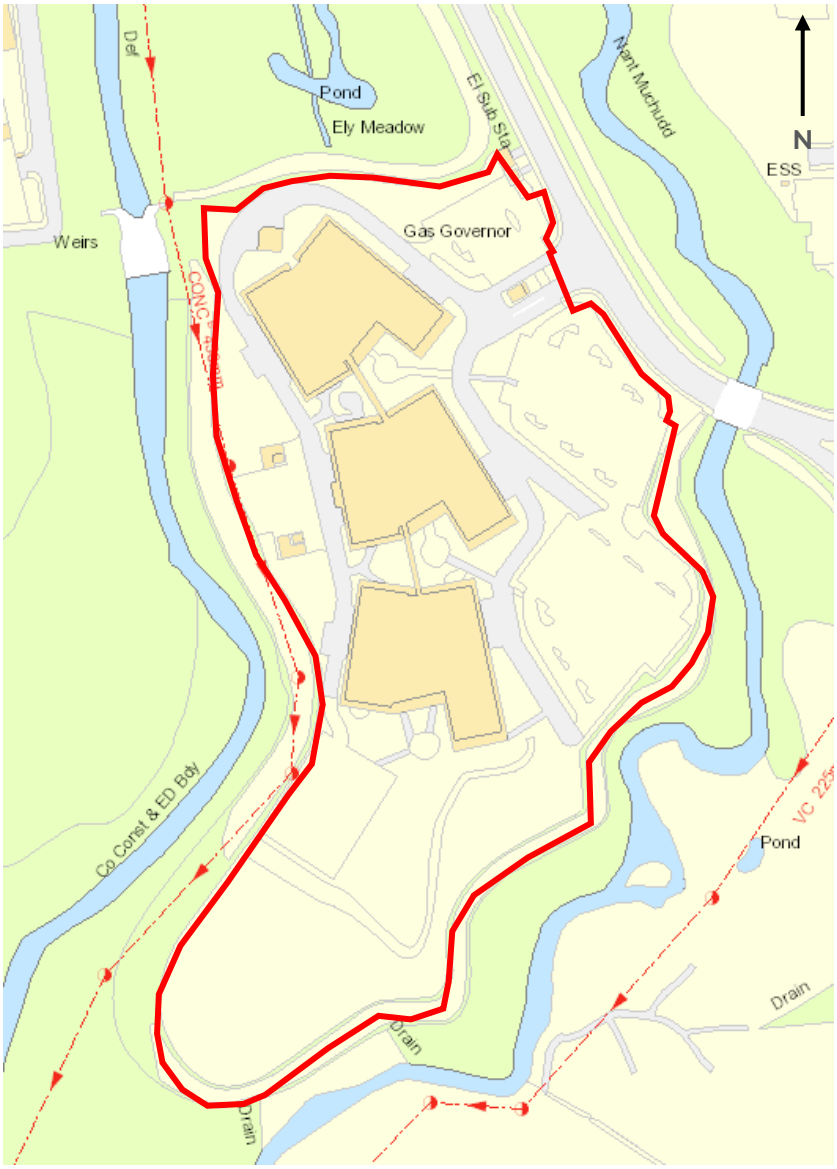

Figure 3-1: Extract of Dwr Cymru Welsh Water Asset Plan (accessed September 2024)

3.2 Surface Water

An extensive review of topographic/utilities surveys, CCTV drainage surveys and available as built information of the current site (See Figure 3-2) has been undertaken for the site.

Figure 3-2: Existing Buildings

From the available information it has been identified that a dedicated surface water drainage system serves the site and may be summarised as follows:

- There is a VC 225mm dia drain increasing in size to become a concrete 375mm dia surface water sewer that runs anti-clockwise around the north of the site via the access road, collecting run off from the northern car park, Building A, Building B and the access road.
- There is a VC 150mm dia drain increasing in size to become a concrete 525mm dia surface water sewer running clockwise around the south of the site, collecting run off from the middle and southern car parks and Building C. This run also has future connection spurs which would allow for connection of the development expansion plot to the south.
- Both surface water drainage runs pass via petrol interceptors before combining in the south west corner of the site at a concrete 525mm dia sewer which discharges to the River Ely at an unrestricted rate.

3.3 Foul Water

Similarly, from the review of the available information it has been identified that a dedicated foul water drainage system serves the site and may be summarised as follows:

- There is a VC 150mm dia foul water drain running north to south on the west of the site passing beneath the access road, collecting foul discharge from Building A, Building B and the entrance gatehouse building.

- There is a VC 150mm dia foul water drain running south to north around the south of the site, collecting foul discharge from Building C. This run also has future connection spurs which would allow for connection of the development expansion plot to the south.
- Both foul water drainage runs combine in the south west corner of the site at a VC 225mm dia sewer before discharging to the existing DCWW combined sewer at chamber ST03835501 just off site within the bank of the River Ely.

3.4 Existing Contributing Areas and Run-Off Rates

In accordance with the statutory Sustainable Drainage Systems Standards for Wales (SDSSW)– designing, constructing, operating and maintaining surface water drainage systems:

> *G2.24 For previously developed sites, site runoff rates should be reduced to the greenfield rates wherever possible. Because the critical duration for the attenuation storage system for the proposed development will be much longer than the storm duration used for sizing pipework for the previously developed site, there is a risk that, by allowing previously developed runoff rates to occur (for a much longer duration) receiving watercourse damage and flood risk could be made considerably worse. Thus, betterment of at least 30% should be considered as a minimum requirement (this will need to be established and agreed with the drainage approving body) and strong consideration should still be given to controlling volumes of runoff to greenfield equivalents.*

The total site area is circa 4.0ha. Portions of the site will not be captured by active drainage and will continue to drain as per the existing greenfield regime. Other areas of the site will continue to drain as existing post development as they are not due to undergo any works but continue to remain operational and be maintained. These areas have therefore been discounted from the area used to calculate the global greenfield run-off rates for the site. The effective contributing area of the site is taken as 1.518ha which includes 45% existing impermeable area i.e buildings. Appendix C identifies the pre-development catchment plan.

The existing greenfield run-off rates have been calculated using the ICP SuDS method and Table 1 summarises the runoff rates for each return period (1, 30, 100 & Q_{Bar}). Calculations detailing the derivation of the values in the tables are available in Appendix D. An urban percentage of 45% has been applied to account for the existing impermeable areas.

Table 1: Existing Urban Greenfield Run-Off Rates by Return Period

Return Period	Run-off Rate (l/s)
1 yr	10.2
30 yr	18.4
100 yr	20.8
$Q_{Bar\ (Urban)}$	**11.6**

4. Proposed Development

4.1 Development Proposals

The site currently houses the 3 former British Airways Avionics Engineering buildings with associated car parking, plant areas and greenfield space. It is anticipated all existing buildings within the development site will be demolished.

The replacement development is proposed to be 3 connected buildings, two at 2-storeys and one at 3-storeys, for Diagnostics, Endoscopy, Arthroplasty & Arthroplasty Theatres. The existing service access road and car parking will remain and be re-used. There are a number of proposed plant areas and a future development zone to the south of proposed buildings.

4.2 Foul Water Drainage

It is proposed to discharge all foul water flows from the new buildings into the existing foul water drainage system before continuing to discharge to the DCWW combined sewer via the existing connection from the previous development. An initial PPA has been submitted to DCWW and no objection was raised to the preliminary discharge rate of 10l/s, however following RIBA Stage 3 design the calculated peak flow rate has been increase to 13.6l/s. DCWW are to confirm this rate as part of their consultation.

All on site sewerage systems will be designed and constructed to comply with building regulations requirements with any adopted elements in accordance with the latest edition of "Sewers for Adoption" and any of the adopting authority's (DCWW) specific requirements.

4.3 Surface Water Drainage

The aim of the surface water drainage strategy is to mimic the natural catchment processes as closely as possible and adopt the principles of water management schemes as stated in section 2 of the Sustainable Drainage Systems Standards for Wales (SDSSW) document, 2018. Since 2019, Schedule 3 of the Flood and Water Management Act has been implemented by the Welsh Government which requires any development of more than 1 unit or where the construction area is greater than 100m^2 to comply with the SuDS Approving Bodies (SAB's) design guidance and ministers' standards which will require all sites to adopt SuDs in their design. The standards are listed below;

- S1 – Surface Water Runoff Destination
- S2 – Surface Water Runoff Hydraulic Control
- S3 – Water Quality
- S4 – Amenity
- S5 – Biodiversity
- S6 – Design of Drainage for Construction, Operation and Maintenance

The Standards listed will need to be met by the design to comply with the SDSSW. S1 is a hierarchy standard with standards S2-S6 being fixed.

The proposed drainage strategy can be found in Appendix E.

4.3.1 S1 - Surface Water Run-off Destination

In determining a suitable methodology for disposal of surface water flows from this development, it is necessary to explore the technical options outlined under Standard S1 of the SDSSW 2018 document published by Welsh Government. This states that disposal should be made through the hierarchical

approach which are, in order of preference; surface water runoff collected for use, infiltration methods, discharge to surface water body, discharge to a surface water sewer, highway sewer or another drainage system and finally discharge to a combined sewer. Each of these options are considered below.

4.3.1.1 Collected for Use

Due to the sensitive nature within the healthcare sector the collection and management of water for reuse has been determined as unfeasible. If not maintained or in periods of very low demand this can lead to associated health risks such as legionella within the rainwater harvesting system and connecting appliances. Considering the nature of the development and its users, rainwater harvesting is deemed unsuitable.

4.3.1.2 Infiltration Methods

Phase 1 Ground Conditions Desk Study determined that the site is superficial alluvium and glaciofluvial deposits and solid Rhondda Member. It was also highlighted that the subsurface is potentially suitable for infiltration although the design will be influenced by the ground conditions and increased infiltration may results in ground instability. Findings of a preliminary ground investigation has reported a heavy extent of made ground which was used to create the plateau built for the existing buildings, however ground conditions in the far South at the lower original levels could provide more opportunity for infiltration to serve the proposed development drainage strategy.

A soakaway as a dedicated discharge method will unlikely be allowable especially on the higher plateau adjacent to the existing buildings due to the nature of the ground conditions which have seen the entire site lifted historically above the flood plain on engineered Made Ground. However, further targeted soakaway testing is due to be undertaken in the South of the site and the lower level as part of an upcoming site investigation and this will help prove the ability for the ground to offer better means of interception.

4.3.1.3 Discharge to Surface Water Body

Sequentially, the next consideration in the hierarchical approach is discharge to a surface water body. The current development discharges to the adjacent River Ely. It is proposed to continue to discharge via the existing outfall but at a restricted rate for the new build element of the development.

4.3.1.4 Discharge to Surface Water Sewer

Based on the above information there is no need to consider discharging into a public surface water sewer system.

4.3.1.5 Discharge to Combined Sewer

Based on the above information there is no need to consider discharging into a combined public sewer system.

4.3.2 S2 - Surface Water Run-off Hydraulic Control

This standard requires surface water to be managed to prevent as far as possible any discharge from the development for rainfall events of less than 5mm and that the surface water runoff rate and volume for up to a 1 in 100-year return period should be managed to protect people, properties, and the receiving water body. Consideration is also required to the risk associated with runoff from events greater than a 1 in 100-year return period with mitigating proposals developed for the scheme.

4.3.2.1 *Interception of Run-off*

Interception will need to be considered under the statutory standards. Interception aims to mimic greenfield runoff conditions by preventing runoff from the majority of all small rainfall events. This can contribute to reducing pollution load to receiving surface water bodies. Meeting the interception criterion is not expected during particularly wet periods, when permeable surfaces and subsoils are saturated, so a suggested target is that 80% compliance should be achieved during the summer and 50% in winter. Refer to table G2.1 in the Statutory Standards for Sustainable Drainage Systems 2018 document published by Welsh Government for details of interception mechanisms and their assumed compliance with the standards. It is proposed that this scheme will utilise a wetland to provide the most part of interception compliance for the new build. There will also be areas of green roof, planters, rain gardens, vegetated SuDS features and permeable paving integrated within the landscape locally around the buildings.

4.3.2.2 *Hydraulic Control and Storage*

For the purposes of this section of the report infiltration will not be accounted for as a sole means of disposing surface water runoff generated from the development, therefore the discharge volume for the site post development is assumed not to decrease.

In order to meet the standards, this report has adopted the simple approach outlined in the statutory standards of restricting all runoff from the new build element of the development site for all return periods up to and including the 1 in 100-year event to the current $Q_{Bar\ urban}$ return period as given in Table 1 of this report which equates to a maximum discharge rate of 11.6 l/s.

In accordance with statutory guidelines, the development of this site should not increase flood risk elsewhere and as such, all runoff from impermeable areas on site should be contained within the site boundary for up to and including a 1 in 100-year design period storm, plus 40% climate change and urban creep allowance, these allowances will be sought to be agreed with the SAB prior to detailed design.

Surface water flows from the proposed new build development would need to be attenuated via a flow control chamber to maximise on-site storage provided for surface water runoff for all rainfall events up to and including a 1 in 100-year event with 40% allowance for climate change. Given the proposed site usage, storage in the form of a wetland basin is achievable for the site.

It is proposed to discharge surface water runoff from the development via gravity to the existing outfall to the River Ely. Runoff rates are to be restricted to the $Q_{Bar\ urban}$ greenfield runoff rate stated in Table 1 for the development site, this will need to be agreed with the adopting SAB authority.

For the purposes of this report, storage has been modelled within Infodrainage and the overall attenuated impermeable area for the development has been taken as 1.47ha. The maximum discharge is assumed at 11.6l/s for all rainfall events up to and including the 100-year return period with 40% allowance for climate change. The minimum preliminary storage required has been calculated and is summarised in Table 2 below. These storage calculations will be further developed at detailed design stage. A copy of the Infodrainage calculations can be found in Appendix F.

Table 2: Development Storage Summary

SuDS Feature	Approximate Area (m^2)	Attenuated Discharge Rate (l/s)	Indicative Storage Provided (m^3)
Detention Basin	2100	11.6	1308

4.3.2.3 *Exceedance Flows and Flood Pathways*

> *"It is inevitable that as a result of extreme rainfall the capacities of sewers, covered watercourses and other drainage systems will be exceeded on occasion. Periods of exceedance occur when the rate of surface runoff exceeds the drainage system inlet capacity, when the pipe system becomes overloaded, or when the outfall becomes restricted due to flood levels in the receiving water. Underground conveyance cannot economically or sustainably be built large enough for the most extreme events and, as a result, there will be occasions when surface water runoff will exceed the design capacity of drains. When drainage exceedance capacity is exceeded the excess water (exceedance flow) is conveyed above ground, and will travel along streets and paths, between and through buildings and across open space. Indiscriminate flooding of property can occur when this flow of water is not controlled." (CIRIA C753).*

Flood-flow pathways would be designed to convey the overland flows from rainfall events above a 1 in 100 year return period to suitable areas of open space, such as watercourses, landscaped areas, car parking areas and other hard surfaced areas to protect properties against flooding. Consideration should also be given to exceedance pathways from storage areas in the event of extreme rainfall or failure with allowance made to convey flows away from properties both on and off the site.

In the event of an extreme rainfall beyond the designed storm events, or poor maintenance of the surface water drainage system, flooding will occur within low points and valleys within the external areas, before re-entering the surface water network through road drainage or flowing offsite to the local watercourses once the storm subsides.

4.3.2.4 *Flood Risk to People*

> *"People are at risk of suffering death or serious injury when flooding occurs. People are unable to stand in deep or fast flowing floodwater. Once they are unable to stand, there is a high risk of death or serious injury. Adults are unable to stand in still floodwater with a depth of about 1.5m or greater, although this is obviously affected by the height of a person. The depth of flowing floodwater where people are unable to stand is much less. For example, some people will be at risk when the water depth is only 0.5m, if the velocity is 1m/s (about 2 mph). If the velocity increases to 2m/s (about 4 mph) some people will be unable to stand in a depth of water of only 0.3m. Most people will be unable to stand when the velocity is 2m/s and the depth is 0.6m." (Defra/ Environment Agency, FD2321/TR2).*

During the detailed design, a hydraulic model will be built to assist the design of the proposed surface water drainage networks. When an extreme storm event is simulated within the model, potential flooding locations will become evident, and the flood flow pathways can be designed/defined based on the proposed layout and levels of the hard areas and landscaping. The depth and velocity of the overland flood water can be determined and then compared with 'Combinations of flood depth and velocity that cause danger to people' in the Defra / EA Flood

Risks to People publication. The velocity and depth as described above would then give a category of flood hazard and the corresponding risk to people. If the risk is deemed to be too high, then the design would require reassessment.

4.3.3 S3 - Water Quality

This standard requires treatment of surface water runoff to prevent negative impacts on the receiving water quality and/or to protect downstream drainage systems including sewers. The only exception to this standard is where drainage connects directly to a combined sewer, where the quality requirements are limited to preventing the discharge of oil and sediments to the sewer system.

The development discharges runoff to an existing river whose ecosystem is to be protected. The aim of the surface water management strategy with regards to water quality is to follow the guiding principles of the SDSSW and use simple, natural processes that promote biodiversity and long-term sustainability. As such, it employs a SuDS management train approach, providing drainage components in series.

The management trains to be used on the project will be assessed using the Simple Index Assessment (SIA) tool available publicly (http://www.ukSuDS.com/drainage-calculation-tools/water-quality-assessment-for-SuDS-developments) which is built around the principles for simple assessment outlined in CIRIA C753 to assess the levels of treatment provided by the proposals.

Planting within the SuDS features should form part of the water quality strategy. SuDS components like green roof, planters, rain gardens, wetland basin and permeable paving provide water quality improvements by reducing sediment and contaminants from runoff either through settlement or biological breakdown of pollutants as part of their interceptor function, so only robust and tolerant species of planting should be specified. Once these species establish this will decrease the flow rate of water travelling through and filter pollutants and contaminants before entering the downstream network.

4.3.4 S4 - Amenity

This standard requires that the design of the surface water management system should maximise amenity benefits.

The primary amenity focus of the SuDS scheme should be to improve the health and well-being of the users/visitors and workers. The scheme will be based on accessible natural forms that mimic natural landscapes found within the region and the vegetated bio retention planting areas are designed with locally contextual species that will encourage natural colonisation. Other key amenity benefits should include improving air quality around the development, increasing carbon sequestration, and improving water quality through removal of pollutants via the rain gardens and wetland basin.

4.3.5 S5 - Biodiversity

This standard requires that the surface water management system should maximise biodiversity benefits. The SuDS scheme's biodiversity strategy will revolve around increasing the overall biodiversity of the site and ecological value. The inclusion of plant species that will enhance the general eco system and simultaneously act as a water filtration system to clean pollutants and contaminants should be used where possible.

The plant species selected should be both locally contextual and appropriate for the varied habitat zones including primary characteristics that shall ensure:

- Good soil binding and filtration species
- Minimised erosion

- Improved filtration via dense root and stem species
- Tolerance to seasonal variations including droughts and inundations
- Good suspended solids retention
- Pollutant tolerant
- Emergent and pioneering species for natural ecological colonisation
- The creation of diverse, self-sustaining, and resilient ecosystems for high species biodiversity
- Support for local and regional habitat strategies

In general, the proposed rain garden areas and wetland basin will be the focal habitat points for the site and will enhance the site over the current site layout by adding areas of water and damp and vegetated soils. Exposed areas of the rain gardens will attract certain species and shaded areas under adjacent buildings and trees will further enhance the varied ecosystem potential.

4.3.6 S6 - Design of Drainage for Construction and Maintenance and Structural Integrity

The surface water drainage system will be designed with the overriding ethos of simplicity in construction, use and maintenance. This then allows a very simple translation from the principles described within standard S6, namely that all elements of the surface water drainage system should be designed so that they can be constructed, as well as maintained and operated "…easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy)." (SDSSW).

The proposed system will not be offered for adoption as it will serve privately owned properties, therefore the maintenance of the drainage will be managed and maintained by the estates management company who will be responsible for all inspection and maintenance activities.

Information with regards to the construction methodology and requirements of the proposed system have been developed and will be further developed as part of the detailed design stage of the project, likewise the maintenance requirements and regime of the proposed system has been developed and will be developed into the full maintenance strategy for the site during the next phase of design development. This will be developed in conjunction with the client's maintenance team, as it is not considered appropriate for these details to be developed by the design team in isolation from the end users. This will then need to be confirmed and submitted for approval to the SAB prior to construction commencing on site.

4.4 Future Development Expansion Zone

Within the site layout proposals, an area to the south of the site has been identified for future development with the following measures made in the proposed drainage strategy to accommodate:

- The future developments surface water flows can be connected to the adjacent surface drainage, with spurs into the Zone proposed as part of the main development.
- Attenuation capacity has been provided within the wetland basinwith suitable freeboard and capacity provided within the main development.
- The Hydrobrake unit that is proposed can be retained, as the hydraulic design has taken the future development zone into account.
- Interception however will need to be achieved independently within the Expansion Zone. Some proportion of interception may be available following full detailed design to assist.

- Water Quality - Additional SuDS will be required within this future development zone depending on its land use. Surface water flows from roof would be dealt with within the wetland, any trafficked areas would require an additional stage of treatment.

5. Statutory Approvals

5.1 SuDS Approval Body

The proposed development is subject to the Schedule 3 requirements and therefore subject to SAB approval. The role of the SAB is also to adopt SuDS features and maintain them for the lifetime of the development; although in this case the SuDS features will not be adopted by the SAB as the development will fall within the single managed curtilage.

Early engagement in the form of a Pre-SAB application with RCT has been completed, with the SAB generally acknowledging the concept proposed could be compliant across all 6 designated standards given the submission of further detail as part of the full SAB application. Importantly SAB have acknowledged the methodology and have agreed the proposed discharge rate of 11.6l/s. A copy of the Pre-SAB Application response can be found in Appendix FG.

5.2 Water Authority

Works associated with new connections or amendments to the existing public sewer network require water authority consent. As such:

- Any connection to a public sewer is subject to confirmation of available downstream capacity and a Section 106 agreement with DCWW - the detail of which should also include any proposed changes to the existing chamber to accept new connections.
- A Section 104 agreement may also be required to any drainage that serves more than one curtilage although not anticipated as required for this scheme.

6. Conclusion

It is considered that the proposed drainage layout has been well considered based on a detailed appraisal of the existing drainage arrangements and site constraints/conditions. As part of the proposals a scheme of SuDS is proposed for the new build element of the scheme which will provide interception, water quality, flow reduction, amenity and biodiversity benefits in line with the applicable standards. A gravity based foul drainage solution is also proposed. It is considered therefore that the proposed development drainage strategy does not offer a barrier to the granting of planning permission.

Appendix A Existing Drainage Plan

SPEL TANKSTOR CHEMICAL STORAGE WITH 27,300 LITRES MINIMUM CAPACITY.REPORTED BY OTHERS TO BE DISUSED.

Longitudinal crack from 17.6 to 17.95m related to defective connection of damaged pipe. 150Ø at 17.94m.

MH79A CL:59.47 IL:55.84

Fine roots at 20.29m

Junction :100Ø at 18.240m

P35 VC 225mmØ

MH80 SW CL58.57 IL58.42 (x) IL58.45 (a)

Junction :150Ø at 5.91

MHB CL:58.69 IL:56.18

P34 VC 225mmØ

Other obstacles at joint, 5% c-s area loss at 18.01m

Roots mass at joint, 5% c-s area loss at 13.94m

Settled deposits 10% c/s area loss

Fine roots at 4.07m

Settled deposits, 5% c-s area loss at 7.81m

MH6 CL:58.47 IL:57.47

Junction : 150Ø at 16.020m

SUB STATION

P7 VC 225mmØ

CL:58.482 IL:55.5 MH79

IC S13

RWP

Under water level 20-40%.

100Ø pvc trespped

Junction :150Ø at 10.660m

P6 VC 225mmØ

MH77 FW CL58.48 IL57.78 (x) Approximately IL57.80 (a.b)

MH74 FW CL58.48 IL57.21 (x) IL57.23 (a) IL 57.27 (b) 57.26 (c)

MH75 CL:58.5 IL:57.48

Attached deposits from 1.52 - 6.3m, Gelitine.

MH72 CL:58.5 IL:55.14

Encrustation causing 5% of c-s area loss at 1.74m.

P47 VC 150mmØ

K100S ACO DRAIN WITH E800 GRATING

MH10 CL:58.69 IL:56.74

P31 VC 150mmØ

MH POSITION TO BE CONFIRMED ON SITE.

MH12 FW CL:58.620 IL:57.487

100mmØ uPVC Grad 1:80

P30 VC 150mmØ

MH11 CL:58.58 IL:56.43

Concrete deposit on wall causing 20% c-s area loss at 13.52m.

F3 CL:58.480 IL:57.227

100mmØ uPVC Grad 1:80

MH13 CL:58.53 IL:57.07

MH70 SW CL58.54 IL57.68 (x) IL55.74 (a)

MH69 CL:58.5 IL:56.05

Encrustation on pipe causing 5% loss of c-s area. from 29.93 to 57.020.

Junction : 150Ø at 43.78m.

P46 VC 150mmØ

S100 ACO DRAIN WITH F900 GRATING

MH68 CL:58.5 IL:56.03

P45 VC 150mmØ

Junction at 1 o'clock , 150Ø at 31.93m.

Encrustation on pipe causing 5% loss of c-s area at 29.93m.

Junction at 1 o'clock, 150Ø at 26.64m.

Joint displaced (medium) at 1.5m

Open joint (medium) at 1.95m

MH67 CL:58.5 IL:56.08

P5 CO 375mmØ

MH15 CL:58.65

Roots, fine at joint at 23.61m.

P4 VC 150mmØ

Settled deposits, 10% c-s area loss @0.20m.

Roots, mass, 10% c-s area loss at 17.81m.

Junction 150mmØ @ 4.40m.

P51 VC 150mmØ

MH16 CL:58.57 IL:56.77

Settled deposit causing 5% of c-s area loss at 20.64m

Fine roots at 2.25m.

P3 VC 100mmØ

Open joint, medium @1.57m

MH17 CL:58.57 IL:57.75

MH14 CL 58.47 UTL C/FAST

P8 VC 225mmØ

Concrete deposit on wall causing 10% c-s area loss at 48.27m

MH18 CL:56.93 IL:55.942

Defective connection. Connecting pipe is intruding at 10 o'clock (intrusion is 10%) at 83.19m 150Ø

MH65 FW CL 58.44 IL57.61 (x) IL57.64 (a) IL57.63 (b)

Encrustation on pipe causing 5% loss of c-s area. from 0.62 to 14.52.

MH-S5 CL:58.5 IL:55.6

P3 VC 300mmØ

Junction at 1 o'clock, 150Ø at 4.57m.

MH64 CL:58.46 IL:54.84

MH83 CL:58.55 IL:56.33

Settled deposits, 5% c-s area loss.

P44 VC 150mmØ

P40 VC 150mmØ

Settled deposits, 5% c-s area loss.

A

W461

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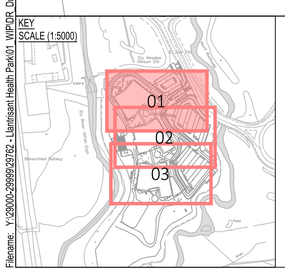
OS NORTH

KEY
SCALE (1:5000)



KEY

EXISTING DRAINAGE VERIFIED BY CCTV SURVEY

- SURFACE WATER CHAMBER
- FOUL WATER CHAMBER
- SURFACE WATER PIPE.
- FOUL WATER PIPE.
- SURFACE/FOUL WATER MANHOLE SHOWED APPROXIMATELY AND TO BE CONFIRMED AT LATER STAGE.
- TEXT — SERVICEABILITY ISSUE
- TEXT — STRUCTURAL ISSUE

EXISTING DRAINAGE FROM AS BUILT RECORDS (APPROXIMATE ONLY)

- AS BUILT SURFACE WATER DRAIN.
- AS BUILT FOUL WATER DRAIN.
- RWP — RAIN WATER PIPE.
- SOIL VENT PIPE
- FG — FLOOR GULLY
- CHEMICAL EFFLUENT WASTE DRAINAGE
- RE — RODDING EYE

TEMPORARY MOBILE MRI ENABLING WORKS DRAINAGE.

- SURFACE WATER DRAIN.
- LINEAR DRAIN CHANNEL
- RW• — RAIN WATER PIPE
- SVP• — SOIL VENT PIPE

EXISTING DRAINAGE FROM GPR SERVICES ONLY

- SURFACE WATER DRAIN.
- FOUL WATER DRAIN.
- SURFACE WATER LINEAR DRAIN.
- GULLY.

REVISIONS

P01	For SAB Pre-Application.					
S2	HS	13/09/24	CD	13/09/24	RB	13/09/24
REV	REVISION NOTES/COMMENTS					
STA.	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

Hydrock now Stantec
3rd Floor, Wharton Place
13 Wharton Street
Cardiff
CF10 1GS
t: +44(0)2920 023665
e: cardiff@hydrock.com

CLIENT
CWM TAF MORGANNWG UNIVERSITY HEALTH BOARD

PROJECT
LLANTRISANT HEALTH PARK

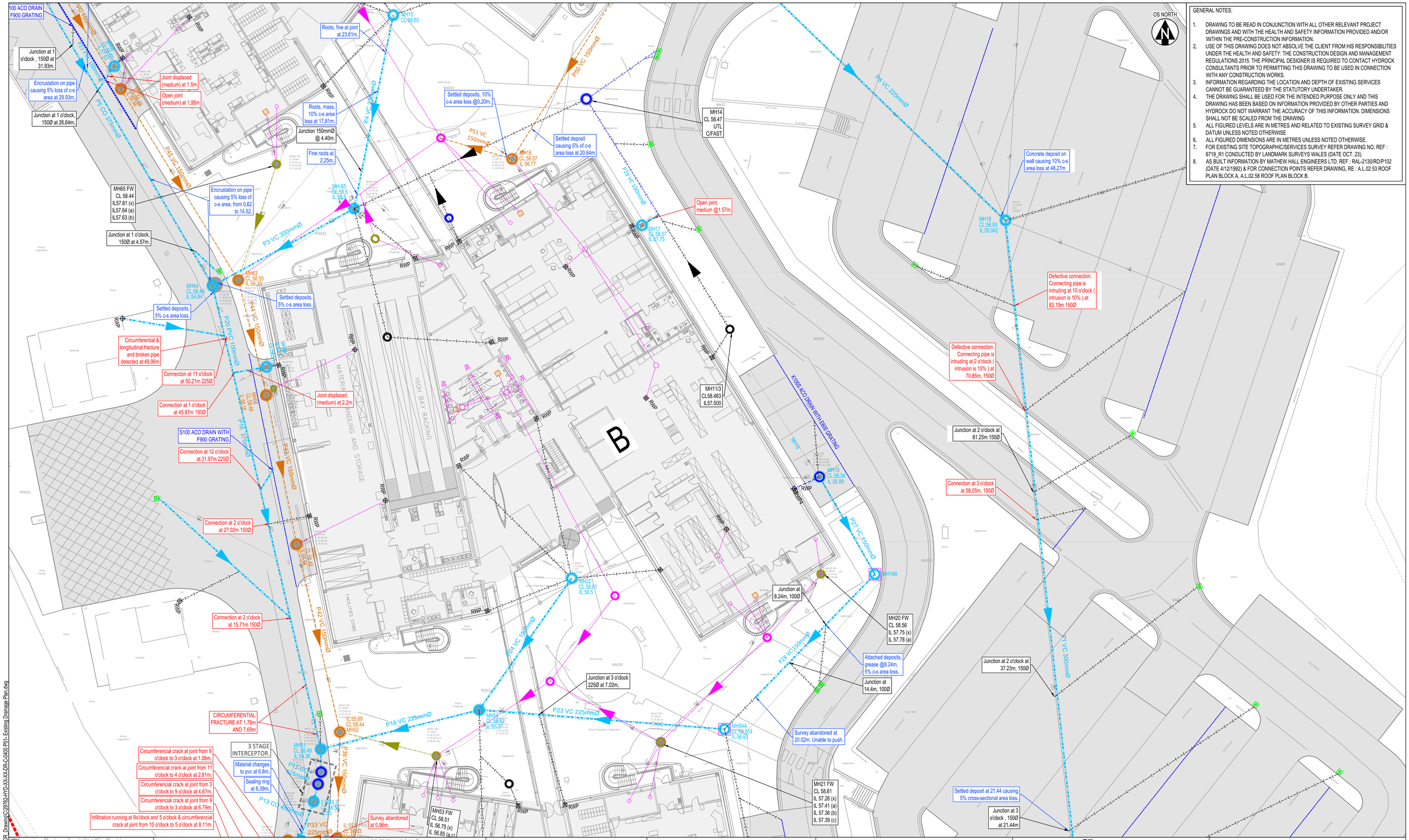
TITLE
EXISTING DRAINAGE PLAN SHEET 01 OF 03

HYDROCK PROJECT NO.	SCALE @ A1
C-29762	1:200

STATUS DESCRIPTION	STATUS
FOR TENDER	D2

DRAWING NO. (PROJECT-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
29762-HYD-XX-XX-DR-C-0401	P01

Filename: X:\29000-29999\29762 - Llantrisant Health Park\01 WIP\DR Drawing\C\29762-HYD-XX-XX-DR-C-0400 P01- Existing Drainage Plan.dwg



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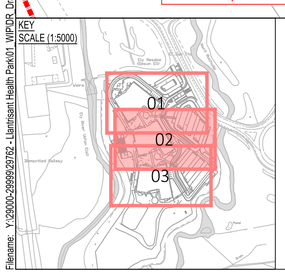
KEY
SCALE (1:5000)



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- RE — RODDING EYE

TEMPORARY MOBILE MRI ENABLING WORKS DRAINAGE.

- SURFACE WATER DRAIN.
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EXISTING DRAINAGE FROM GPR SERVICES ONLY

- SURFACE WATER DRAIN.
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REVISIONS

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S2	HS	13/09/24	CD	13/09/24	RB	13/09/24	
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STA.	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE	

Hydrock now Stantec
3rd Floor, Wharton Place
13 Wharton Street
Cardiff
CF10 1GS
t: +44(0)2920 023665
e: cardiff@hydrock.com

CLIENT
CWM TAF MORGANNWG UNIVERSITY HEALTH BOARD

PROJECT
LLANTRISANT HEALTH PARK

TITLE
EXISTING DRAINAGE PLAN SHEET 02 OF 03

HYDROCK PROJECT NO.	SCALE @ A1
C-29762	1:200

STATUS DESCRIPTION	STATUS
FOR TENDER	D2

DRAWING NO. (PROJECT-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
29762-HYD-XX-XX-DR-C-0402	P01

Filename: Y:\29000-29999\29762 - Llantrisant Health Park\01 WIP\5X_Drawings\C29762-HYD-XX-XX-DR-C-0400 P01- Existing Drainage Plan.dwg

OS NORTH

Connection at 2 o'clock at 27.02m 150Ø

Connection at 2 o'clock at 15.71m 150Ø

CIRCUMFERENTIAL FRACTURE AT 1.76m AND 7.69m

Circumferencial crack at joint from 9 o'clock to 3 o'clock at 1.06m.

Circumferencial crack at joint from 11 o'clock to 4 o'clock at 2.81m.

Circumferencial crack at joint from 3 o'clock to 9 o'clock at 4.67m.

Circumferencial crack at joint from 9 o'clock to 3 o'clock at 6.79m.

Infiltration running at 8o'clock and 5 o'clock & circumferencial crack at joint from 10 o'clock to 5 o'clock at 8.11m.

Circumferencial crack at joint from 10 o'clock to 5 o'clock at 10.11m.

Circumferencial crack at joint from 11 o'clock to 5 o'clock at 11.89m.

Circumferencial crack at joint from 3 o'clock to 5 o'clock at 13.57m.

Circumferencial crack at joint from 7 o'clock to 10 o'clock at 15.35m.

Circumferencial crack at joint from 7 o'clock to 2 o'clock at 17.06m.

Circumferencial crack at joint from 9 o'clock to 2 o'clock at 18.81m.

Circumferencial crack at joint from 11 o'clock to 5 o'clock at 20.70m.

Circumferencial crack at joint from 11 o'clock to 2 o'clock at 22.42m.

Circumferencial crack at joint from 7 o'clock to 10 o'clock at 24.19m.

ASSUMED SURFACE WATER DISCHARGE IN RIVER ELY. TO BE CONFIRMED ON SITE.

RIVER ELY

400mmØ CONC

3 STAGE INTERCEPTOR.

Material changes to pvc at 6.8m.

Sealing ring at 6.39m.

Survey abandoned at 0.96m.

Connection : 150Ø at 2.56m.

3 STAGE INTERCEPTOR.

Joint displaced (medium) at 0.59m.

Material changes to pvc at 1.10m from oil separator.

Blind connection.

Junction at 10 o'clock at 2.7m 100Ø.

CCTV reported grese trap.

Settled deposit at 8.21m 5% c-s area loss.

Settled deposit at 8.21m. 5% c-s area loss.

Obsatacle at 3 o'clock, 5% c-s area loss at 2.89m. Joint displaced (medium).

Exact location for MH34A to be determined on site. Existing appears to be covered over.

Junction at 3 o'clock 225Ø at 7.02m.

Junction at 8.24m, 100Ø

Attached deposits, grease @8.24m, 5% c-s area loss.

Junction at 14.4m, 100Ø

Survey abandoned at 20.02m. Unable to push.

Junction at 2 o'clock at 37.23m, 150Ø

Settled deposit at 21.44 causing 5% cross-sectional area loss.

Junction at 3 o'clock , 150Ø at 21.44m

Settled deposit from 15.73 to 18.88 causing 10% cross-sectional area loss.

Connection other than junction at 3 o'clock , 150Ø at 13.31m

Connection other than junction at 3 o'clock , 150Ø at 7.88m

Junction at 9 o'clock , 150Ø at 4.67m

Connection at 2 o'clock at 9.75m, 150Ø

Concrete deposit at 9.75m causing 5% c-s area loss.

Connection at 10 o'clock at 29.42m, 150Ø

Concrete deposit at 29.42m causing 10 % c-s area loss.

Junction at 6 o'clock at 1.17m, 150Ø (Backdrop)

MH20 FW CL 58.56 IL 57.75 (x) IL 57.78 (a)

MH21 FW CL 58.61 IL 57.26 (x) IL 57.41 (a) IL 57.36 (b) IL 57.39 (c)

MH53 FW CL 58.51 IL 56.75 (x) IL 56.85 (a,c) IL 56.81 (b)

P18 VC 225mmØ

P23 VC 225mmØ

P24 VC 150mmØ

P27 VC 150mmØ

P28 VC 150mmØ

P1 VC 300mmØ

P36 VC 150mmØ

P17 CO 225mmØ

P13 CO 450mmØ

P33 VC 225mmØ

P32 VC 225mmØ

P37 VC 150mmØ

P14 CO 525mmØ

P38 VC 150mmØ

P39 VC 150mmØ

P11 CO 525mmØ

P40 VC 150mmØ

P12 PVC 150mmØ

P41 VC 150mmØ

P9 CO 525mmØ

P10 CO 450mmØ

P25 VC 150mmØ

P2 CO 375mmØ

P22 VC 100mmØ

MH1 CL:58.49 IL:56.49

MH22 CL:58.61 IL:56.5

MH51 CL:58.49 IL:54.39

MH52 CL:58.52 IL:55.37

MH54A CL:58.514 IL:56.63

MH47 CL:58.59 IL:52.7

MH44 CL:58.59 IL:54.14

MH43 CL:58.5 IL:57.7

3 SOS CL:58.59 IL:53.39

MH42 CL:58.48 IL:55.59

MH 38 CL:58.48 IL:57.500

MH37 CL:58.53 IL:56.28

MH34A CL:58.27 IL:54.30

MH36 CL:58.51 IL:56.57

MH35 CL:58.51 IL:56.56

MH34 CL:58.54 IL:54.44

MH33 CL:58.57 IL:56.79

MH32 CL:58.54 IL:54.56

MH23 CL:58.54 IL:57.75

MH10/3 CL:58.534 IL:57.500

MH19A

MH24 CL:58.48 IL:55.02

MH25 CL:58.63

MH26 CL:58.59 IL:56.66

IL:57.43

IL:57.17 CL:58.52 MH31

RESTAURANT

BATTERY WORKSHOP

FACILITIES STORE

C

KEY
SCALE (1:5000)

01
02
03

KEY

EXISTING DRAINAGE VERIFIED BY CCTV SURVEY

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- CHEMICAL EFFLUENT WASTE DRAINAGE
- RE — RODDING EYE

DCWW KEY

- EXISTING FOUL SEWER
- EXISTING FOUL CHAMBER

TEMPORARY MOBILE MRI ENABLING WORKS DRAINAGE.

- SURFACE WATER DRAIN.
- LINEAR DRAIN CHANNEL
- RW — RAIN WATER PIPE
- SVP — SOIL VENT PIPE

EXISTING DRAINAGE FROM GPR SERVICES ONLY

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REVISIONS

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STA.	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE	

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CLIENT
CWM TAF MORGANNWG UNIVERSITY HEALTH BOARD

PROJECT
LLANTRISANT HEALTH PARK

TITLE
EXISTING DRAINAGE PLAN SHEET 03 OF 03

HYDROCK PROJECT NO.	SCALE @ A1
C-29762	1:200

STATUS DESCRIPTION	STATUS
FOR TENDER	D2

DRAWING NO. (PROJECT-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
29762-HYD-XX-XX-DR-C-0403	P01

Filename: Y:\29000-29999\29762 - Llantrisant Health Park\01 - WIP\DR - Drawing\C\29762-HYD-XX-XX-DR-C-0400 P01 - Existing Drainage Plan.dwg

Appendix B DCWW PPA Response

Dŵr Cymru
Welsh Water

Developer Services
PO Box 3146
Cardiff
CF30 0EH

Tel: +44 (0)800 917 2652
Fax: +44 (0)2920 740472
E.mail: developer.services@dwrcymru.com

Gwasanaethau Datblygu
Blwch Post 3146
Caerdydd
CF30 0EH

Ffôn: +44 (0)800 917 2652
Ffacs: +44 (0)2920 740472
E.bost: developer.services@dwrcymru.com

Mr Christopher Dolecki
Hydrock
3rd Floor, Wharton Place 13
Wharton Street
Cardiff
CF10 1GS

Date: 10/04/2024
Our Ref: PPA0008634

Dear Mr Dolecki,

Grid Ref: 303619 183533
Site Address: Llantrisant Health Park, Ely Meadow, Pontyclun
Development: Redevelopment of existing avionics engineering buildings for multi-service healthcare facilities.

I refer to your pre-planning enquiry received relating to the above site, seeking our views on the capacity of our network of assets and infrastructure to accommodate your proposed development. Having reviewed the details submitted I can provide the following comments which should be taken into account within any future planning application for the development.

Appraisal

Firstly, we note that the proposal relates to a multi-service healthcare facility comprising day surgery, general surgery, endoscopy, diagnostics, and inpatient accommodation for recovery and acknowledge that this is a brownfield site. Therefore, we offer the following comments as part of our appraisal of this development.

Public Sewerage Network

The proposed development site is located in the immediate vicinity of a combined sewerage system, which drains to Coslech Wastewater Treatment Works (WwTW).

The proposed site is crossed by public combined sewer with the approximate position being marked on the attached Statutory Public Sewer Record. Under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times. No operational development (or filter strip/drain) will be permitted within 3 metres either side of the centreline of the public sewer.

You are also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. The presence of such assets may affect the proposal. In order to assist you may contact Dwr Cymru Welsh Water on 0800 085 3968 to establish the location and status of the apparatus in and around your site. Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

Surface Water Drainage

As of 07/01/2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy which states that discharge to a combined sewer shall only be made as a last resort. Disposal should be made through the hierarchical approach, preferring infiltration and, where infiltration is not possible, disposal to a surface water drainage body in liaison with the Land Drainage Authority and/or Natural Resources Wales.

It is therefore recommended that the developer consult with Rhondda Cynon Taff County Borough Council, as the determining SuDS Approval Body (SAB), in relation to their proposals for SuDS features. Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice and Guidance note and our Developer Services website at https://developers.dwrcymru.com/en/help-advice/regulation-to-be-aware-of/sustainable-drainage-systems. In addition, please note that no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

Foul Water Drainage – Sewerage Network

Currently we have no objection to the estimated 10l/s domestic foul flows generated from this development can be communicated to the 450mm public combined sewer crossing the site as indicated on the extract of public sewer record provide connect to the public sewer. However, we cannot guarantee, or reserve capacity and we will review during future stages of the planning process. However, should you wish for an alternative connection point to be considered please provide further information to us in the form of a drainage strategy, preferably in advance of a planning application being submitted.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water industry Act 1991. However, if the connection to the public sewer network is either via a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer (i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains and conform with the publication "Sewers for Adoption" – 7th Edition. Further information can be obtained via the Developer Services pages of **www.dwrcymru.com**

If the development will give rise to a new discharge (or alter an existing discharge) of trade effluent, directly or indirectly to the public sewerage system, then a Discharge Consent under Section 118 of the Water Industry Act 1991 is required from Dwr Cymru / Welsh Water. Please note that the process for applying for a Discharge Consent is independent of the planning process and an application for consent may be refused even though planning permission may have already been granted.

We would also point out, that if any of the private connections from the former buildings were not to be utilised, then they will need to be abandoned and capped off before entering our public sewer. We require these drains to be capped off as to ensure no water infiltration is entering our sewer via your private drain.

Sewage Treatment

No problems are envisaged with the Wastewater Treatment Works for the treatment of domestic discharges from this site.

Water Supply

We anticipate this development will require the installation of a new single water connection to serve the new premise. Capacity is available in the water supply system to accommodate the development. The applicant will need to apply to Dwr Cymru Welsh Water for a connection to the potable water supply system under Section 45 of the Water industry Act 1991. The applicant attention is drawn to our new water connection application guidance notes available on our website.

The proposed development is crossed by a trunk/distribution watermain, the approximate position being shown on the attached plan. Dwr Cymru Welsh Water as Statutory Undertaker has statutory powers to access our apparatus at all times. I enclose our Conditions for Development near Watermain(s). It may be possible for this watermain to be diverted under Section 185 of the Water Industry Act 1991, the cost of which will be re-charged to the developer. The developer must consult Dwr Cymru Welsh Water before any development commences on site.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at **developer.services@dwrcymru.com**

Please quote our reference number in all communications and correspondence.

Yours faithfully,

Owain George
Planning Liaison Manager
Developer Services

***Please Note** that demands upon the water and sewerage systems change continually; consequently, the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.*

Appendix C Existing Catchment Plan

OS NORTH

101 m²
99 m²
131 m²
192 m²
62 m²
170 m²
218 m²
143 m²
175 m²
133 m²
196 m²
199 m²
171 m²
162 m²
259 m²
181 m²
195 m²
282 m²
208 m²
78 m²
253 m²
414 m²
91 m²
206 m²
172 m²
197 m²
368 m²
291 m²
340 m²
511 m²
98 m²
1164 m²
60 m²
87 m²
537 m²
247 m²
249 m²
198 m²
288 m²
185 m²
186 m²
176 m²
88 m²
150 m²
177 m²
184 m²
158 m²
164 m²
278 m²
341 m²
341 m²
493 m²
421 m²
207 m²
220 m²
88 m²
236 m²
123 m²
120 m²
1069 m²
189 m²
190 m²
172 m²
174 m²
221 m²
145 m²
139 m²
1425 m²
324 m²
153 m²
153 m²
219 m²
283 m²
217 m²
171 m²
171 m²
123 m²
209 m²
184 m²

HIGH BAY RACKING
MATERIALS HANDLING AND STORAGE
FACILITIES STORE
RESTAURANT
BACK OF HOUSE

MH12 FW
CL:58.620
IL:57.487

100mmØ uPVC
Gravity

FW
CL:58.480
IL:57.227

KEY

- SURFACE WATER CHAMBER
- SURFACE WATER PIPE.
- GULLY.
- EXISTING HARD PAVED CATCHMENT AREA (12067 m²)
- EXISTING BUILDING CATCHMENT AREA (7073 m²)

GENERAL NOTES:

1. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT PROJECT DRAWINGS AND WITH THE HEALTH AND SAFETY INFORMATION PROVIDED AND/OR WITHIN THE PRE-CONSTRUCTION INFORMATION.
2. USE OF THIS DRAWING DOES NOT ABSOLVE THE CLIENT FROM HIS RESPONSIBILITIES UNDER THE HEALTH AND SAFETY: THE CONSTRUCTION DESIGN AND MANAGEMENT REGULATIONS 2015. THE PRINCIPAL DESIGNER IS REQUIRED TO CONTACT HYDROCK CONSULTANTS PRIOR TO PERMITTING THIS DRAWING TO BE USED IN CONNECTION WITH ANY CONSTRUCTION WORKS.
3. INFORMATION REGARDING THE LOCATION AND DEPTH OF EXISTING SERVICES CANNOT BE GUARANTEED BY THE STATUTORY UNDERTAKER.
4. THE DRAWING SHALL BE USED FOR THE INTENDED PURPOSE ONLY AND THIS DRAWING HAS BEEN BASED ON INFORMATION PROVIDED BY OTHER PARTIES AND HYDROCK DO NOT WARRANT THE ACCURACY OF THIS INFORMATION. DIMENSIONS SHALL NOT BE SCALED FROM THE DRAWING
5. ALL FIGURED LEVELS ARE IN METRES AND RELATED TO EXISTING SURVEY GRID & DATUM UNLESS NOTED OTHERWISE
6. ALL FIGURED DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

REVISIONS

P01	For SAB Pre-Application.					
S2	HS	13/09/24	JH	13/09/24	CD	13/09/24
REV	REVISION NOTES/COMMENTS					
STA.	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

Hydrock
THIRD FLOOR, WHARTON PLACE
13 WHARTON STREET
CARDIFF
CF10 1GS
t: +44 (0) 2920 023665
e: cardiff@hydrock.com

CLIENT
CWM TAF MORGANNWG UNIVERSITY HEALTH BOARD

PROJECT
LLANTRISANT HEALTH PARK

TITLE
EXISTING DRAINAGE CATCHMENT PLAN

HYDROCK PROJECT NO.	SCALE @ A1
C-29762	NTS

STATUS DESCRIPTION	STATUS
FOR INFORMATION	S2

DRAWING NO. (PROJECT-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
29762-HYD-XX-XX-DR-C-4201	P01

Filename: Y:\29000-29999\29762 - Llantrisant Health Park\01 WIP\DR Drawing\C\29762-HYD-XX-XX-DR-C-4201 P01 - Existing catchment area plan.dwg

Appendix D Greenfield Runoff Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.300
Area (ha)	1.518	Urban	0.450
SAAR (mm)	1400	Region Number	Region 9

Results l/s

QBAR Rural	6.2
QBAR Urban	11.6
Q1 year	10.2
Q1 year	10.2
Q30 years	18.4
Q100 years	20.8

Appendix E Drainage Strategy

OS NORTH

TEMPORARY MRI SCANNER COMPOUND TO BE RETURNED TO CAR PARK

NEW CHAMBER BUILT ON EXISTING FOUL SEWER

EXISTING RIVER ELY SURFACE WATER OUTFALL.

MAINTAINANCE ACCESS

AREA OF FUTURE EXPANSION

WETLAND BASIN

DC/WW WATER MAIN EASEMENT

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

This list is not an exhaustive register of all hazards or risks present, it identifies only the significant risks remaining following the internal risk assessment undertaken by the project designers. It should be considered alongside the typical risks and hazards that a competent and experienced contractor would expect to be present during such construction related activity.

CONSTRUCTION

The contractor's attention is drawn to the following health and safety risks.

01 Existing services & drainage to remain
02 Excavation / Trenches - Deep drainage works
03 Works around existing petrol interceptors to remain
04 Existing strategic water main and easement to be protected/observed
05 Works at/around existing retaining walls to remain

*FOR FURTHER INFORMATION RELATING TO END USE, MAINTENANCE & DEMOLITION, SEE THE HEALTH AND SAFETY FILE.

ALL WORKS SHOULD BE UNDERTAKEN IN ACCORDANCE WITH THE CONSTRUCTION (DESIGN & MANAGEMENT) REGULATIONS 2015.

IMPORTANT NOTES:

- RWP POSITIONS AND NUMBER ARE ASSUMED ONLY. SUITABLE ALLOWANCES TO BE MADE AS THIS WILL DICTATE THE NUMBER OF LINEAR DRAINAGE CONNECTIONS INDICATED TO CONVEY FLOWS TO SuDS FEATURES AND MAY AFFECT SOIL EROSION CONTROL MEASURES.
- AN ALLOWANCE FOR 10 No. ADDITIONAL CHAMBERS SHOULD BE MADE TO ALLOW FOR PICK UPS NEAR BUILDING PERIMETER THAT MAY NEED FURTHER COORDINATION FURTHER COORDINATION WITH THE STRUCTURE.
- FURTHER FOUNDATION OPTIMISATION MAYBE POSSIBLE TO REDUCE SLEEVING PROVISION
- IN THE EVENT THAT ZONE 1 IS REQUIRED TO BE COMPLETED AHEAD OF ZONE 2 & 3, THE ATTENUATION/WETLAND BASIN, MAIN CARRIER DRAINAGE AND DRAINAGE DIVERSIONS WILL BE REQUIRED TO BE COMPLETED AS PART O THE FIRST PHASE.

KEY

SITE BOUNDARY

PROPOSED

SURFACE WATER DRAIN
SURFACE WATER PERFORATED DRAIN
SURFACE WATER LINEAR DRAIN
EXISTING SURFACE WATER LINEAR DRAIN
S.W. PERFORATED UNDERDRAIN
S.W. INSPECTION CHAMBER Ø450
SURFACE WATER GULLY
EXISTING SURFACE WATER GULLY
SURFACE WATER MANHOLE
SURFACE WATER HYDROBREAK CHAMBER
SURFACE WATER ORIFICE CHAMBER
SURFACE WATER HEADWALL
RODDING EYE
CHANNEL DRAIN SUMP
PERMAVOID DISTRIBUTION CELLS
RAIN GARDEN
PERMEABLE PAVING
WETLAND/ATTENUATION BASIN
GREEN ROOF
SUB-BASE TRENCH
FOUL WATER DRAIN
FOUL WATER MANHOLE
FOUL WATER INSPECTION CHAMBER
FOUL WATER BACK-DROP
FOUL WATER GULLY
FOUL WATER SOIL CONNECTION
FOUL WATER DRAIN SLEEVED THROUGH GROUND BEAM
FOUL WATER DRAIN BELOW GROUND BEAM

KEY - EXISTING DRAINAGE TO REMAIN

SURFACE WATER DRAINAGE
FOUL WATER DRAINAGE
SURFACE WATER LINEAR DRAIN
SURFACE WATER GULLY

KEY - EXISTING DRAINAGE TO BE REMOVED (AS PART OF MAIN WORKS POST DEMO)

FOUL WATER DRAINAGE
SURFACE WATER DRAINAGE
SURFACE WATER GULLY

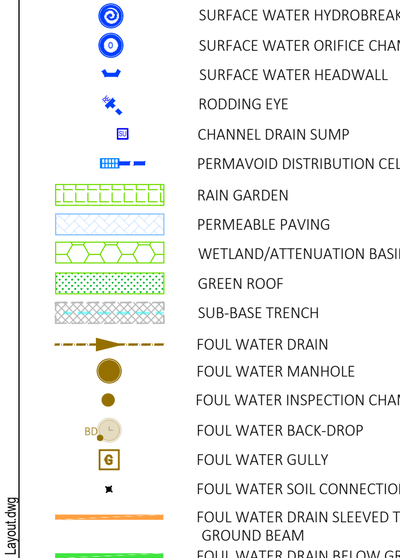
KEY - EXISTING DRAINAGE TO BE RE-PROVIDED

SURFACE WATER LINEAR DRAIN
SURFACE WATER GULLY

NOTES:

1. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT PROJECT DRAWINGS AND WITH THE HEALTH AND SAFETY INFORMATION PROVIDED AND/OR WITHIN THE PRE-CONSTRUCTION INFORMATION.
2. USE OF THIS DRAWING DOES NOT ABSOLVE THE CLIENT FROM HIS RESPONSIBILITIES UNDER THE HEALTH AND SAFETY: THE CONSTRUCTION DESIGN AND MANAGEMENT REGULATIONS 2015. THE PRINCIPAL DESIGNER IS REQUIRED TO CONTACT HYDROCK CONSULTANTS PRIOR TO PERMITTING THIS DRAWING TO BE USED IN CONNECTION WITH ANY CONSTRUCTION WORKS.
3. BEFORE COMMENCEMENT OF ANY WORKS ASSOCIATED WITH THE DRAWING REFER TO ALL RELEVANT HEALTH AND SAFETY INFORMATION FOR THE WORKS INCLUDING RESIDUAL RISK INFORMATION.
4. THE CONTRACTOR SHOULD COMPLY WITH HS(G) 47 "AVOIDING DANGER FROM UNDERGROUND SERVICES" WHEN PLANNING, LOCATING AND EXCAVATING AROUND EXISTING SERVICES. IT IS KNOWN THAT EXISTING UTILITY COMPANY UNDERGROUND SERVICES AND APPARATUS ARE PRESENT WITHIN THE PROPOSED WORKS AREA AND IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE EXISTING SERVICES ON SITE ACCURATELY.
5. INFORMATION REGARDING THE LOCATION AND DEPTH OF EXISTING SERVICES CANNOT BE GUARANTEED BY THE STATUTORY UNDERTAKER.
6. THE CONTRACTOR SHALL CONDUCT THE WORKS WITH DUE REGARD FOR THE ECOLOGICAL AND ENVIRONMENTAL REQUIREMENTS OF THE SCHEME.
7. THE DRAWING SHALL BE USED FOR THE INTENDED PURPOSE ONLY AND THIS DRAWING HAS BEEN BASED ON INFORMATION PROVIDED BY OTHER PARTIES AND HYDROCK DO NOT WARRANT THE ACCURACY OF THIS INFORMATION. DIMENSIONS SHALL NOT BE SCALED FROM THE DRAWING AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL DIMENSIONS AND LEVELS ON SITE FOR THE ACTUAL SETTING OUT OF THE WORKS. DIMENSIONS MARKED 'DIMENSIONS TO BE SITE CHECKED' ARE SUBJECT TO CONFIRMATION BY THE CONTRACTOR BEFORE THE WORKS COMMENCE.
8. HYDROCK IS NOT RESPONSIBLE FOR CHECKING DIMENSIONS ON SITE.
9. HYDROCK IS NOT RESPONSIBLE FOR SETTING OUT GRID LINES, BUILDING LINE ETC
10. HYDROCK IS NOT RESPONSIBLE FOR DIMENSIONS USED IN THE ORDERING AND MANUFACTURING OF EQUIPMENT AND THIS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
11. ALL FIGURED LEVELS ARE IN METRES AND RELATED TO EXISTING SURVEY GRID & DATUM UNLESS NOTED OTHERWISE
12. ALL FIGURED DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
13. TEMPORARY WORKS DESIGN ASSOCIATED WITH THE CONSTRUCTION OF THE WORKS SHALL BE RESPONSIBILITY OF THE CONTRACTOR.
14. THE CONTRACTOR SHALL MAINTAIN FREE AND OPEN ACCESS TO PUBLIC HIGHWAY AND ADJACENT LANDS AT ALL TIMES DURING THE COURSE OF THE WORKS UNLESS OTHERWISE AGREED IN WRITING WITH THE INTERESTED PARTIES.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF ALL TRAFFIC MANAGEMENT PROPOSALS & PHASING. SUCH DETAILS SHALL BE SUBMITTED TO THE LOCAL HIGHWAY AUTHORITY FOR APPROVAL PRIOR TO THE START OF THE WORKS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASSOCIATED COSTS AND ORDERS.
16. CONFLICTING INFORMATION SHOWN ON THE ENGINEER'S DRAWINGS OR DISCREPANCIES BETWEEN THE INFORMATION GIVEN BY THE ENGINEER AND THAT PROVIDED BY OTHERS MUST BE REFERRED TO THE ENGINEER BEFORE THE WORKS COMMENCE.

KEY
SCALE (1:5000)



REVISIONS

Rev.	Revision Notes	Date	Drawn By	Checked | Approved
P01	Issue For PAC	15/05/25	BM	IMH | CD

Hydrock now Stantec
3rd Floor, Wharton Place
13 Wharton Street
Cardiff
CF10 1GS
t: +44(0)2920 023665
e: cardiff@hydrock.com

CLIENT
MTX ON BEHALF OF CWM TAF MORGANNWG UNIVERSITY HEALTH BOARD

PROJECT
LLANTRISANT HEALTH PARK

TITLE
PROPOSED DRAINAGE LAYOUT OVERVIEW

HYDROCK PROJECT NO.	SCALE @ A1
C-38800	1:500

STATUS DESCRIPTION	STATUS
FOR STAGE APPROVAL	S4

DRAWING NO. (PROJECT-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
38800-HYD-XX-XX-DR-C-3000	P01

Filename: P:\38800-389999\38800 - Llantrisant Health Park - MTX Novation\01 WIP\DR Drawing\C38800-HYD-XX-XX-DR-C-3000 P06 - Drainage Layout.dwg

Appendix F Infodrainage Calculations

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Bioretention

Type : Bioretention

Ponding Area

Exceedance Level (m)	58.486
Depth (m)	0.300
Base Level (m)	58.186
Top Area (m²)	38.03
Side Slope (1:X)	2.47
Base Area (m²)	11.50
Freeboard (mm)	100
Porosity (%)	95
Length (m)	17.884
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	7.758

Filter Area

Base Level (m)	57.386

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Green Roof (1) Catchment Area (39) Catchment Area (25)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (29)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.386

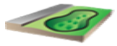
Outlet (1)

Outgoing Connection	Pipe (30)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	37.054
Top Perimeter (m)	40.020



Bioretention (1)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.598
Depth (m)	0.300
Base Level (m)	58.298
Top Area (m²)	82.57
Side Slope (1:X)	2.89
Base Area (m²)	51.90
Freeboard (mm)	100
Porosity (%)	95
Length (m)	17.701
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	28.250

Filter Area

Base Level (m)	57.548

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.050

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Drainage Layer	150	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (6) Catchment Area (26)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

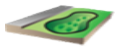
Outlet

Outgoing Connection	Pipe
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	41.267
Top Perimeter (m)	44.732



Bioretention (3)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.672
Depth (m)	0.250
Base Level (m)	58.422
Top Area (m²)	25.11
Side Slope (1:X)	2.16
Base Area (m²)	7.90
Freeboard (mm)	100
Porosity (%)	95
Length (m)	15.964
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	3.904

Filter Area

Base Level (m)	57.822

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.050

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	450	45	0.372	Soil Type
	Drainage Layer	150	30	0.216	

Inlets

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (40)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (1)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.572

Outlet (1)

Outgoing Connection	Pipe (12)
Outlet Type	Under Drain

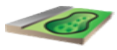
Outlet (2)

Outgoing Connection	Pipe (38)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	32.917
Top Perimeter (m)	35.073



Bioretention (4)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.398
Depth (m)	0.300
Base Level (m)	58.098
Top Area (m²)	64.15
Side Slope (1:X)	2.31
Base Area (m²)	25.25
Freeboard (mm)	100
Porosity (%)	95
Length (m)	28.026
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	15.748

Filter Area

Base Level (m)	57.298

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (12)
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (38)
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (2)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.198

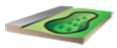
Outlet (1)

Outgoing Connection	Pipe (9)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	57.854
Top Perimeter (m)	60.631



Bioretention (5)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.553
Depth (m)	0.250
Base Level (m)	58.303
Top Area (m²)	82.04
Side Slope (1:X)	2.40
Base Area (m²)	26.20
Freeboard (mm)	100
Porosity (%)	95
Length (m)	46.453
Long. Slope (1:X)	250.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	14.904

Filter Area

Base Level (m)	57.503

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (15)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (3)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.453

Outlet (1)

Outgoing Connection	Pipe (11)
Outlet Type	Under Drain

Outlet (2)

Outgoing Connection	Pipe (39)
Outlet Type	Under Drain

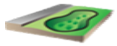
Outlet (3)

Outgoing Connection	Pipe (40)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.453

Advanced

Ponding Area

Base Perimeter (m)	94.034
Top Perimeter (m)	96.438



Bioretention (6)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.309
Depth (m)	0.300
Base Level (m)	58.009
Top Area (m²)	88.03
Side Slope (1:X)	2.93
Base Area (m²)	32.89
Freeboard (mm)	100
Porosity (%)	95
Length (m)	31.406
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	20.768

Filter Area

Base Level (m)	57.209

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (3)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (11)
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (39)
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (40)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Under Drain

Outlet (1)

Outgoing Connection	Pipe (8)
Outlet Type	Under Drain

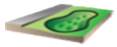
Outlet (2)

Outgoing Connection	Pipe (35)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.209

Advanced

Ponding Area

Base Perimeter (m)	64.906
Top Perimeter (m)	68.418



Bioretention (7)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.294
Depth (m)	0.300
Base Level (m)	57.994
Top Area (m²)	92.33
Side Slope (1:X)	4.78
Base Area (m²)	26.30
Freeboard (mm)	100
Porosity (%)	95
Length (m)	23.022
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	17.985

Filter Area

Base Level (m)	57.194

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (5)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (10)
Bypass Destination	(None)
Inlet Destination	Subsurface Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (6)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.073

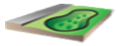
Outlet (1)

Outgoing Connection	Pipe (7)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	48.329
Top Perimeter (m)	54.065



Bioretention (8)

Type : Bioretention

Ponding Area

Exceedance Level (m)	58.464
Depth (m)	0.300
Base Level (m)	58.164
Top Area (m²)	236.99
Side Slope (1:X)	4.19
Base Area (m²)	123.80
Freeboard (mm)	100
Porosity (%)	95
Length (m)	45.071
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	71.792

Filter Area

Base Level (m)	57.364

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (18)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (35)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (13)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.364

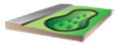
Outlet (1)

Outgoing Connection	Pipe (14)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	95.635
Top Perimeter (m)	100.658



Bioretention (9)

Type : Bioretention

Ponding Area

Exceedance Level (m)	58.244
Depth (m)	0.300
Base Level (m)	57.944
Top Area (m²)	187.59
Side Slope (1:X)	5.94
Base Area (m²)	45.70
Freeboard (mm)	100
Porosity (%)	95
Length (m)	39.781
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	32.969

Filter Area

Base Level (m)	57.144

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (20)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (5)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (17)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.144

Outlet (1)

Outgoing Connection	Pipe (18)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	81.860
Top Perimeter (m)	88.994

Bioretention (10)

Type : Bioretention

Ponding Area

Exceedance Level (m)	58.399
Depth (m)	0.300
Base Level (m)	58.099
Top Area (m²)	172.72
Side Slope (1:X)	5.95
Base Area (m²)	40.78
Freeboard (mm)	100
Porosity (%)	95
Length (m)	36.975
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	29.765

Filter Area

Base Level (m)	57.299

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Outlets

Outlet

Outgoing Connection	Pipe (15)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.299

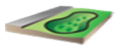
Outlet (1)

Outgoing Connection	Pipe (16)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	76.155
Top Perimeter (m)	83.292



Bioretention (11)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.181
Depth (m)	0.300
Base Level (m)	57.881
Top Area (m²)	48.07
Side Slope (1:X)	3.88
Base Area (m²)	7.00
Freeboard (mm)	100
Porosity (%)	95
Length (m)	17.647
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	6.338

Filter Area

Base Level (m)	57.081

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

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

Outlets

Outlet

Outgoing Connection	Pipe (19)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.086

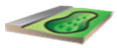
Outlet (1)

Outgoing Connection	Pipe (20)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	36.088
Top Perimeter (m)	40.743



Bioretention (12)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.295
Depth (m)	0.300
Base Level (m)	57.995
Top Area (m²)	13.62
Side Slope (1:X)	0.93
Base Area (m²)	7.60
Freeboard (mm)	100
Porosity (%)	95
Length (m)	10.773
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	4.392

Filter Area

Base Level (m)	57.195

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (11)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (21)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.195

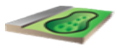
Outlet (1)

Outgoing Connection	Pipe (24)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	22.957
Top Perimeter (m)	24.074



Bioretention (13)

Type : Bioretention

Ponding Area

Exceedance Level (m)	58.565
Depth (m)	0.300
Base Level (m)	58.265
Top Area (m²)	32.74
Side Slope (1:X)	2.00
Base Area (m²)	13.52
Freeboard (mm)	100
Porosity (%)	95
Length (m)	16.013
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	8.338

Filter Area

Base Level (m)	57.465

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Green Roof (5)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (44)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (33)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.465

Outlet (1)

Outgoing Connection	Pipe (34)
Outlet Type	Under Drain

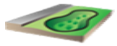
Outlet (2)

Outgoing Connection	Pipe (37)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.465

Advanced

Ponding Area

Base Perimeter (m)	33.716
Top Perimeter (m)	36.116



Bioretention (14)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.276
Depth (m)	0.300
Base Level (m)	57.976
Top Area (m²)	14.13
Side Slope (1:X)	2.00
Base Area (m²)	7.82
Freeboard (mm)	100
Porosity (%)	95
Length (m)	5.260
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	4.493

Filter Area

Base Level (m)	57.176

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (21)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (31)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.176

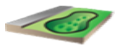
Outlet (1)

Outgoing Connection	Pipe (32)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	13.491
Top Perimeter (m)	15.891



Bioretention (15)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.072
Depth (m)	0.300
Base Level (m)	57.772
Top Area (m²)	62.00
Side Slope (1:X)	1.31
Base Area (m²)	42.89
Freeboard (mm)	100
Porosity (%)	95
Length (m)	24.274
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.3
Total Volume (m³)	23.647

Filter Area

Base Level (m)	56.972

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Outlets

Outlet

Outgoing Connection	Pipe (22)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	57.972

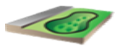
Outlet (1)

Outgoing Connection	Pipe (23)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	52.083
Top Perimeter (m)	53.657



Bioretention (19)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	57.795
Depth (m)	0.300
Base Level (m)	57.495
Top Area (m²)	45.00
Side Slope (1:X)	4.12
Base Area (m²)	10.60
Freeboard (mm)	100
Porosity (%)	95
Length (m)	13.906
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	7.767

Filter Area

Base Level (m)	56.695

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (22)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (25)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	57.695

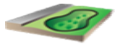
Outlet (1)

Outgoing Connection	Pipe (26)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	29.337
Top Perimeter (m)	34.285



Bioretention (20)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.453
Depth (m)	0.300
Base Level (m)	58.153
Top Area (m²)	158.73
Side Slope (1:X)	1.49
Base Area (m²)	116.00
Freeboard (mm)	100
Porosity (%)	95
Length (m)	47.790
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	63.289

Filter Area

Base Level (m)	57.353

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (17)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Green Roof (2)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (27)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.353

Outlet (1)

Outgoing Connection	Pipe (28)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	100.435
Top Perimeter (m)	102.223

Bioretention (23)

Type : Bioretention

Ponding Area

Exceedance Level (m)	58.533
Depth (m)	0.250
Base Level (m)	58.283
Top Area (m²)	35.10
Side Slope (1:X)	1.09
Base Area (m²)	23.48
Freeboard (mm)	100
Porosity (%)	95
Length (m)	21.260
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	11.708

Filter Area

Base Level (m)	57.483

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (41)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (5)
Outlet Type	Weir
Width (m)	0.150
Coefficient of Discharge	0.544
Crest Level (m)	58.433

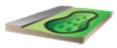
Outlet (1)

Outgoing Connection	Pipe (10)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	44.730
Top Perimeter (m)	45.822



Bioretention (2)

Type : Bioretention

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Stormwater Controls Storm Phase: Phase			

Ponding Area

Exceedance Level (m)	58.483
Depth (m)	0.300
Base Level (m)	58.183
Top Area (m²)	94.09
Side Slope (1:X)	3.10
Base Area (m²)	55.00
Freeboard (mm)	100
Porosity (%)	95
Length (m)	21.031
Long. Slope (1:X)	0.00
Filtration Rate (m/hr)	0.35
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	31.191

Filter Area

Base Level (m)	57.383

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	45	0.372	Soil Type
	Storage	200	30	0.216	

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (10)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (32)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (33)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (4)
Outlet Type	Weir
Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	58.384

Outlet (1)

Outgoing Connection	Pipe (36)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	47.292
Top Perimeter (m)	51.009

Basin

Type : Pond

Dimensions

Exceedance Level (m)	56.700
Depth (m)	0.950
Base Level (m)	55.750
Freeboard (mm)	200
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.912
Total Volume (m³)	1308.409

Depth (m)	Area (m²)	Volume (m³)
0.000	1532.00	0.000
0.950	2091.00	1714.056

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	S1.012
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	S1.013
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	73.735
Friction Scheme	Manning's n
n	0.03

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Connections Storm Phase: Phase			

Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Height (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)	Downstream Cover Level (m)	Downstream Invert Level (m)	Lock
S1.000	35.766	Pipe	150.000		0.6	150		58.548	57.398	58.493	57.160	Levels
S1.001	21.610	Pipe	150.000		0.6	150		58.493	57.160	58.478	57.015	None
S1.002	17.056	Pipe	250.818		0.6	300		58.478	56.867	58.422	56.799	Levels
S1.003	47.029	Pipe	250.152		0.6	300		58.422	56.799	58.452	56.611	None
S1.004	21.550	Pipe	250.581		0.6	300		58.452	56.611	58.478	56.525	None
S1.009	15.714	Pipe	302.197		0.6	450		58.030	56.094	58.488	56.042	None
S1.010	39.605	Pipe	300.035		0.6	450		58.488	56.042	58.300	55.910	None
S3.000	25.167	Pipe	150.000		0.6	150		58.610	57.500	58.616	57.332	All
S3.004	21.082	Pipe	250.000		0.6	450		58.694	56.815	58.600	56.731	Levels
S3.005	59.950	Pipe	250.000		0.6	450		58.600	56.731	58.365	56.491	Levels
S3.006	22.324	Pipe	250.000		0.6	450		58.365	56.491	58.564	56.402	Levels
S3.007	21.918	Pipe	249.906		0.6	450		58.564	56.402	58.512	56.314	None
S3.008	20.673	Pipe	51.172		0.6	450		58.512	56.314	58.300	55.910	Levels
S1.014	34.771	Pipe	263.801		0.6	300		56.700	55.700	56.745	55.568	None
S1.015	42.500	Pipe	253.479		0.6	300		56.745	55.568	58.310	55.401	None
S1.016	20.670	Pipe	244.545		0.6	300		58.310	55.401	58.463	55.316	None
S2.000	27.173	Pipe	84.916		0.6	300		58.750	57.650	58.630	57.330	None
S2.001	17.500	Pipe	37.798		0.6	300		58.630	57.330	58.478	56.867	None
S1.012	7.988	Pipe	307.250		0.6	450		56.745	55.776	55.900	55.750	None
S1.013	7.216	Pipe	144.329		0.6	300		55.900	55.750	56.700	55.700	None
S1.017	22.498	Pipe	249.974		0.6	300		58.463	55.316	58.607	55.226	None
S3.003	30.546	Pipe	250.000		0.6	300		58.720	57.087	58.694	56.965	Levels
S4.000	6.911	Pipe	113.299		0.6	100		58.410	57.210	58.716	57.149	None
S1.011	40.087	Pipe	299.156		0.6	450		58.300	55.910	56.745	55.776	None
S1.018	6.109	Pipe	5.195		0.6	300		58.607	55.226	58.589	54.050	None
3.001	8.120	Pipe	225.000		0.6	225		58.616	57.257	58.716	57.221	Levels
3.002	15.513	Pipe	250.000		0.6	300		58.716	57.149	58.720	57.087	Levels
Pipe	9.397	Pipe	45.156		0.6	100		58.667	57.548	58.610	57.340	None
Pipe (1)	3.533	Rectangular Channel	54.371		0.6	150	150	58.693	58.543	58.628	58.478	None
Pipe (3)	4.632	Pipe	3.724		0.6	100		58.588	58.453	58.374	57.209	None
Pipe (5)	5.437	Pipe	4.387		0.6	100		58.643	58.433	58.508	57.194	None
Pipe (6)	8.103	Pipe	6.719		0.6	100		58.365	58.073	58.478	56.867	None
Pipe (7)	6.196	Pipe	16.444		0.6	100		58.315	57.244	58.478	56.867	None
Pipe (8)	8.636	Pipe	-62.132		0.6	100		58.511	57.259	58.548	57.398	None
Pipe (10)	4.297	Pipe	12.661		0.6	100		58.581	57.533	58.456	57.194	None
Pipe (11)	4.322	Pipe	12.574		0.6	100		58.601	57.553	58.366	57.209	None
Pipe (12)	3.566	Pipe	6.809		0.6	100		58.710	57.822	58.629	57.298	None
Pipe (13)	12.237	Pipe	7.819		0.6	100		58.517	58.364	58.422	56.799	None

Pipe (14)	5.280	Pipe	8.592	0.6	100		58.509	57.414	58.422	56.799	None
Pipe (15)	18.170	Pipe	10.764	0.6	100		58.528	58.299	58.452	56.611	None
Pipe (16)	23.658	Pipe	32.079	0.6	100		58.485	57.349	58.452	56.611	None
Pipe (17)	18.378	Pipe	11.988	0.6	100		58.428	58.144	58.452	56.611	None
Pipe (18)	8.422	Pipe	100.000	0.6	100		58.431	57.194	58.452	57.110	None
Pipe (19)	8.951	Pipe	5.734	0.6	100		58.223	58.086	58.478	56.525	None
Pipe (20)	13.725	Pipe	22.633	0.6	100		58.378	57.131	58.478	56.525	None
Pipe (25)	7.500	Pipe	4.684	0.6	100		58.476	57.695	58.030	56.094	None
Pipe (26)	2.866	Pipe	4.404	0.6	100		58.343	56.745	58.030	56.094	None
Pipe (27)	10.115	Pipe	6.236	0.6	100		58.599	58.353	58.600	56.731	None
Pipe (28)	10.647	Pipe	15.844	0.6	100		58.596	57.403	58.600	56.731	None
Pipe (29)	6.498	Pipe	5.755	0.6	100		58.652	58.386	58.616	57.257	None
Pipe (30)	4.036	Pipe	22.548	0.6	100		58.618	57.436	58.616	57.257	None
Pipe (31)	3.916	Pipe	2.216	0.6	100		58.502	58.176	58.580	56.409	None
Pipe (32)	5.282	Pipe	6.469	0.6	100		58.468	57.226	58.580	56.409	None
Pipe (33)	2.992	Pipe	1.455	0.6	100		58.594	58.465	58.580	56.409	None
Pipe (34)	7.051	Pipe	6.373	0.6	100		58.588	57.515	58.580	56.409	None
Pipe (35)	16.884	Pipe	100.000	0.6	100		58.363	58.209	58.493	58.040	Levels
Pipe (4)	9.870	Pipe	6.290	0.6	100		58.631	58.384	58.694	56.815	None
Pipe (36)	10.017	Pipe	16.217	0.6	100		58.604	57.433	58.694	56.815	None
Pipe (37)	2.992	Pipe	1.455	0.6	100		58.594	58.465	58.580	56.409	None
S1.006	9.854	Pipe	252.656	0.6	300		58.580	56.409	58.130	56.370	None
S1.007	25.827	Pipe	250.744	0.6	300		58.130	56.370	58.383	56.267	All
S1.008	6.738	Pipe	292.937	0.6	450		58.383	56.117	58.030	56.094	None
S1.005	29.003	Pipe	250.028	0.6	300		58.478	56.525	58.580	56.409	All
Pipe (22)	16.689	Pipe	8.997	0.6	100		58.167	57.972	58.383	56.117	None
Pipe (23)	11.237	Pipe	12.419	0.6	100		58.255	57.022	58.383	56.117	None
Pipe (21)	7.014	Pipe	4.200	0.6	100		58.488	58.195	58.478	56.525	None
Pipe (24)	9.047	Pipe	12.558	0.6	100		58.454	57.245	58.478	56.525	None
Pipe (2)	11.446	Pipe	14.307	0.6	100		58.615	58.198	58.548	57.398	None
Pipe (9)	5.498	Pipe	-109.770	0.6	100		58.558	57.348	58.548	57.398	None
Pipe (38)	4.064	Pipe	7.760	0.6	100		58.712	57.822	58.646	57.298	None
Pipe (39)	5.294	Pipe	15.402	0.6	100		58.623	57.553	58.508	57.209	None
Pipe (40)	4.110	Pipe	3.304	0.6	100		58.581	58.453	58.382	57.209	None

Name	Flow Restriction (L/s)	Culvert Type	Culvert Entrance
S1.000		(None)	(None)
S1.001		(None)	(None)
S1.002		(None)	(None)
S1.003		(None)	(None)
S1.004		(None)	(None)

S1.009		(None)	(None)
S1.010		(None)	(None)
S3.000		(None)	(None)
S3.004		(None)	(None)
S3.005		(None)	(None)
S3.006		(None)	(None)
S3.007		(None)	(None)
S3.008		(None)	(None)
S1.014	10.999	(None)	(None)
S1.015		(None)	(None)
S1.016		(None)	(None)
S2.000		(None)	(None)
S2.001		(None)	(None)
S1.012		(None)	(None)
S1.013		(None)	(None)
S1.017		(None)	(None)
S3.003		(None)	(None)
S4.000		(None)	(None)
S1.011		(None)	(None)
S1.018		(None)	(None)
3.001		(None)	(None)
3.002		(None)	(None)
Pipe	0.000	(None)	(None)
Pipe (1)	0.000		
Pipe (3)	0.000	(None)	(None)
Pipe (5)	0.001	(None)	(None)
Pipe (6)	32.199	(None)	(None)
Pipe (7)	0.000	(None)	(None)
Pipe (8)	0.000	(None)	(None)
Pipe (10)	0.000	(None)	(None)
Pipe (11)	0.000	(None)	(None)
Pipe (12)	0.000	(None)	(None)
Pipe (13)	0.000	(None)	(None)
Pipe (14)	0.000	(None)	(None)
Pipe (15)	0.000	(None)	(None)
Pipe (16)	0.000	(None)	(None)
Pipe (17)	0.000	(None)	(None)
Pipe (18)	0.000	(None)	(None)
Pipe (19)	0.000	(None)	(None)
Pipe (20)	0.000	(None)	(None)
Pipe (25)	0.000	(None)	(None)
Pipe (26)	0.000	(None)	(None)

Pipe (27)	0.000	(None)	(None)
Pipe (28)	0.000	(None)	(None)
Pipe (29)	0.000	(None)	(None)
Pipe (30)	0.000	(None)	(None)
Pipe (31)	0.000	(None)	(None)
Pipe (32)	0.000	(None)	(None)
Pipe (33)	0.003	(None)	(None)
Pipe (34)	0.000	(None)	(None)
Pipe (35)	0.000	(None)	(None)
Pipe (4)	0.000	(None)	(None)
Pipe (36)	0.000	(None)	(None)
Pipe (37)	0.003	(None)	(None)
S1.006		(None)	(None)
S1.007		(None)	(None)
S1.008		(None)	(None)
S1.005		(None)	(None)
Pipe (22)	0.000	(None)	(None)
Pipe (23)	0.000	(None)	(None)
Pipe (21)	0.006	(None)	(None)
Pipe (24)	0.000	(None)	(None)
Pipe (2)	24.214	(None)	(None)
Pipe (9)	0.000	(None)	(None)
Pipe (38)	0.000	(None)	(None)
Pipe (39)	0.000	(None)	(None)
Pipe (40)	0.000	(None)	(None)

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Inflow Summary Storm Phase: Phase			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Bioretention (11)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (1)	Bioretention (4)		Time of Concentration	0.008	100	0	100	0.008
Catchment Area (2)	S2		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (3)	S3		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (4)	S5		Time of Concentration	0.005	100	0	100	0.005
Catchment Area (5)	Bioretention (9)		Time of Concentration	0.005	100	0	100	0.005
Catchment Area (6)	Bioretention (1)		Time of Concentration	0.010	100	0	100	0.010
Catchment Area (7)	S26 (1)		Time of Concentration	0.014	100	0	100	0.014
Catchment Area (8)	S29 (1)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (9)	S28 (1)		Time of Concentration	0.025	100	0	100	0.025
Catchment Area (10)	Bioretention (2)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (11)	Bioretention (12)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (12)	S6		Time of Concentration	0.025	100	0	100	0.025
Catchment Area (13)	S3		Time of Concentration	0.028	100	0	100	0.028
Catchment Area (14)	S31		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (15)	Bioretention (5)		Time of Concentration	0.032	100	0	100	0.032
Catchment Area (16)	S23 (1)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (17)	Bioretention (20)		Time of Concentration	0.084	100	0	100	0.084
Catchment Area (18)	Bioretention (8)		Time of Concentration	0.047	100	0	100	0.047
Catchment Area (19)	S5		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (20)	Bioretention (9)		Time of Concentration	0.011	100	0	100	0.011
Catchment Area (21)	Bioretention (14)		Time of Concentration	0.010	100	0	100	0.010
Catchment Area (22)	Bioretention (19)		Time of Concentration	0.005	100	0	100	0.005
Catchment Area (23)	S10		Time of Concentration	0.001	100	0	100	0.001
Catchment Area (24)	S09		Time of Concentration	0.018	100	0	100	0.018
Catchment Area (25)	Bioretention		Time of Concentration	0.006	100	0	100	0.006
Catchment Area (26)	Bioretention (1)		Time of Concentration	0.015	100	0	100	0.015
Catchment Area (27)	S20 (1)		Time of Concentration	0.029	100	0	100	0.029
Catchment Area (28)	S20 (1)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (29)	S25 (1)		Time of Concentration	0.019	100	0	100	0.019
Catchment Area (30)	S23 (1)		Time of Concentration	0.011	100	0	100	0.011
Catchment Area (31)	S25 (1)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (32)	Bioretention (2)		Time of Concentration	0.031	100	0	100	0.031
Catchment Area (33)	Bioretention (2)		Time of Concentration	0.026	100	0	100	0.026
Catchment Area (34)	S27 (1)		Time of Concentration	0.065	100	0	100	0.065
Catchment Area (35)	Bioretention (8)		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (36)	S29 (1)		Time of Concentration	0.015	100	0	100	0.015
Catchment Area (37)	S27 (1)		Time of Concentration	0.034	100	0	100	0.034
Catchment Area (38)	S10		Time of Concentration	0.012	100	0	100	0.012
Catchment Area (39)	Bioretention		Time of Concentration	0.005	100	0	100	0.005
Catchment Area (40)	Bioretention (3)		Time of Concentration	0.017	100	0	100	0.017

Catchment Area (41)	Bioretention (23)		Time of Concentration	0.032	100	0	100	0.032
Catchment Area (42)	S6		Time of Concentration	0.059	100	0	100	0.059
Catchment Area (43)	S6		Time of Concentration	0.038	100	0	100	0.038
Catchment Area (44)	Bioretention (13)		Time of Concentration	0.054	100	0	100	0.054
Catchment Area (45)	S10		Time of Concentration	0.040	100	0	100	0.040
Catchment Area (46)	S30 (1)		Time of Concentration	0.051	100	0	100	0.051
Catchment Area (47)	S29 (1)		Time of Concentration	0.070	100	0	100	0.070
Catchment Area (48)	S28 (1)		Time of Concentration	0.050	100	0	100	0.050
Catchment Area (49)	S30 (1)		Time of Concentration	0.018	100	0	100	0.018
Catchment Area (50)	S12		Time of Concentration	0.042	100	0	100	0.042
Catchment Area (51)	S11		Time of Concentration	0.023	100	0	100	0.023
Catchment Area (52)	S13		Time of Concentration	0.037	100	0	100	0.037
Catchment Area (53)	S25 (1)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (54)	S13		Time of Concentration	0.128	100	0	100	0.128
Green Roof	S31		Green Roof	0.006		0		0.006
Green Roof (1)	Bioretention		Green Roof	0.005		0		0.005
Green Roof (2)	Bioretention (20)		Green Roof	0.008		0		0.008
Green Roof (3)	S20 (1)		Green Roof	0.029		0		0.029
Green Roof (4)	S27 (1)		Green Roof	0.049		0		0.049
Green Roof (5)	Bioretention (13)		Green Roof	0.026		0		0.026
Green Roof (6)	S11		Green Roof	0.017		0		0.017
TOTAL		**0.0**		**1.469**				**1.469**

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Details:	Hydrock/Stantec :		
Type: Network Design Criteria Storm Phase: Phase			

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Options	Minimise Pipe Diameter
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☐

Llantrisant Health Park: Preliminary Model	Date: 10/02/2025		
	Designed by: IMH	Checked by: SP	Approved By:
Report Details: Type: Outfall Details Storm Phase: Phase	Hydrock/Stantec :		

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
Bioretention (6)	Free Discharge			
S19	Free Discharge			

Llantrisant Health Park:	Date:		
Preliminary Model	10/02/2025		
	Designed by:	Checked by:	Approved By:
	IMH	SP	
Report Title:	Hydrock/Stantec :		
Rainfall Analysis Criteria			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Shortest
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Prefill Manhole Sumps	☐
Perform No Discharge Analysis	☐

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S15	FEH: 100 years: +40 %: 240 mins: Winter	56.745	55.568	55.650	0.082	11.0	0.093	0.000	11.0	252.393	OK
S10	FEH: 100 years: +40 %: 30 mins: Summer	58.030	56.094	56.777	0.683	125.9	0.772	0.000	124.0	131.319	Surcharged
S6	FEH: 100 years: +40 %: 30 mins: Summer	58.478	56.525	57.321	0.796	81.0	0.901	0.000	74.9	88.006	Surcharged
S3	FEH: 100 years: +40 %: 30 mins: Summer	58.478	56.867	57.417	0.550	39.7	0.622	0.000	37.9	42.477	Surcharged
S2	FEH: 100 years: +40 %: 30 mins: Summer	58.493	57.160	57.414	0.254	3.2	0.288	0.000	5.3	4.032	Surcharged
S22 (1)	FEH: 100 years: +40 %: 1440 mins: Summer	58.610	57.340	57.525	0.185	0.9	0.052	0.000	0.9	32.612	OK
S23 (1)	FEH: 100 years: +40 %: 15 mins: Summer	58.616	57.257	57.341	0.084	9.5	0.095	0.000	9.0	4.134	OK
S24 (1)	FEH: 100 years: +40 %: 15 mins: Summer	58.716	57.149	57.231	0.082	11.0	0.093	0.000	10.4	5.491	OK
S26 (1)	FEH: 100 years: +40 %: 15 mins: Summer	58.694	56.815	56.972	0.157	32.4	0.177	0.000	29.8	17.597	OK
S27 (1)	FEH: 100 years: +40 %: 15 mins: Summer	58.600	56.731	56.951	0.220	101.4	0.248	0.000	93.5	52.599	OK
S28 (1)	FEH: 100 years: +40 %: 30 mins: Summer	58.365	56.491	56.800	0.309	107.8	0.350	0.000	102.3	108.105	OK
S30 (1)	FEH: 100 years: +40 %: 30 mins: Summer	58.512	56.314	56.717	0.403	158.1	0.455	0.000	156.2	158.202	OK
S13	FEH: 100 years: +40 %: 1440 mins: Summer	56.745	55.776	56.393	0.617	74.8	0.698	0.000	74.4	1824.708	Surcharged
S16	FEH: 100 years: +40 %: 120 mins: Summer	58.310	55.401	55.483	0.083	11.0	0.094	0.000	11.0	120.175	OK
S17	FEH: 100 years: +40 %: 360 mins: Summer	58.463	55.316	55.399	0.083	11.0	0.094	0.000	11.0	376.613	OK
S19	FEH: 100 years: +40 %: 360 mins: Summer	58.589	54.050	54.081	0.031	11.0	0.000	0.000	11.0	376.512	OK
S14	FEH: 100 years: +40 %: 1440 mins: Summer	56.700	55.400	56.392	0.992	11.1	1.753	0.000	11.0	1538.894	Surcharged
S12	FEH: 100 years: +40 %: 30 mins: Summer	58.300	55.910	56.647	0.737	305.8	0.834	0.000	300.7	312.420	Surcharged
S1	FEH: 100 years: +40 %: 120 mins: Summer	58.548	57.398	57.442	0.044	4.1	0.012	0.000	2.7	9.458	OK
S11	FEH: 100 years: +40 %: 30 mins: Summer	58.488	56.042	56.735	0.693	134.6	0.784	0.000	135.0	142.363	Surcharged

S29 (1)	FEH: 100 years: +40 %: 30 mins: Summer	58.564	56.402	56.765	0.363	136.1	0.410	0.000	133.7	137.200	OK
S5	FEH: 100 years: +40 %: 30 mins: Summer	58.452	56.611	57.350	0.739	46.5	0.836	0.000	51.5	48.033	Surcharged
S4	FEH: 100 years: +40 %: 30 mins: Summer	58.422	56.799	57.396	0.597	37.9	0.675	0.000	44.1	41.847	Surcharged
S7	FEH: 100 years: +40 %: 30 mins: Summer	58.580	56.409	57.165	0.756	99.6	0.855	0.000	98.9	106.784	Surcharged
S20 (1)	FEH: 100 years: +40 %: 15 mins: Summer	58.750	57.650	57.756	0.106	28.9	0.030	0.000	28.3	15.086	OK
S21 (1)	FEH: 100 years: +40 %: 30 mins: Summer	58.630	57.330	57.427	0.097	22.9	0.110	0.000	19.9	23.414	OK
S18 (2)	FEH: 100 years: +40 %: 360 mins: Summer	58.607	55.226	55.258	0.032	11.0	0.036	0.000	11.0	376.512	OK
S25 (1)	FEH: 100 years: +40 %: 15 mins: Summer	58.720	57.087	57.213	0.126	26.0	0.143	0.000	23.4	12.200	OK
S31	FEH: 100 years: +40 %: 15 mins: Summer	58.410	57.210	57.251	0.041	2.1	0.012	0.000	2.0	1.388	OK
S08	FEH: 100 years: +40 %: 30 mins: Summer	58.130	56.370	57.041	0.671	98.9	0.759	0.000	98.1	106.590	Surcharged
S09	FEH: 100 years: +40 %: 30 mins: Summer	58.383	56.117	56.796	0.679	106.6	0.768	0.000	105.9	113.789	Surcharged

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

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S15	FEH: 30 years: +0 %: 960 mins: Summer	56.745	55.568	55.650	0.082	11.0	0.093	0.000	11.0	829.198	OK
S10	FEH: 30 years: +0 %: 30 mins: Summer	58.030	56.094	56.376	0.282	80.1	0.319	0.000	79.3	71.718	OK
S6	FEH: 30 years: +0 %: 15 mins: Summer	58.478	56.525	56.756	0.231	62.9	0.261	0.000	57.7	33.975	OK
S3	FEH: 30 years: +0 %: 15 mins: Summer	58.478	56.867	57.016	0.149	32.1	0.169	0.000	30.4	15.868	OK
S2	FEH: 30 years: +0 %: 15 mins: Summer	58.493	57.160	57.200	0.041	2.6	0.046	0.000	2.2	1.128	OK
S22 (1)	FEH: 30 years: +0 %: 960 mins: Summer	58.610	57.340	57.525	0.185	0.9	0.052	0.000	0.9	15.187	OK
S23 (1)	FEH: 30 years: +0 %: 15 mins: Summer	58.616	57.257	57.320	0.063	5.6	0.071	0.000	5.3	2.415	OK
S24 (1)	FEH: 30 years: +0 %: 15 mins: Summer	58.716	57.149	57.208	0.059	6.4	0.067	0.000	6.1	3.199	OK
S26 (1)	FEH: 30 years: +0 %: 15 mins: Summer	58.694	56.815	56.911	0.096	18.7	0.108	0.000	17.1	9.352	OK
S27 (1)	FEH: 30 years: +0 %: 15 mins: Summer	58.600	56.731	56.890	0.159	58.9	0.180	0.000	53.9	29.751	OK
S28 (1)	FEH: 30 years: +0 %: 15 mins: Summer	58.365	56.491	56.693	0.202	75.2	0.228	0.000	67.2	38.733	OK
S30 (1)	FEH: 30 years: +0 %: 15 mins: Summer	58.512	56.314	56.463	0.149	110.8	0.168	0.000	108.7	59.172	OK
S13	FEH: 30 years: +0 %: 30 mins: Summer	56.745	55.776	56.132	0.356	217.6	0.402	0.000	201.4	199.514	OK
S16	FEH: 30 years: +0 %: 960 mins: Summer	58.310	55.401	55.483	0.083	11.0	0.094	0.000	11.0	828.940	OK
S17	FEH: 30 years: +0 %: 960 mins: Summer	58.463	55.316	55.399	0.083	11.0	0.094	0.000	11.0	828.738	OK
S19	FEH: 30 years: +0 %: 960 mins: Summer	58.589	54.050	54.081	0.031	11.0	0.000	0.000	11.0	828.690	OK
S14	FEH: 30 years: +0 %: 960 mins: Summer	56.700	55.400	56.067	0.667	11.0	1.178	0.000	11.0	829.618	Surcharged
S12	FEH: 30 years: +0 %: 30 mins: Summer	58.300	55.910	56.311	0.401	186.5	0.454	0.000	184.3	171.515	OK
S1	FEH: 30 years: +0 %: 960 mins: Summer	58.548	57.398	57.414	0.016	0.8	0.005	0.000	0.4	25.390	OK
S11	FEH: 30 years: +0 %: 30 mins: Summer	58.488	56.042	56.351	0.309	85.4	0.350	0.000	83.7	78.126	OK

S29 (1)	FEH: 30 years: +0 %: 15 mins: Summer	58.564	56.402	56.615	0.213	94.8	0.241	0.000	90.9	50.585	OK
S5	FEH: 30 years: +0 %: 15 mins: Summer	58.452	56.611	56.777	0.166	33.9	0.188	0.000	25.7	17.933	OK
S4	FEH: 30 years: +0 %: 15 mins: Summer	58.422	56.799	56.932	0.133	30.4	0.151	0.000	28.3	15.732	OK
S7	FEH: 30 years: +0 %: 30 mins: Summer	58.580	56.409	56.675	0.266	65.2	0.301	0.000	64.7	57.794	OK
S20 (1)	FEH: 30 years: +0 %: 15 mins: Summer	58.750	57.650	57.729	0.079	16.9	0.022	0.000	16.4	8.790	OK
S21 (1)	FEH: 30 years: +0 %: 15 mins: Summer	58.630	57.330	57.389	0.059	16.4	0.067	0.000	15.9	8.731	OK
S18 (2)	FEH: 30 years: +0 %: 960 mins: Summer	58.607	55.226	55.258	0.032	11.0	0.036	0.000	11.0	828.690	OK
S25 (1)	FEH: 30 years: +0 %: 15 mins: Summer	58.720	57.087	57.180	0.093	15.2	0.105	0.000	13.4	7.098	OK
S31	FEH: 30 years: +0 %: 15 mins: Summer	58.410	57.210	57.241	0.031	1.2	0.009	0.000	1.2	0.808	OK
S08	FEH: 30 years: +0 %: 30 mins: Summer	58.130	56.370	56.610	0.240	64.7	0.271	0.000	64.0	57.640	OK
S09	FEH: 30 years: +0 %: 30 mins: Summer	58.383	56.117	56.392	0.275	68.9	0.311	0.000	68.6	61.818	OK

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

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S15	FEH: 2 years: +0 %: 1440 mins: Summer	56.745	55.568	55.645	0.077	9.7	0.087	0.000	9.7	626.295	OK
S10	FEH: 2 years: +0 %: 30 mins: Summer	58.030	56.094	56.231	0.137	32.6	0.155	0.000	32.4	30.620	OK
S6	FEH: 2 years: +0 %: 15 mins: Summer	58.478	56.525	56.663	0.138	30.0	0.156	0.000	26.9	16.085	OK
S3	FEH: 2 years: +0 %: 15 mins: Summer	58.478	56.867	56.964	0.097	15.1	0.109	0.000	14.1	7.532	OK
S2	FEH: 2 years: +0 %: 15 mins: Summer	58.493	57.160	57.187	0.027	1.2	0.031	0.000	1.0	0.538	OK
S22 (1)	FEH: 2 years: +0 %: 240 mins: Summer	58.610	57.340	57.512	0.172	0.2	0.049	0.000	0.2	2.588	OK
S23 (1)	FEH: 2 years: +0 %: 15 mins: Summer	58.616	57.257	57.300	0.043	2.7	0.048	0.000	2.5	1.149	OK
S24 (1)	FEH: 2 years: +0 %: 15 mins: Summer	58.716	57.149	57.190	0.041	3.0	0.046	0.000	2.8	1.516	OK
S26 (1)	FEH: 2 years: +0 %: 15 mins: Summer	58.694	56.815	56.874	0.059	8.6	0.067	0.000	8.0	4.428	OK
S27 (1)	FEH: 2 years: +0 %: 15 mins: Summer	58.600	56.731	56.837	0.106	27.9	0.120	0.000	24.9	14.114	OK
S28 (1)	FEH: 2 years: +0 %: 15 mins: Summer	58.365	56.491	56.617	0.126	35.0	0.143	0.000	30.2	18.346	OK
S30 (1)	FEH: 2 years: +0 %: 15 mins: Summer	58.512	56.314	56.414	0.100	50.2	0.113	0.000	48.7	28.045	OK
S13	FEH: 2 years: +0 %: 30 mins: Summer	56.745	55.776	56.000	0.224	97.0	0.254	0.000	93.1	89.912	OK
S16	FEH: 2 years: +0 %: 1440 mins: Summer	58.310	55.401	55.478	0.077	9.7	0.088	0.000	9.7	626.215	OK
S17	FEH: 2 years: +0 %: 1440 mins: Summer	58.463	55.316	55.394	0.078	9.7	0.089	0.000	9.7	626.147	OK
S19	FEH: 2 years: +0 %: 1440 mins: Summer	58.589	54.050	54.079	0.029	9.7	0.000	0.000	9.7	626.130	OK
S14	FEH: 2 years: +0 %: 1440 mins: Summer	56.700	55.400	55.934	0.534	9.7	0.943	0.000	9.7	626.422	OK
S12	FEH: 2 years: +0 %: 30 mins: Summer	58.300	55.910	56.134	0.224	82.5	0.253	0.000	81.5	76.659	OK
S1	FEH: 2 years: +0 %: 960 mins: Summer	58.548	57.398	57.410	0.012	0.4	0.003	0.000	0.2	17.468	OK
S11	FEH: 2 years: +0 %: 30 mins: Summer	58.488	56.042	56.173	0.131	35.3	0.148	0.000	34.8	33.559	OK

S29 (1)	FEH: 2 years: +0 %: 15 mins: Summer	58.564	56.402	56.542	0.140	43.4	0.159	0.000	40.7	23.965	OK
S5	FEH: 2 years: +0 %: 30 mins: Summer	58.452	56.611	56.698	0.087	13.2	0.099	0.000	13.1	12.407	OK
S4	FEH: 2 years: +0 %: 15 mins: Summer	58.422	56.799	56.888	0.089	14.1	0.100	0.000	12.3	7.445	OK
S7	FEH: 2 years: +0 %: 30 mins: Summer	58.580	56.409	56.547	0.138	25.3	0.156	0.000	25.2	24.238	OK
S20 (1)	FEH: 2 years: +0 %: 15 mins: Summer	58.750	57.650	57.704	0.054	8.0	0.015	0.000	7.8	4.184	OK
S21 (1)	FEH: 2 years: +0 %: 15 mins: Summer	58.630	57.330	57.371	0.041	7.8	0.046	0.000	7.5	4.146	OK
S18 (2)	FEH: 2 years: +0 %: 1440 mins: Summer	58.607	55.226	55.256	0.030	9.7	0.034	0.000	9.7	626.130	OK
S25 (1)	FEH: 2 years: +0 %: 15 mins: Summer	58.720	57.087	57.149	0.062	7.2	0.070	0.000	6.0	3.361	OK
S31	FEH: 2 years: +0 %: 15 mins: Summer	58.410	57.210	57.231	0.021	0.6	0.006	0.000	0.6	0.384	OK
S08	FEH: 2 years: +0 %: 30 mins: Summer	58.130	56.370	56.500	0.130	25.2	0.147	0.000	25.0	24.124	OK
S09	FEH: 2 years: +0 %: 30 mins: Summer	58.383	56.117	56.254	0.137	27.3	0.155	0.000	27.2	26.041	OK

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Basin	FEH: 100 years: +40 %: 1440 mins: Summer	56.393	56.393	0.643	0.643	74.4	1101.556	0.000	0.000	11.1	1540.024	15.810	OK
Bioretention	FEH: 100 years: +40 %: 120 mins: Summer	58.412	58.412	1.026	1.026	4.4	7.214	0.000	0.000	2.4	7.537	7.010	Flood Risk
Bioretention (1)	FEH: 100 years: +40 %: 480 mins: Summer	58.454	58.454	0.906	0.906	3.7	23.608	0.000	0.000	0.9	21.885	16.432	OK
Bioretention (3)	FEH: 100 years: +40 %: 60 mins: Summer	58.630	58.630	0.808	0.808	7.6	4.152	0.000	0.000	7.2	7.459	-6.339	Flood Risk
Bioretention (4)	FEH: 100 years: +40 %: 60 mins: Summer	58.244	58.244	0.946	0.946	10.5	9.897	0.000	0.000	3.6	6.588	37.155	OK
Bioretention (5)	FEH: 100 years: +40 %: 30 mins: Summer	58.516	58.507	0.828	1.004	14.9	8.759	0.000	0.000	12.7	8.478	41.227	Flood Risk
Bioretention (6)	FEH: 100 years: +40 %: 960 mins: Summer	58.243	58.243	1.034	1.034	4.4	21.526	0.000	0.000	1.8	94.150	-3.651	Flood Risk
Bioretention (7)	FEH: 100 years: +40 %: 360 mins: Winter	58.097	58.097	0.903	0.903	3.4	10.661	0.000	0.000	2.4	33.273	40.720	OK
Bioretention (8)	FEH: 100 years: +40 %: 960 mins: Summer	58.324	58.324	0.961	0.961	5.0	61.617	0.000	0.000	1.3	55.131	14.174	OK
Bioretention (9)	FEH: 100 years: +40 %: 60 mins: Summer	58.011	58.011	0.867	0.867	8.1	13.595	0.000	0.000	0.6	1.459	58.766	OK
Bioretention (10)	FEH: 100 years: +40 %: 15 mins: Summer	57.299	57.301	0.000	0.002	0.0	4.582	0.000	0.000	0.0	0.000	84.606	OK
Bioretention (11)	FEH: 100 years: +40 %: 60 mins: Summer	57.967	57.967	0.885	0.885	2.3	2.481	0.000	0.000	0.5	1.325	60.855	OK
Bioretention (12)	FEH: 100 years: +40 %: 60 mins: Summer	58.083	58.083	0.888	0.888	1.3	2.355	0.000	0.000	0.4	0.931	46.394	OK
Bioretention (13)	FEH: 100 years: +40 %: 30 mins: Winter	58.535	58.534	1.070	1.069	24.4	7.727	0.000	0.000	23.5	20.858	7.325	Flood Risk
Bioretention (14)	FEH: 100 years: +40 %: 60 mins: Summer	58.209	58.209	1.033	1.033	4.4	3.850	0.000	0.000	3.6	4.031	14.307	Flood Risk
Bioretention (15)	FEH: 100 years: +40 %: 15 mins: Summer	56.972	56.972	0.000	0.000	0.0	4.813	0.000	0.000	0.0	0.000	79.644	OK
Bioretention (19)	FEH: 100 years: +40 %: 60 mins: Summer	57.591	57.591	0.896	0.896	2.2	3.706	0.000	0.000	0.4	1.382	52.288	OK
Bioretention (20)	FEH: 100 years: +40 %: 360 mins: Summer	58.411	58.411	1.058	1.058	15.9	68.867	0.000	0.000	8.8	67.819	-8.813	Flood Risk
Bioretention (23)	FEH: 100 years: +40 %: 60 mins: Winter	58.523	58.523	1.040	1.040	9.6	11.589	0.000	0.000	5.7	7.182	1.011	Flood Risk
Bioretention (2)	FEH: 100 years: +40 %: 60 mins: Summer	58.465	58.465	1.082	1.082	29.5	31.308	0.000	0.000	12.9	16.772	-0.375	Flood Risk

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

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Basin	FEH: 30 years: +0 %: 960 mins: Summer	56.068	56.068	0.318	0.318	52.3	515.582	0.000	0.000	11.0	830.445	60.595	OK
Bioretention	FEH: 30 years: +0 %: 240 mins: Summer	58.370	58.370	0.984	0.984	1.9	6.225	0.000	0.000	0.4	6.757	19.763	OK
Bioretention (1)	FEH: 30 years: +0 %: 60 mins: Summer	58.351	58.351	0.803	0.803	6.3	13.547	0.000	0.000	0.6	1.084	52.046	OK
Bioretention (3)	FEH: 30 years: +0 %: 60 mins: Summer	58.602	58.602	0.781	0.781	4.3	3.615	0.000	0.000	3.0	2.950	7.404	Flood Risk
Bioretention (4)	FEH: 30 years: +0 %: 960 mins: Summer	58.209	58.209	0.911	0.911	1.8	10.866	0.000	0.000	0.8	52.641	31.001	OK
Bioretention (5)	FEH: 30 years: +0 %: 60 mins: Summer	58.506	58.483	0.817	0.980	8.1	8.913	0.000	0.000	4.8	4.868	40.198	Flood Risk
Bioretention (6)	FEH: 30 years: +0 %: 1440 mins: Summer	58.115	58.115	0.906	0.906	2.0	13.984	0.000	0.000	0.5	97.814	32.668	OK
Bioretention (7)	FEH: 30 years: +0 %: 960 mins: Winter	58.061	58.061	0.867	0.867	1.4	9.712	0.000	0.000	0.6	60.999	46.001	OK
Bioretention (8)	FEH: 30 years: +0 %: 60 mins: Summer	58.215	58.214	0.851	0.850	13.7	31.050	0.000	0.000	0.3	0.544	56.750	OK
Bioretention (9)	FEH: 30 years: +0 %: 60 mins: Summer	57.983	57.972	0.839	0.828	3.9	9.954	0.000	0.000	0.0	0.000	69.809	OK
Bioretention (10)	FEH: 30 years: +0 %: 15 mins: Summer	57.299	57.299	0.000	0.000	0.0	4.576	0.000	0.000	0.0	0.000	84.625	OK
Bioretention (11)	FEH: 30 years: +0 %: 60 mins: Summer	57.923	57.923	0.841	0.841	0.8	1.753	0.000	0.000	0.3	0.336	72.337	OK
Bioretention (12)	FEH: 30 years: +0 %: 60 mins: Summer	58.029	58.029	0.834	0.834	0.7	1.740	0.000	0.000	0.2	0.213	60.389	OK
Bioretention (13)	FEH: 30 years: +0 %: 30 mins: Winter	58.513	58.512	1.047	1.047	14.1	7.079	0.000	0.000	13.0	9.765	15.102	Flood Risk
Bioretention (14)	FEH: 30 years: +0 %: 120 mins: Summer	58.182	58.182	1.006	1.006	2.0	3.674	0.000	0.000	0.6	3.412	18.215	Flood Risk
Bioretention (15)	FEH: 30 years: +0 %: 15 mins: Summer	56.972	56.972	0.000	0.000	0.0	4.813	0.000	0.000	0.0	0.000	79.644	OK
Bioretention (19)	FEH: 30 years: +0 %: 60 mins: Summer	57.539	57.539	0.844	0.844	1.2	2.672	0.000	0.000	0.4	0.513	65.601	OK
Bioretention (20)	FEH: 30 years: +0 %: 960 mins: Summer	58.350	58.350	0.997	0.997	4.9	60.255	0.000	0.000	1.2	55.505	4.793	OK
Bioretention (23)	FEH: 30 years: +0 %: 480 mins: Winter	58.472	58.472	0.988	0.988	1.6	12.693	0.000	0.000	1.3	34.418	-8.414	Flood Risk
Bioretention (2)	FEH: 30 years: +0 %: 360 mins: Summer	58.413	58.413	1.030	1.030	7.2	31.834	0.000	0.000	3.3	31.961	-2.061	Flood Risk

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

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Basin	FEH: 2 years: +0 %: 1440 mins: Summer	55.936	55.936	0.186	0.186	26.2	293.810	0.000	0.000	9.7	627.056	77.544	OK
Bioretention	FEH: 2 years: +0 %: 360 mins: Summer	58.254	58.254	0.868	0.868	0.9	3.922	0.000	0.000	0.4	4.350	49.446	OK
Bioretention (1)	FEH: 2 years: +0 %: 30 mins: Summer	58.317	58.302	0.769	0.754	3.1	8.518	0.000	0.000	0.0	0.000	69.846	OK
Bioretention (3)	FEH: 2 years: +0 %: 960 mins: Summer	58.586	58.586	0.764	0.764	0.7	3.928	0.000	0.000	0.6	44.517	-0.611	Flood Risk
Bioretention (4)	FEH: 2 years: +0 %: 960 mins: Summer	58.116	57.498	0.818	0.200	1.0	7.805	0.000	0.000	0.4	43.597	50.436	OK
Bioretention (5)	FEH: 2 years: +0 %: 960 mins: Summer	58.492	58.465	0.803	0.962	1.1	11.298	0.000	0.000	0.7	48.264	24.192	Flood Risk
Bioretention (6)	FEH: 2 years: +0 %: 1440 mins: Summer	58.027	57.409	0.818	0.200	1.2	10.029	0.000	0.000	0.4	79.898	51.711	OK
Bioretention (7)	FEH: 2 years: +0 %: 960 mins: Winter	57.682	57.265	0.489	0.071	0.3	4.852	0.000	0.000	0.1	8.754	73.024	OK
Bioretention (8)	FEH: 2 years: +0 %: 15 mins: Summer	58.197	57.364	0.834	0.000	9.9	18.188	0.000	0.000	0.0	0.000	74.666	OK
Bioretention (9)	FEH: 2 years: +0 %: 15 mins: Summer	57.970	57.144	0.826	0.000	2.8	6.336	0.000	0.000	0.0	0.000	80.784	OK
Bioretention (10)	FEH: 2 years: +0 %: 15 mins: Summer	57.299	57.299	0.000	0.000	0.0	4.576	0.000	0.000	0.0	0.000	84.625	OK
Bioretention (11)	FEH: 2 years: +0 %: 30 mins: Summer	57.899	57.081	0.817	0.000	0.4	1.134	0.000	0.000	0.0	0.000	82.105	OK
Bioretention (12)	FEH: 2 years: +0 %: 30 mins: Summer	58.007	57.195	0.811	0.000	0.4	1.170	0.000	0.000	0.0	0.000	73.356	OK
Bioretention (13)	FEH: 2 years: +0 %: 240 mins: Summer	58.487	58.487	1.022	1.021	4.4	7.748	0.000	0.000	4.3	17.400	7.079	Flood Risk
Bioretention (14)	FEH: 2 years: +0 %: 120 mins: Summer	58.056	58.056	0.881	0.881	1.0	2.407	0.000	0.000	0.4	1.468	46.426	OK
Bioretention (15)	FEH: 2 years: +0 %: 15 mins: Summer	56.972	56.972	0.000	0.000	0.0	4.813	0.000	0.000	0.0	0.000	79.644	OK
Bioretention (19)	FEH: 2 years: +0 %: 30 mins: Summer	57.510	57.497	0.815	0.802	0.6	1.717	0.000	0.000	0.0	0.000	77.892	OK
Bioretention (20)	FEH: 2 years: +0 %: 960 mins: Summer	58.212	58.212	0.859	0.859	3.1	42.781	0.000	0.000	1.2	29.356	32.403	OK
Bioretention (23)	FEH: 2 years: +0 %: 960 mins: Winter	58.427	58.427	0.944	0.944	0.6	11.377	0.000	0.000	0.3	10.721	2.823	OK
Bioretention (2)	FEH: 2 years: +0 %: 480 mins: Summer	58.309	58.309	0.926	0.926	3.7	24.208	0.000	0.000	0.9	20.909	22.390	OK

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m^3)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
S1.000	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S1	S2	58.548	57.442	0.048	4.437	0.5	0.18	2.7	OK
S1.001	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	S2	S3	58.493	57.401	0.150	6.234	0.6	0.63	9.1	Surcharged
S1.002	FEH: 100 years: +40 %: 15 mins: Winter	Pipe	S3	S4	58.478	57.174	0.300	23.891	0.9	0.6	42.2	Surcharged
S1.003	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S4	S5	58.422	57.396	0.300	41.846	0.8	0.63	44.1	Surcharged
S1.004	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S5	S6	58.452	57.350	0.300	47.505	0.7	0.74	51.5	Surcharged
S1.009	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	S10	S11	58.030	56.753	0.450	195.867	0.8	0.67	124.1	Surcharged
S1.010	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S11	S12	58.488	56.735	0.450	142.363	0.8	0.73	135.0	Surcharged
S3.000	FEH: 100 years: +40 %: 1440 mins: Summer	Pipe	S22 (1)	S23 (1)	58.610	57.525	0.025	32.612	0.4	0.06	0.9	OK
S3.004	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	S26 (1)	S27 (1)	58.694	56.951	0.167	55.380	0.6	0.16	31.6	OK
S3.005	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S27 (1)	S28 (1)	58.600	56.951	0.254	52.599	1.0	0.46	93.5	OK
S3.006	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S28 (1)	S29 (1)	58.365	56.780	0.299	68.069	1.0	0.58	117.7	OK
S3.007	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S29 (1)	S30 (1)	58.564	56.711	0.306	88.445	1.3	0.72	147.3	OK
S3.008	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S30 (1)	S12	58.512	56.717	0.450	158.202	1.2	0.34	156.2	OK
S1.014	FEH: 100 years: +40 %: 360 mins: Summer	Pipe	S14	S15	56.700	56.281	0.083	378.315	0.7	0.16	11.0	Surcharged
S1.015	FEH: 100 years: +40 %: 240 mins: Summer	Pipe	S15	S16	56.745	55.650	0.082	249.477	0.7	0.16	11.0	OK
S1.016	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S16	S17	58.310	55.483	0.083	120.175	0.7	0.16	11.0	OK
S2.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S20 (1)	S21 (1)	58.750	57.756	0.092	15.086	1.5	0.23	28.3	OK
S2.001	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S21 (1)	S3	58.630	57.408	0.210	14.986	0.8	0.15	27.6	OK
S1.012	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S13	Basin	56.745	56.247	0.290	360.727	3.6	2.13	391.3	Surcharged
S1.013	FEH: 100 years: +40 %: 240 mins: Summer	Pipe	Basin	S14	55.900	56.226	0.300	252.099	0.4	0.12	11.1	Surcharged

S1.017	FEH: 100 years: +40 %: 360 mins: Summer	Pipe	S17	S18 (2)	58.463	55.399	0.058	376.613	1.2	0.16	11.0	OK
S3.003	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S25 (1)	S26 (1)	58.720	57.213	0.121	12.200	0.9	0.33	23.4	OK
S4.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S31	S24 (1)	58.410	57.251	0.061	1.388	0.4	0.36	2.0	OK
S1.011	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	S12	S13	58.300	56.631	0.450	465.131	1.9	1.62	300.8	Surcharged
S1.018	FEH: 100 years: +40 %: 360 mins: Summer	Pipe	S18 (2)	S19	58.607	55.258	0.031	376.512	2.8	0.02	11.0	OK
3.001	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S23 (1)	S24 (1)	58.616	57.341	0.081	4.134	0.7	0.26	9.0	OK
3.002	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S24 (1)	S25 (1)	58.716	57.231	0.104	5.491	0.5	0.15	10.4	OK
Pipe	FEH: 100 years: +40 %: 1440 mins: Summer	Pipe	Bioretention (1)	S22 (1)	58.667	58.403	0.100	32.801	0.2	0.1	0.9	Surcharged
Pipe (1)	FEH: 100 years: +40 %: 60 mins: Summer	Rectangular Channel	Bioretention (3)	Bioretention (4)	58.693	58.630	0.040	6.758	1.2	0.19	6.9	Flood Risk
Pipe (3)	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	Bioretention (5)	Bioretention (6)	58.588	58.417	0.080	3.873	2.0	0.2	6.3	Flood Risk
Pipe (5)	FEH: 100 years: +40 %: 60 mins: Winter	Pipe	Bioretention (23)	Bioretention (7)	58.643	58.523	0.064	6.499	1.7	0.2	5.8	Flood Risk
Pipe (6)	FEH: 100 years: +40 %: 360 mins: Winter	Pipe	Bioretention (7)	S3	58.365	58.097	0.054	8.004	0.5	0.08	1.9	OK
Pipe (7)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (7)	S3	58.315	58.008	0.100	0.000	0.4	0.19	2.8	Surcharged
Pipe (8)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (6)	S1	58.511	58.110	0.027	0.243	-0.0	0	0.0	Surcharged
Pipe (10)	FEH: 100 years: +40 %: 480 mins: Winter	Pipe	Bioretention (23)	Bioretention (7)	58.581	58.494	0.100	1.694	1.4	0.04	0.6	Flood Risk
Pipe (11)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Bioretention (5)	Bioretention (6)	58.601	58.408	0.100	0.457	1.1	0.02	0.3	Flood Risk
Pipe (12)	FEH: 100 years: +40 %: 120 mins: Winter	Pipe	Bioretention (3)	Bioretention (4)	58.710	58.609	0.100	0.322	1.3	0.01	0.2	Flood Risk
Pipe (13)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (8)	S4	58.517	58.246	0.100	0.000	0.0	0	0.0	OK
Pipe (14)	FEH: 100 years: +40 %: 480 mins: Summer	Pipe	Bioretention (8)	S4	58.509	58.312	0.057	38.513	0.9	0.06	1.3	Surcharged
Pipe (15)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (10)	S5	58.528	57.299	0.100	0.000	0.0	0	0.0	OK
Pipe (16)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (10)	S5	58.485	57.299	0.100	0.000	0.0	0	0.0	OK
Pipe (17)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (9)	S5	58.428	57.997	0.100	0.000	0.0	0	0.0	OK
Pipe (18)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (9)	S5	58.431	57.997	0.025	0.000	0.5	0.13	0.8	Surcharged
Pipe (19)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (11)	S6	58.223	57.947	0.100	0.000	0.0	0	0.0	OK
Pipe (20)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (11)	S6	58.378	57.947	0.100	0.000	0.2	0.12	1.6	Surcharged

Pipe (25)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (19)	S10	58.476	57.567	0.100	0.000	0.0	0	0.0	OK
Pipe (26)	FEH: 100 years: +40 %: 480 mins: Summer	Pipe	Bioretention (19)	S10	58.343	57.538	0.100	4.402	0.1	0.01	0.4	Surcharged
Pipe (27)	FEH: 100 years: +40 %: 360 mins: Summer	Pipe	Bioretention (20)	S27 (1)	58.599	58.411	0.089	28.649	1.1	0.31	7.6	Flood Risk
Pipe (28)	FEH: 100 years: +40 %: 1440 mins: Summer	Pipe	Bioretention (20)	S27 (1)	58.596	58.394	0.061	85.105	0.8	0.08	1.2	Flood Risk
Pipe (29)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Bioretention	S23 (1)	58.652	58.412	0.039	3.016	0.7	0.08	2.0	Flood Risk
Pipe (30)	FEH: 100 years: +40 %: 240 mins: Winter	Pipe	Bioretention	S23 (1)	58.618	58.405	0.032	7.948	0.5	0.03	0.4	Flood Risk
Pipe (31)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Bioretention (14)	S7	58.502	58.209	0.100	2.235	0.5	0.09	3.6	Flood Risk
Pipe (32)	FEH: 100 years: +40 %: 480 mins: Summer	Pipe	Bioretention (14)	S7	58.468	58.191	0.100	8.066	0.1	0.02	0.4	Flood Risk
Pipe (33)	FEH: 100 years: +40 %: 30 mins: Winter	Pipe	Bioretention (13)	S7	58.594	58.535	0.100	10.174	1.5	0.23	11.7	Flood Risk
Pipe (34)	FEH: 100 years: +40 %: 240 mins: Winter	Pipe	Bioretention (13)	S7	58.588	58.504	0.100	10.062	0.4	0.02	0.5	Flood Risk
Pipe (35)	FEH: 100 years: +40 %: 960 mins: Summer	Pipe	Bioretention (6)	S2	58.363	58.243	0.033	9.083	0.6	0.23	1.4	Flood Risk
Pipe (4)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Bioretention (2)	S26 (1)	58.631	58.465	0.086	12.977	1.8	0.53	12.9	Flood Risk
Pipe (36)	FEH: 100 years: +40 %: 480 mins: Summer	Pipe	Bioretention (2)	S26 (1)	58.604	58.445	0.055	32.911	0.8	0.06	0.9	Flood Risk
Pipe (37)	FEH: 100 years: +40 %: 30 mins: Winter	Pipe	Bioretention (13)	S7	58.594	58.535	0.100	10.174	1.5	0.23	11.7	Flood Risk
S1.006	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S7	S08	58.580	57.165	0.300	106.784	1.4	1.42	98.9	Surcharged
S1.007	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	S08	S09	58.130	57.020	0.300	160.996	1.4	1.41	98.2	Surcharged
S1.008	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S09	S10	58.383	56.796	0.450	113.789	0.7	0.56	105.9	Surcharged
S1.005	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S6	S7	58.478	57.321	0.300	87.307	1.1	1.07	74.9	Surcharged
Pipe (22)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (15)	S09	58.167	56.972	0.100	0.000	0.0	0	0.0	OK
Pipe (23)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (15)	S09	58.255	56.972	0.100	0.000	0.0	0	0.0	OK
Pipe (21)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention (12)	S6	58.488	58.061	0.100	0.000	0.0	0	0.0	OK
Pipe (24)	FEH: 100 years: +40 %: 240 mins: Summer	Pipe	Bioretention (12)	S6	58.454	58.048	0.100	1.842	0.1	0.02	0.4	Surcharged
Pipe (2)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Bioretention (4)	S1	58.615	58.244	0.036	3.463	1.8	0.27	4.3	OK
Pipe (9)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Bioretention (4)	S1	58.558	58.241	0.069	0.171	0.2	0.09	0.5	Surcharged
Pipe (38)	FEH: 100 years: +40 %: 120 mins: Winter	Pipe	Bioretention (3)	Bioretention (4)	58.712	58.609	0.100	0.322	1.3	0.01	0.2	Flood Risk

Pipe (39)	FEH: 100 years: +40 %: 240 mins: Summer	Pipe	Bioretention (5)	Bioretention (6)	58.623	58.401	0.100	0.597	1.1	0.02	0.4	Flood Risk
Pipe (40)	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	Bioretention (5)	Bioretention (6)	58.581	58.417	0.080	3.959	2.1	0.19	6.4	Flood Risk

Llantrisant Health Park: Preliminary Model	Date: 10/02/2025		
	Designed by: IMH	Checked by: SP	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Hydrock/Stantec :		

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

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m^3)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
S1.000	FEH: 30 years: +0 %: 960 mins: Summer	Pipe	S1	S2	58.548	57.414	0.018	10.621	0.3	0.02	0.4	OK
S1.001	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S2	S3	58.493	57.200	0.040	1.128	0.6	0.15	2.2	OK
S1.002	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S3	S4	58.478	57.016	0.141	15.868	0.9	0.44	30.4	OK
S1.003	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S4	S5	58.422	56.932	0.150	15.732	0.8	0.4	28.3	OK
S1.004	FEH: 30 years: +0 %: 30 mins: Summer	Pipe	S5	S6	58.452	56.775	0.196	26.795	0.6	0.4	27.6	OK
S1.009	FEH: 30 years: +0 %: 30 mins: Summer	Pipe	S10	S11	58.030	56.376	0.295	71.718	0.8	0.43	79.3	OK
S1.010	FEH: 30 years: +0 %: 30 mins: Summer	Pipe	S11	S12	58.488	56.351	0.355	78.126	0.7	0.45	83.7	OK
S3.000	FEH: 30 years: +0 %: 960 mins: Summer	Pipe	S22 (1)	S23 (1)	58.610	57.525	0.025	15.187	0.4	0.06	0.9	OK
S3.004	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S26 (1)	S27 (1)	58.694	56.911	0.127	9.352	0.5	0.08	17.1	OK
S3.005	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S27 (1)	S28 (1)	58.600	56.890	0.180	29.751	0.9	0.26	53.9	OK
S3.006	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S28 (1)	S29 (1)	58.365	56.693	0.207	38.733	0.9	0.33	67.2	OK
S3.007	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S29 (1)	S30 (1)	58.564	56.615	0.181	50.585	1.5	0.45	90.9	OK
S3.008	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S30 (1)	S12	58.512	56.463	0.250	59.172	1.2	0.24	108.7	OK
S1.014	FEH: 30 years: +0 %: 960 mins: Summer	Pipe	S14	S15	56.700	56.067	0.083	829.503	0.7	0.16	11.0	Surcharged
S1.015	FEH: 30 years: +0 %: 960 mins: Summer	Pipe	S15	S16	56.745	55.650	0.082	829.198	0.7	0.16	11.0	OK
S1.016	FEH: 30 years: +0 %: 960 mins: Summer	Pipe	S16	S17	58.310	55.483	0.083	828.940	0.7	0.16	11.0	OK
S2.000	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S20 (1)	S21 (1)	58.750	57.729	0.069	8.790	1.3	0.14	16.4	OK
S2.001	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S21 (1)	S3	58.630	57.389	0.104	8.731	0.7	0.09	15.9	OK
S1.012	FEH: 30 years: +0 %: 30 mins: Winter	Pipe	S13	Basin	56.745	56.128	0.215	203.581	3.0	1.23	226.4	OK
S1.013	FEH: 30 years: +0 %: 1440 mins: Summer	Pipe	Basin	S14	55.900	56.068	0.300	1022.856	0.3	0.12	11.0	Surcharged

S1.017	FEH: 30 years: +0 %: 960 mins: Summer	Pipe	S17	S18 (2)	58.463	55.399	0.058	828.738	1.2	0.16	11.0	OK
S3.003	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S25 (1)	S26 (1)	58.720	57.180	0.090	7.098	0.7	0.19	13.4	OK
S4.000	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S31	S24 (1)	58.410	57.241	0.045	0.808	0.4	0.21	1.2	OK
S1.011	FEH: 30 years: +0 %: 30 mins: Summer	Pipe	S12	S13	58.300	56.311	0.379	171.515	1.3	0.99	184.3	OK
S1.018	FEH: 30 years: +0 %: 960 mins: Summer	Pipe	S18 (2)	S19	58.607	55.258	0.031	828.690	2.8	0.02	11.0	OK
3.001	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S23 (1)	S24 (1)	58.616	57.320	0.061	2.415	0.6	0.15	5.3	OK
3.002	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S24 (1)	S25 (1)	58.716	57.208	0.076	3.199	0.4	0.09	6.1	OK
Pipe	FEH: 30 years: +0 %: 960 mins: Summer	Pipe	Bioretention (1)	S22 (1)	58.667	58.323	0.100	15.376	0.3	0.1	0.9	Surcharged
Pipe (1)	FEH: 30 years: +0 %: 60 mins: Summer	Rectangular Channel	Bioretention (3)	Bioretention (4)	58.693	58.602	0.021	2.189	0.9	0.07	2.7	Flood Risk
Pipe (3)	FEH: 30 years: +0 %: 60 mins: Summer	Pipe	Bioretention (5)	Bioretention (6)	58.588	58.395	0.034	1.663	1.2	0.07	2.3	Flood Risk
Pipe (5)	FEH: 30 years: +0 %: 480 mins: Winter	Pipe	Bioretention (23)	Bioretention (7)	58.643	58.472	0.031	32.335	1.7	0.05	1.5	Flood Risk
Pipe (6)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (7)	S3	58.365	57.194	0.075	0.000	0.0	0	0.0	OK
Pipe (7)	FEH: 30 years: +0 %: 480 mins: Winter	Pipe	Bioretention (7)	S3	58.315	58.039	0.030	16.143	0.6	0.04	0.6	Surcharged
Pipe (8)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (6)	S1	58.511	58.029	0.000	0.000	-0.0	0	0.0	Surcharged
Pipe (10)	FEH: 30 years: +0 %: 60 mins: Winter	Pipe	Bioretention (23)	Bioretention (7)	58.581	58.460	0.100	1.324	1.3	0.03	0.6	Flood Risk
Pipe (11)	FEH: 30 years: +0 %: 360 mins: Summer	Pipe	Bioretention (5)	Bioretention (6)	58.601	58.386	0.100	0.790	1.2	0.02	0.3	Flood Risk
Pipe (12)	FEH: 30 years: +0 %: 30 mins: Winter	Pipe	Bioretention (3)	Bioretention (4)	58.710	58.597	0.100	0.254	1.3	0.01	0.2	Flood Risk
Pipe (13)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (8)	S4	58.517	58.206	0.067	0.000	0.0	0	0.0	OK
Pipe (14)	FEH: 30 years: +0 %: 1440 mins: Summer	Pipe	Bioretention (8)	S4	58.509	58.194	0.036	32.964	0.6	0.06	1.3	Surcharged
Pipe (15)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (10)	S5	58.528	57.299	0.083	0.000	0.0	0	0.0	OK
Pipe (16)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (10)	S5	58.485	57.299	0.083	0.000	0.0	0	0.0	OK
Pipe (17)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (9)	S5	58.428	57.971	0.083	0.000	0.0	0	0.0	OK
Pipe (18)	FEH: 30 years: +0 %: 480 mins: Summer	Pipe	Bioretention (9)	S5	58.431	57.956	0.014	5.125	0.4	0.04	0.2	Surcharged
Pipe (19)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (11)	S6	58.223	57.917	0.100	0.000	0.0	0	0.0	OK
Pipe (20)	FEH: 30 years: +0 %: 120 mins: Summer	Pipe	Bioretention (11)	S6	58.378	57.916	0.090	0.600	0.1	0.02	0.3	Surcharged

Pipe (25)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (19)	S10	58.476	57.532	0.100	0.000	0.0	0	0.0	OK
Pipe (26)	FEH: 30 years: +0 %: 120 mins: Summer	Pipe	Bioretention (19)	S10	58.343	57.531	0.100	0.976	0.1	0.01	0.4	Surcharged
Pipe (27)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (20)	S27 (1)	58.599	58.238	0.079	0.000	0.0	0	0.0	OK
Pipe (28)	FEH: 30 years: +0 %: 240 mins: Summer	Pipe	Bioretention (20)	S27 (1)	58.596	58.302	0.054	24.237	0.7	0.08	1.2	Surcharged
Pipe (29)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention	S23 (1)	58.652	58.293	0.032	0.000	0.0	0	0.0	OK
Pipe (30)	FEH: 30 years: +0 %: 360 mins: Winter	Pipe	Bioretention	S23 (1)	58.618	58.328	0.023	7.078	0.5	0.03	0.4	Surcharged
Pipe (31)	FEH: 30 years: +0 %: 120 mins: Summer	Pipe	Bioretention (14)	S7	58.502	58.182	0.100	0.118	0.0	0.01	0.2	Flood Risk
Pipe (32)	FEH: 30 years: +0 %: 240 mins: Summer	Pipe	Bioretention (14)	S7	58.468	58.178	0.092	4.514	0.3	0.02	0.4	Flood Risk
Pipe (33)	FEH: 30 years: +0 %: 30 mins: Winter	Pipe	Bioretention (13)	S7	58.594	58.513	0.100	4.637	0.8	0.13	6.5	Flood Risk
Pipe (34)	FEH: 30 years: +0 %: 120 mins: Winter	Pipe	Bioretention (13)	S7	58.588	58.500	0.092	5.258	0.6	0.02	0.5	Flood Risk
Pipe (35)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (6)	S2	58.363	58.029	0.000	0.000	0.0	0	0.0	OK
Pipe (4)	FEH: 30 years: +0 %: 360 mins: Summer	Pipe	Bioretention (2)	S26 (1)	58.631	58.413	0.040	6.731	0.8	0.1	2.5	Flood Risk
Pipe (36)	FEH: 30 years: +0 %: 960 mins: Summer	Pipe	Bioretention (2)	S26 (1)	58.604	58.405	0.034	41.625	0.8	0.06	0.9	Flood Risk
Pipe (37)	FEH: 30 years: +0 %: 30 mins: Winter	Pipe	Bioretention (13)	S7	58.594	58.513	0.100	4.637	0.8	0.13	6.5	Flood Risk
S1.006	FEH: 30 years: +0 %: 30 mins: Summer	Pipe	S7	S08	58.580	56.675	0.253	57.794	1.0	0.93	64.7	OK
S1.007	FEH: 30 years: +0 %: 30 mins: Summer	Pipe	S08	S09	58.130	56.610	0.218	57.640	1.2	0.92	64.0	OK
S1.008	FEH: 30 years: +0 %: 30 mins: Summer	Pipe	S09	S10	58.383	56.392	0.278	61.818	0.7	0.36	68.6	OK
S1.005	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	S6	S7	58.478	56.756	0.227	33.975	1.0	0.83	57.7	OK
Pipe (22)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (15)	S09	58.167	56.972	0.100	0.000	0.0	0	0.0	OK
Pipe (23)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (15)	S09	58.255	56.972	0.100	0.000	0.0	0	0.0	OK
Pipe (21)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Bioretention (12)	S6	58.488	58.025	0.100	0.000	0.0	0	0.0	OK
Pipe (24)	FEH: 30 years: +0 %: 120 mins: Summer	Pipe	Bioretention (12)	S6	58.454	58.020	0.090	0.458	0.1	0.02	0.3	Surcharged
Pipe (2)	FEH: 30 years: +0 %: 960 mins: Summer	Pipe	Bioretention (4)	S1	58.615	58.209	0.013	1.260	0.6	0.02	0.4	OK
Pipe (9)	FEH: 30 years: +0 %: 480 mins: Winter	Pipe	Bioretention (4)	S1	58.558	58.203	0.040	0.000	0.2	0.08	0.5	Surcharged
Pipe (38)	FEH: 30 years: +0 %: 30 mins: Winter	Pipe	Bioretention (3)	Bioretention (4)	58.712	58.597	0.100	0.254	1.2	0.01	0.2	Flood Risk

Pipe (39)	FEH: 30 years: +0 %: 360 mins: Summer	Pipe	Bioretention (5)	Bioretention (6)	58.623	58.386	0.100	0.663	1.1	0.02	0.4	Flood Risk
Pipe (40)	FEH: 30 years: +0 %: 60 mins: Summer	Pipe	Bioretention (5)	Bioretention (6)	58.581	58.395	0.034	1.709	1.2	0.07	2.4	Flood Risk

Llantrisant Health Park: Preliminary Model	Date: 10/02/2025		
	Designed by: IMH	Checked by: SP	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Hydrock/Stantec :		

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

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m^3)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
S1.000	FEH: 2 years: +0 %: 960 mins: Summer	Pipe	S1	S2	58.548	57.410	0.014	7.277	0.2	0.01	0.2	OK
S1.001	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S2	S3	58.493	57.187	0.027	0.538	0.5	0.07	1.0	OK
S1.002	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S3	S4	58.478	56.964	0.093	7.532	0.8	0.2	14.1	OK
S1.003	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S4	S5	58.422	56.888	0.086	7.445	0.7	0.18	12.3	OK
S1.004	FEH: 2 years: +0 %: 30 mins: Summer	Pipe	S5	S6	58.452	56.698	0.109	12.407	0.6	0.19	13.1	OK
S1.009	FEH: 2 years: +0 %: 30 mins: Summer	Pipe	S10	S11	58.030	56.231	0.134	30.620	0.8	0.18	32.4	OK
S1.010	FEH: 2 years: +0 %: 30 mins: Summer	Pipe	S11	S12	58.488	56.173	0.177	33.559	0.6	0.19	34.8	OK
S3.000	FEH: 2 years: +0 %: 360 mins: Summer	Pipe	S22 (1)	S23 (1)	58.610	57.512	0.012	4.302	0.3	0.01	0.2	OK
S3.004	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S26 (1)	S27 (1)	58.694	56.874	0.083	4.428	0.4	0.04	8.0	OK
S3.005	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S27 (1)	S28 (1)	58.600	56.837	0.116	14.114	0.8	0.12	24.9	OK
S3.006	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S28 (1)	S29 (1)	58.365	56.617	0.133	18.346	0.8	0.15	30.2	OK
S3.007	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S29 (1)	S30 (1)	58.564	56.542	0.120	23.965	1.2	0.2	40.7	OK
S3.008	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S30 (1)	S12	58.512	56.414	0.152	28.045	1.0	0.11	48.7	OK
S1.014	FEH: 2 years: +0 %: 1440 mins: Summer	Pipe	S14	S15	56.700	55.934	0.078	626.388	0.7	0.14	9.7	OK
S1.015	FEH: 2 years: +0 %: 1440 mins: Summer	Pipe	S15	S16	56.745	55.645	0.077	626.295	0.7	0.14	9.7	OK
S1.016	FEH: 2 years: +0 %: 1440 mins: Summer	Pipe	S16	S17	58.310	55.478	0.078	626.215	0.7	0.14	9.7	OK
S2.000	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S20 (1)	S21 (1)	58.750	57.704	0.048	4.184	1.1	0.06	7.8	OK
S2.001	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S21 (1)	S3	58.630	57.371	0.069	4.146	0.6	0.04	7.5	OK
S1.012	FEH: 2 years: +0 %: 30 mins: Summer	Pipe	S13	Basin	56.745	56.000	0.137	89.912	2.3	0.51	93.1	OK
S1.013	FEH: 2 years: +0 %: 1440 mins: Summer	Pipe	Basin	S14	55.900	55.936	0.210	627.056	0.3	0.1	9.7	OK

S1.017	FEH: 2 years: +0 %: 1440 mins: Summer	Pipe	S17	S18 (2)	58.463	55.394	0.054	626.147	1.1	0.14	9.7	OK
S3.003	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S25 (1)	S26 (1)	58.720	57.149	0.060	3.361	0.6	0.09	6.0	OK
S4.000	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S31	S24 (1)	58.410	57.231	0.031	0.384	0.3	0.1	0.6	OK
S1.011	FEH: 2 years: +0 %: 30 mins: Summer	Pipe	S12	S13	58.300	56.134	0.224	76.659	1.0	0.44	81.5	OK
S1.018	FEH: 2 years: +0 %: 1440 mins: Summer	Pipe	S18 (2)	S19	58.607	55.256	0.030	626.130	2.7	0.02	9.7	OK
3.001	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S23 (1)	S24 (1)	58.616	57.300	0.041	1.149	0.5	0.07	2.5	OK
3.002	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S24 (1)	S25 (1)	58.716	57.190	0.051	1.516	0.4	0.04	2.8	OK
Pipe	FEH: 2 years: +0 %: 360 mins: Summer	Pipe	Bioretention (1)	S22 (1)	58.667	58.305	0.091	4.505	0.3	0.02	0.2	Surcharged
Pipe (1)	FEH: 2 years: +0 %: 960 mins: Summer	Rectangular Channel	Bioretention (3)	Bioretention (4)	58.693	58.586	0.010	42.182	0.6	0.02	0.9	Flood Risk
Pipe (3)	FEH: 2 years: +0 %: 960 mins: Summer	Pipe	Bioretention (5)	Bioretention (6)	58.588	58.377	0.014	22.242	1.2	0.02	0.5	Flood Risk
Pipe (5)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (23)	Bioretention (7)	58.643	58.329	0.000	0.000	0.0	0	0.0	OK
Pipe (6)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (7)	S3	58.365	57.194	0.048	0.000	0.0	0	0.0	OK
Pipe (7)	FEH: 2 years: +0 %: 1440 mins: Winter	Pipe	Bioretention (7)	S3	58.315	57.466	0.019	11.960	0.3	0.01	0.1	Surcharged
Pipe (8)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (6)	S1	58.511	57.209	0.000	0.000	-0.0	0	0.0	OK
Pipe (10)	FEH: 2 years: +0 %: 240 mins: Winter	Pipe	Bioretention (23)	Bioretention (7)	58.581	58.349	0.100	3.460	1.4	0.04	0.6	Surcharged
Pipe (11)	FEH: 2 years: +0 %: 360 mins: Winter	Pipe	Bioretention (5)	Bioretention (6)	58.601	58.350	0.100	2.075	1.1	0.02	0.3	Surcharged
Pipe (12)	FEH: 2 years: +0 %: 60 mins: Winter	Pipe	Bioretention (3)	Bioretention (4)	58.710	58.541	0.100	0.726	1.3	0.01	0.2	Surcharged
Pipe (13)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (8)	S4	58.517	58.178	0.044	0.000	0.0	0	0.0	OK
Pipe (14)	FEH: 2 years: +0 %: 960 mins: Summer	Pipe	Bioretention (8)	S4	58.509	58.173	0.023	11.451	0.4	0.01	0.2	Surcharged
Pipe (15)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (10)	S5	58.528	57.299	0.042	0.000	0.0	0	0.0	OK
Pipe (16)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (10)	S5	58.485	57.299	0.042	0.000	0.0	0	0.0	OK
Pipe (17)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (9)	S5	58.428	57.953	0.042	0.000	0.0	0	0.0	OK
Pipe (18)	FEH: 2 years: +0 %: 1440 mins: Summer	Pipe	Bioretention (9)	S5	58.431	57.949	0.010	5.636	0.3	0.02	0.1	Surcharged
Pipe (19)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (11)	S6	58.223	57.891	0.069	0.000	0.0	0	0.0	OK
Pipe (20)	FEH: 2 years: +0 %: 240 mins: Summer	Pipe	Bioretention (11)	S6	58.378	57.887	0.051	0.459	0.1	0.01	0.1	Surcharged

Pipe (25)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (19)	S10	58.476	57.504	0.064	0.000	0.0	0	0.0	OK
Pipe (26)	FEH: 2 years: +0 %: 240 mins: Summer	Pipe	Bioretention (19)	S10	58.343	57.500	0.061	0.730	0.1	0.01	0.2	Surcharged
Pipe (27)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (20)	S27 (1)	58.599	58.185	0.053	0.000	0.0	0	0.0	OK
Pipe (28)	FEH: 2 years: +0 %: 1440 mins: Summer	Pipe	Bioretention (20)	S27 (1)	58.596	58.207	0.038	36.817	0.6	0.08	1.2	Surcharged
Pipe (29)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention	S23 (1)	58.652	58.230	0.021	0.000	0.0	0	0.0	OK
Pipe (30)	FEH: 2 years: +0 %: 240 mins: Summer	Pipe	Bioretention	S23 (1)	58.618	58.254	0.021	3.416	0.5	0.03	0.4	Surcharged
Pipe (31)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (14)	S7	58.502	58.033	0.067	0.000	0.0	0	0.0	OK
Pipe (32)	FEH: 2 years: +0 %: 240 mins: Summer	Pipe	Bioretention (14)	S7	58.468	58.050	0.067	2.315	0.2	0.02	0.4	Surcharged
Pipe (33)	FEH: 2 years: +0 %: 120 mins: Summer	Pipe	Bioretention (13)	S7	58.594	58.487	0.071	2.572	0.3	0.04	1.9	Flood Risk
Pipe (34)	FEH: 2 years: +0 %: 1440 mins: Summer	Pipe	Bioretention (13)	S7	58.588	58.475	0.040	25.830	0.4	0.02	0.5	Flood Risk
Pipe (35)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (6)	S2	58.363	57.209	0.000	0.000	0.0	0	0.0	OK
Pipe (4)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (2)	S26 (1)	58.631	58.240	0.030	0.000	0.0	0	0.0	OK
Pipe (36)	FEH: 2 years: +0 %: 360 mins: Summer	Pipe	Bioretention (2)	S26 (1)	58.604	58.299	0.031	17.184	0.8	0.06	0.9	Surcharged
Pipe (37)	FEH: 2 years: +0 %: 120 mins: Summer	Pipe	Bioretention (13)	S7	58.594	58.487	0.071	2.572	0.3	0.04	1.9	Flood Risk
S1.006	FEH: 2 years: +0 %: 30 mins: Summer	Pipe	S7	S08	58.580	56.547	0.134	24.238	0.8	0.36	25.2	OK
S1.007	FEH: 2 years: +0 %: 30 mins: Summer	Pipe	S08	S09	58.130	56.500	0.125	24.124	0.9	0.36	25.0	OK
S1.008	FEH: 2 years: +0 %: 30 mins: Summer	Pipe	S09	S10	58.383	56.254	0.137	26.041	0.7	0.14	27.2	OK
S1.005	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	S6	S7	58.478	56.663	0.136	16.085	0.9	0.38	26.9	OK
Pipe (22)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (15)	S09	58.167	56.972	0.063	0.000	0.0	0	0.0	OK
Pipe (23)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (15)	S09	58.255	56.972	0.063	0.000	0.0	0	0.0	OK
Pipe (21)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (12)	S6	58.488	58.001	0.069	0.000	0.0	0	0.0	OK
Pipe (24)	FEH: 2 years: +0 %: 480 mins: Summer	Pipe	Bioretention (12)	S6	58.454	57.997	0.044	0.781	0.0	0.01	0.1	Surcharged
Pipe (2)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Bioretention (4)	S1	58.615	58.098	0.000	0.000	0.0	0	0.0	OK
Pipe (9)	FEH: 2 years: +0 %: 960 mins: Summer	Pipe	Bioretention (4)	S1	58.558	58.110	0.039	0.000	0.2	0.07	0.4	Surcharged
Pipe (38)	FEH: 2 years: +0 %: 60 mins: Winter	Pipe	Bioretention (3)	Bioretention (4)	58.712	58.541	0.100	0.726	1.3	0.01	0.2	Surcharged

Pipe (39)	FEH: 2 years: +0 %: 360 mins: Winter	Pipe	Bioretention (5)	Bioretention (6)	58.623	58.350	0.100	1.899	1.1	0.02	0.3	Surcharged
Pipe (40)	FEH: 2 years: +0 %: 960 mins: Summer	Pipe	Bioretention (5)	Bioretention (6)	58.581	58.377	0.014	23.195	1.3	0.01	0.5	Flood Risk

Appendix G Pre-SAB APP Response

RHONDDA CYNON TAF COUNTY BOROUGH COUNCIL

Sustainable Drainage Approval Body

Llantrisant Health Park

Pre-Application Enhanced Detailed Review Report

November 2024

ANDREW STONE
Head of Flood Risk Management and Strategic Projects
Strategic Projects, Llawr / Floor 2, Llys Cadwyn, Pontypridd, CF37 4TH

Stephen Williams BSc
Service Director - Highways, Streetcare & Transportation Services
Llawr / Floor 2, Llys Cadwyn, Pontypridd, CF37 4TH

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DOCUMENT VERIFICATION

Applicant	Ms Rosie Cavill
Site Name	Llantrisant Health Park
Document Title	Pre-Application Enhanced Detailed Review Report
Document Ref	EDR - 24 – RCTSAB338-001-PA

Revision Status	FINAL
Date of Issue	November 2024
Prepared by	Daniel Mathias BSc (Hons), MSc
Checked by	Liam Swanwick BSc (Hons), MSc
Approved by	Liam Swanwick BSc (Hons), MSc

This report should only be used in its entirety.

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RHONDDA CYNON TAF

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CONTENTS

1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

The purpose of the report is to undertake an appraisal of the site and assess the applications compliance with the National Standards. The report will also inform the applicant, where required, what additional information is required for the full application in order for the application to constitute as a validly made application.

1.2 SITE PROPOSAL

The applicant proposes to demolish the former British Airways Avionic Engineering (BAAE) site, which consists of 3 buildings, and the redevelopment of the land to provide a new regional, multi-service facility that includes general theatres, day theatres and a series of diagnostics facilities with a co-located training academy, along with associated internal access routes. The development proposals include the retention of current car parking facilities in the east of the site.

1.3 SUSTAINABLE DRAINAGE PROPOSAL

It is not clear from the submitted information exactly how the system will function, however it is assumed the existing car parks and northern access road are to remain untouched and drain as existing, with runoff freely draining to the existing surface water network which outfalls to the River Ely. To note this network will be redirected and upgraded in sections. However, should the area not be impacted by the works, then the drainage for this area does not fall under the SAB application.

For the building areas, downpipes aren't detailed, therefore it is difficult to ascertain conveyance. However, it is assumed for buildings B and C runoff from the roof area appears to be collected by what may be bioretention areas and conveyed downstream towards a proposed basin. For building A, it is assumed as per the interception plan that all runoff is conveyed to the same network and downstream basin, however the layout plan provided does seem to also depict the northern section will be captured by the existing system and will be freely draining.

For the external hardstanding areas to the north around building A (C1-3), these areas will drain to bioretention areas and are then assumed to drain to the proposed network, although this is unclear from plan as this could also be depicted as draining to the

existing network. It's noted a section of permeable paving to the north of the site is proposed to drain to the existing network.

For the external hardstanding areas to around the buildings B and C (C4-C10 & C12-C18), it does appear runoff is to be collected by proposed bioretention areas before conveying to the basin. It's noted sections of permeable paving between building A and B, between building B and C, and in the adjacent car parks will also convey to the system.

The generator compound (C11) to the South of the site will consist of hardstanding and will drain immediately to the proposed basin, as will C8, which is located to the West of building B.

The proposed hardstanding along the Western boundary of the site (C19-C23) appears to be collected by bioretention areas, however no conveyance to the proposed network is depicted. It is assumed this will be the case, with all runoff from the proposed development conveying to the basin via some SuDS features, with the exception of the permeable paving in the Northern Car park.

The proposed basin will discharge runoff to a flow control chamber which will restrict discharge to 11.6l.s for the Q100+40% CC event.

1.4 Site Location

The land to be developed lies off Llantrisant Health Park, Ely Meadow, Talbot Green, Ynysmaerdy, Pontyclun CF72 8XL.

E- 303645, N - 183587

1.5 Submitted Documentation

As part of the application, the following documents were submitted:

- Pre-App Application Form
- 29762-HYD-XX-XX-RP-WENV-0002
- LHP-HYD-XX-XX-RP-GE-1000-S2-P02 DTS
- 29762-HYD-XX-XX-DR-C-3000 P02- Drainage strategy
- 29762-HYD-XX-XX-DR-C-4100 P01- Interception plan
- 29762-HYD-XX-XX-DR-C-4600 P01- Maintenance Plan
- 29762-HYD-XX-XX-RP-C-4600 - Operation and Maintenance

- 29762-HYD-XX-XX-DR-C-0401 P01- Existing Drainage Plan
- 29762-HYD-XX-XX-DR-C-0402 P01- Existing Drainage Plan
- 29762-HYD-XX-XX-DR-C-0403 P01- Existing Drainage Plan
- 29762-HYD-XX-XX-IR-C-0001
- 29762-4200 P01- Existing Imperm and Perm Areas
- 29762-4300 P01- Proposed Imperm and Perm Areas
- 29762-HYD-XX-XX-DR-C-4201 P01- Existing catchment area plan
- 6719_R2 - Llantrisant Health Park Utility Survey
- LHP-epd-VES-ZZ-DR-V-0001 Tree Constraint Plan PL01
- 29762-HYD-XX-XX-DR-C-0500 P02- Site Constraints Plan
- 1
- 20
- 100
- 100+40%
- 29762-HYD-XX-XX-RP-C-0001 Drainage Strategy_P02 (SAB Pre-App)

2 SITE APPRAISAL

2.1 SUSTAINABLE DRAINAGE APPLICATION HISTORY

No sustainable drainage application has previously been submitted within the boundary of the development.

2.2 EXISTING SITE USE

The land is currently occupied by a disused engineering facility, previously occupied by British Airways, with areas of car parking and soft landscaping.

2.3 EXISTING SITE DRAINAGE

The applicant has provided a layout of the existing development drainage regime. The layouts depict that runoff from the existing buildings, car parking areas and access road are all collected by a surface water drainage network that discharge runoff to the River Ely.

In the northern area of the site, a 225mm diameter network increasing to a 375mm network runs anticlockwise around building A and the access road, collecting runoff from buildings A and B, and from the access road.

In the centre of the site at the entrance to building A/B, there is also a 150mm diameter network which increases to a 525mm network running clockwise around the south of the site collecting runoff from the middle and southern car parking areas. It's noted the also contains spurs at the south of the site, enabling future connections.

Both networks pass petrol interceptors before combining at the West of the site before discharging into the River Ely at an unrestricted rate.

2.4 FLOOD RISK REVIEW

Following a review of the Development Advice Map, it was found that the site does not lie within a Tan15 C1 or C2 zone.

The risk of surface water flooding has been investigated utilising Natural Resources Wales' Flood Risk Assessment Wales maps. The results of which have identified that the site is not situated within an area of surface water flood risk (figure 1).

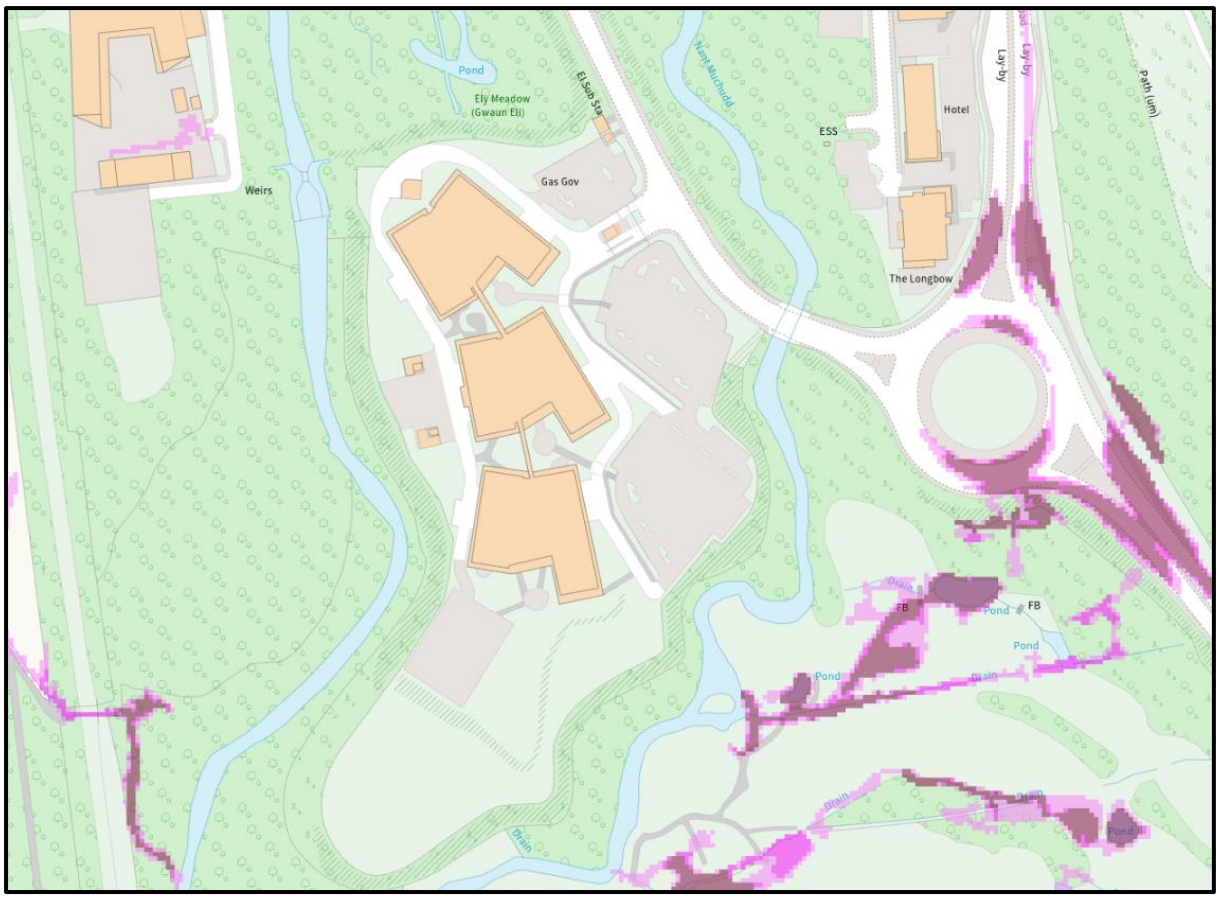

Figure 1. Areas of Low/Medium/High Surface Water Flood Risk at the proposed site, as per NRW Flood Risk Assessment maps.

It's noted no areas of fluvial flood risk are also present within the SAB boundary.

2.5 Environmental Impact Assessment

The applicant has stated that the proposed development does not require an environmental impact assessment, and therefore the determination period for the full application will be 7 weeks once the application is determined as validly made.

2.6 Ordinary Watercourse Consents

Since the Lead Local Flood Authority became responsible for authorising ordinary watercourse consents (OWC) in 2012, no OWC have been authorised within the boundary of the site.

2.7 Dwr Cymru Welsh Water Apparatus

Following a review of the Dwr Cymru Welsh Water (DCWW) GeoWeb, DCWW apparatus was identified within the site boundary comprising of combined sewer which runs along the western perimeter of the site. This is depicted in figure 2.

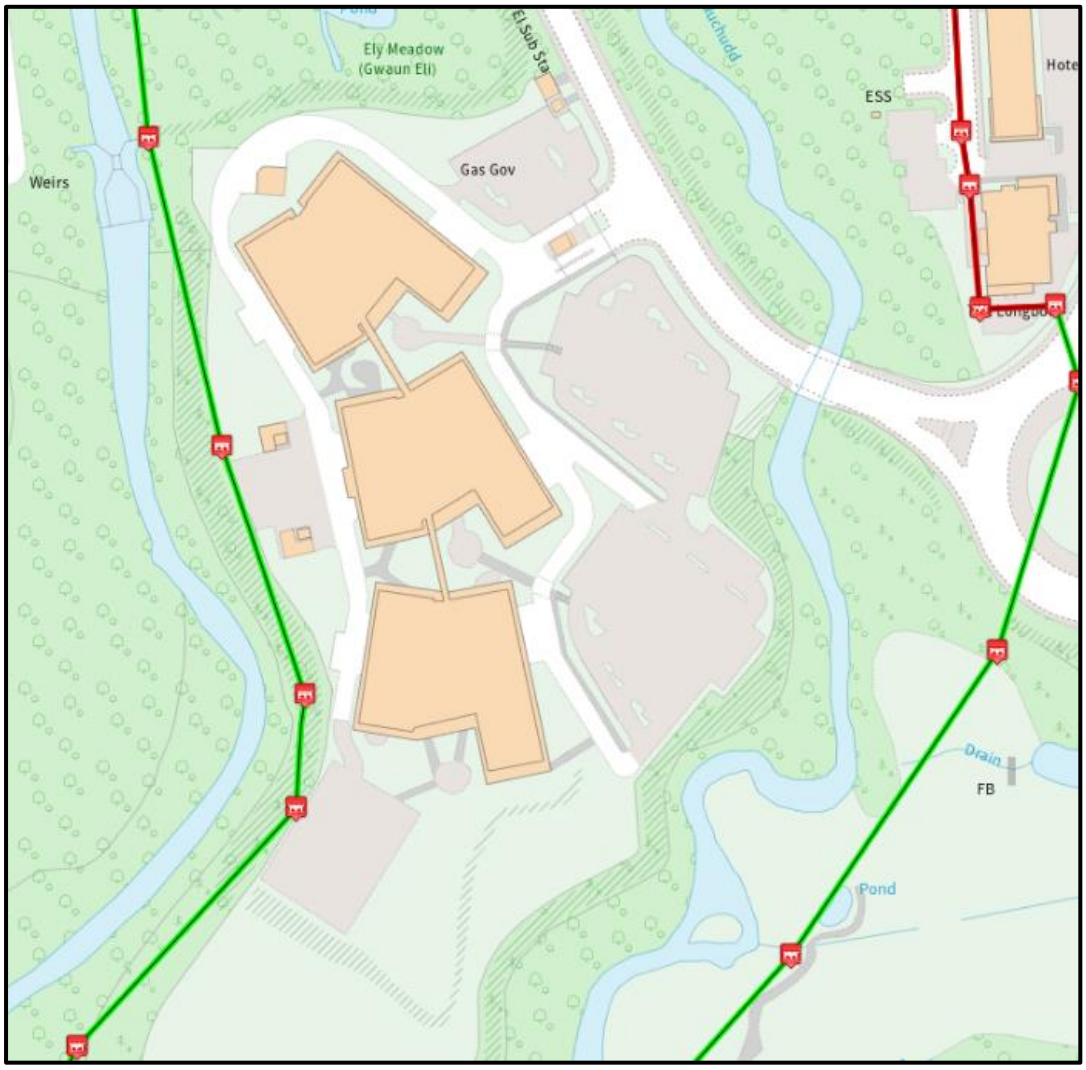

Figure 2. DCWW apparatus located on site.

2.8 Ordinary Watercourses

No known ordinary watercourses lie within the boundary of the site.

The Nant Muchudd ordinary watercourse is situated within 70m of the (Eastern) boundary of the site. The watercourses convey from North to South before converging with the River Ely.

2.9 Main River

No main river lies within the boundary of the site. Although the River Ely is located approximately 30m to the West of the Western site boundary, conveying southwards.

2.10 Assets

There are no known land drainage assets situated within the boundary of the site.

3 Validity of Application

3.1 REQUIREMENTS FOR A FULL APPLICATION

Paragraph 9 (2) of schedule 3 states that an application must be in any form required by the Approving Body. Within Regulations 'The Sustainable Drainage (Approval and Adoption Procedure) (Wales) Regulations 2018', regulation 3 states that an approving body may refuse to determine an application for approval which is not made in accordance with Paragraph 9(2) of Schedule 3.

The table below summarises the general documentation determined to be the minimum required to constitute a valid application, based on the development proposed. Table A and Table B found within the "Guidance on completing the full application form" has been utilised to determine the required documentation for a validly made application.

It is recommended that the applicant considers Table A and Table B prior to submitting a full application to the SuDS Approval Body (SAB). Supporting documentation required for each of the standards is stated and discussed in chapter 5 "compliance with National Standards" of this report.

Please note that where insufficient detail has been found on a drawing, that documentation has been determined to not be provided.

The SAB application form must be completed in full.

Table 1. General documentation required for the Full Application

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
A Site Plan	Construction area extent (1:2500 scale)	Y	Y
	Extent of Drainage system	Y	Y
	Location Plan	Y	Y
General documentation	EIA Statement	N	N
	Drawing Issue Sheet	Y	Y

3.2 CONSTRUCTION AREA AND ASSOCIATED FEE

An applicant must pay the correct fee in order for the application to constitute as a valid application. Each full application will be charged by the SAB in accordance with the regulations i.e. the application fee is related to the construction area of the proposed development. A review has been undertaken regarding the construction area and an estimate can be found in the table below.

Table 2. Required Fee based on an estimation of the Construction Area

Criteria	Estimated construction area (m^2)	Required Fee (£)	Comments
Application fee	1.95ha	£1,150	Applicant needs to define construction area.

It is of note that the Application fee does not need to be provided to the SAB until the SAB has confirmed the validity of the application. Please visit the below webpage address which states the process of submission and validation for a full application.

Web Link - www.rctcbc.gov.uk/sustainabledrainage

4 ADOPTION

4.1 REQUIREMENT FOR ADOPTION

The SuDS proposed is designed to provide drainage for a single property as defined by Regulation 9 of The Sustainable Drainage (Approval and Adoption Procedure) (Wales) Regulations 2018 and therefore **the SAB does not have a mandatory duty to adopt** as per the exemption detailed in paragraph 18 (1) and (2) of Schedule 3 of the Flood and Water Management Act 2010.

5 MEETING

A virtual meeting was held on 12th of November at 10:00am. The meeting was attended by the following:

- Chris Dolecki (CD)
- Stephanie Parry (SP)
- Daniel Mathias (DM)
- Rowan Thomas (RT)
- Rosie Cavill (RC)
- Stephen Robbins (SR)
- Chloe Madge (CM)
- Ben Kirby (BK)
- Alex Bowles (AB)

Meeting started 10:00.

Summary of discussion:

DM-Dan gives a brief of the overall plan for meeting and process.

CD-Chris Dolecki provides a description of the project of the project, site history/ access roads and levels.

CD-Site built on a raised engineered platform to lift levels out of the flood plain.

CD-Chris mentions site constraints and highlights water main to the south east of the land parcel. DCWW consultation led to 11.3m water main easement

CD-Chris discusses the existing drainage arrangements compiled from available resources and surveys carried out.

CD-Surface water is currently discharging from an outfall into nearby water course.

CD-Chris presents the proposed site layout and design.

CD-Chris highlights the desire to repurpose existing features.

Standard S1 - Surface Water Runoff Destination

CD-SUDS wetland area to the south of the site, draining southwards of the site.

CD- Infiltration testing completed, awaiting results but initial evidence with made up ground suggests this may not be desirable.

CD explained that there is some potential for infiltration. At the time of soakaway testing, ecology constraints prevented a soakaway test being completed at the location of the proposed basin but one has been taken as near as possible at this time.

CD-Highlights discharge into watercourse as a last solution

CD-Potential of incorporation of green roofs for small portions of the site but this may not be employed.

CD-Site is raised so exceedance flows will be directed off sites into associated watercourses.

DM-Dan takes over and goes through priority levels of surface water runoff, covers infiltration on made ground and the potential contamination (testing evidence).

DM- Request for features to be impermeably lined.

DM-Trial pit locations, soakaway testing, exception criteria covered (ground water flooding, contamination, ground instability)

DM suggested that infiltration as the primary runoff destination can be ruled out if there is evidence of lack of infiltration capacity, shallow ground water, risk of contamination and ground instability

CD-Chris highlights potential desire for infiltration but Dan will require evidence of GI report.

DM confirmed that if there was any evidence of contamination the SuDS features are to be lined.

DM highlighted that for Full SAB the following is required - soakaway testing results, full GI, soil logs, trial pit locations and sufficient coverage of soakaway tests including the location of the basin

DM confirmed that discharge to the River Ely via the existing connection is acceptable provided infiltration is ruled out as the main discharge destination.

S2 - - Surface Water Runoff Hydraulic Control

Interception of runoff:

DM acknowledged the interception plan and its compliance. DM also mentioned that if the SuDS features are to be lined due to contamination risk SAB will be accepting that interception will have been achieved as much as practically possible providing that runoff goes to the surface level of the SuDS features, the surface gradients of

the features are as flat as possible (no steeper than 1:100) unless check dams are proposed and roof runoff is via a diffuser if to below ground.

DM-Highlights permeable areas can't exceed the 2:1 ratio.

Morphological protection and flood risk mitigation for the receiving waterbodies:

CD explained that the proposed discharge rate from the new development area (SAB required area) is to be restricted to QBar Urban rate (11.6l/s) for all storms up to 1 in 100 year + 40% climate change allowance

DM-11.86 l/s is acceptable, however asked for clarity on the areas used to calculate the QBar Urban rate.

DM-Dan questions a perm paving area to the north which appears to connect to the existing.

CD-Chris mentions the desire to use gravity to connect to new features but if unable he hopes to use perm paving unlined and use infiltration and treatment of surface water if possible.

DM confirmed no issue with the proposed 11.6l/s rate from the new development area and requested any discharge from the new development that goes back into the existing drainage system to remain will need to be offset from the 11.6l/s rate.

DM-Dan mentions northern hardstanding area currently isn't clear how surface water will convey to the wetland basin but accepts this is an early concept design.

CD clarified that green roof area coverage potential is limited due to M&E equipment and proposed form of construction but will explore opportunities.

CD clarified that the connections not shown from the north west SuDS features will be to the basin.

DM highlighted some information that will be required at Full SAB - contributing area plan, hydrobrake and associated chamber construction detail, rainfall methodology, full network model, engineering model, downpipe locations, exceedance flow plan and overflows in bioretention features and their associated gradients.

DM-Dan requests hydro-brake details, overflow details and rainfall methodology.

DM-Extreme events, mentions pooling in low points, flow into river Ely. (Exceedance flow plan required).

Standard S3 - Water Quality

DM-S3 -All drainage draining to the bioretention area must be from surface water.

DM-Gradients required/overflow shouldn't come into affect prematurely.

DM-Base area below outfall of basin requires detailing to determine treatment area provided.

DM suggest the following information is included to support the water quality achievement from bioretention areas - filter media at least 400mm deep, hydraulic conductivity minimum of 100mm/hr and SuDS features plan area and gradients shown.

CD suggested a low flow swale and forebay will look to be incorporated into the basin. DM suggested a forebay of 10% of the basin area.

Standard S4/S5 - Amenity/Biodiversity

DM acknowledged that the design should be compliant.

DM suggested as part of Full SAB application a planting schedule and landscape plan be included.

BK confirmed discussions has been had with the local authority regarding the landscaping/ecology.

Standard S6 - Construction, Operation & Maintenance

DM-Construction management plan required, for Full SAB approval but it can be conditioned.

DM - Estate management company to maintain features with sufficient access to the features. Requested it is included in maintenance plan as to who is responsible.

DM suggested a maintenance berm around the basin between 1.5m-3m wide for maintenance access. DM acknowledged the water main easement constraint which may limit this.

DM clarified that full construction details to be included in the Full SAB Application including bioretention make up and level and type of overflow in the Hydrobrake chamber.

DM-Dan ends drainage standards.

CD-Chris queries demolition phase and SAB requirements for this phase.

DM confirmed that there is no formal SAB requirement related to the early demolition phase.

Meeting ended at 10:50

6 COMPLIANCE WITH NATIONAL STANDARDS

6.1 STANDARD S1 - SURFACE WATER RUNOFF DESTINATION

Priority level 1 –

Within the drainage strategy, the applicant states considering the nature of the development and it's users, rainwater harvesting is deemed unsuitable as there would be insufficient demand for such system. The SAB would require further evidence as per the exemption criteria outlined in section G1.4 of the SuDS national standards is provided. For example, no stresses on the DCWW water supply, or evidence that the cost of implementing such system would not be cost effective when considering the design life of the development.

Priority level 2 –

The applicant is not proposing to discharge any runoff at this priority destination level.

The applicant has provided a phase 1 ground conditions desk study for the site. The Document highlights as per BGS, ground conditions in the region are likely to consist of alluvium and glaciofluvial deposits, with the bedrock consisting of Rhondda Member. Based on the historical reports review, it should also be noted it appears a substantial amount of fill has been undertaken on site to raise ground levels.

Based on the existing site use and construction activities, the presence of made ground is anticipated on site, possibly containing elevated levels of metals, inorganics, PAH's and petroleum hydrocarbons which pose a risk of contamination to groundwater. The presence of variable made ground also increases the risk of instability on site, which is compounded by the potential for shallow groundwater.

The desktop study highlights groundwater level is anticipated to be shallow on site, and present in the upper alluvial deposits, in continuity with water levels in the River Ely and Nant Muchudd.

Based on the above, the applicant states a soakaway as a dedicated discharge method is unlikely to be suitable due to the nature of the ground conditions which have seen the site lifted above the flood plain on engineered made ground. The applicant does state soakaway testing is due to be undertaken to prove the ability of the ground to offer better means of interception.

Within the enhanced detail review, the applicant states Infiltration testing has recently been completed, and they are awaiting results but initial evidence with made up ground suggests this may not be desirable.

It was stated by the applicant that there is some potential for infiltration. At the time of soakaway testing, ecology constraints prevented a soakaway test being completed at the location of the proposed basin but one has been taken as near as possible at this time.

The SAB note should any infiltration be proposed, based on the size of the site, an assessment as per section B.4.2 of the Ciria SuDS manual should be undertaken. This section outlines the use of infiltration should be approved by a geotechnical engineer or engineering geologist should the following conditions be met:

- Larger sites where area drained to infiltration component exceeds 1000m²
- In areas where there are likely to be issues with the use of infiltration (eg due to potential solution features)
- Where the consequences of failure are significant.

Whilst the SAB are in agreement that infiltration is unlikely to be feasible based on the desktop study provided. At full application, for a lower priority destination level to be considered, the SAB will require the applicant suitably evidences at least **one** of the exemption criteria outlined in section G1.8 of the SuDS national standards and section 25.2 of the Ciria SuDS manual, which highlights the potential constraints for infiltration systems with respect to infiltration capacity, depth to groundwater, ground stability, groundwater flood risk, and protection of groundwater from contamination.

It should also be noted, should partial infiltration be proposed (leaky system – permeably lined), the acceptability of partial infiltration will also need to follow guidance provided in section 25.2 of the Ciria SuDS manual, complying with all relevant requirements for infiltration systems with respect to depth to groundwater, ground stability, groundwater flood risk, and protection of groundwater from contamination. Therefore, should the applicant rule out infiltration on the basis that one of the above exemption criteria is met, for example shallow depth of groundwater, then the SAB would request all SuDS features are impermeably lined.

Details of the requirements to evidence the exemption criteria and constraints are provided below.

Infiltration capacity and infiltration testing:

If the lack of infiltration capacity is stated to be one of the justifications as to why a lower priority destination level needs to be considered, the SAB will require evidence at full application that soakaway testing in accordance with BRE365 has been conducted on site. The SAB require trial pit locations and logs are provided, demonstrating testing was undertaken with a suitable methodology. Should an infiltration test fail we would expect an additional trial pits are excavated to provide sufficient coverage of the site and to demonstrate the findings are reflective of the site as a whole and not just at that specific point. It's noted as per section 25.2.1 and section 25.3 of the Ciria SuDS manual the soil log is imperative to provide confirmation that the measured infiltration capacity is representative of the wider soil mass, i.e testing hasn't been undertaken in a limited sand/gravel layer situated within a wider mass of clay, or vice versa.

In particular, the SAB would expect based on the proposed design that testing is conducted in the vicinity of the proposed basin.

Should the soakaway testing identify negligible infiltration rates (lower than minimum rate of 1×10^{-6}m/s detailed in section 25.2.1 of the Ciria SuDS manual), then the SAB will deem that the exemption criteria has been suitably evidenced. However, should suitable infiltration rates be obtained, the SAB will require one of the other exemption criteria is evidenced.

Groundwater flood risk:

As per section 25.2.2 of the Cira SuDS manual, 1m of unsaturated ground is required beneath the base of an infiltration component/any SuDS feature to ensure the performance of the feature and protecting the system from underlying groundwater. It's noted the desktop study highlights that groundwater levels are likely to be shallow on site.

Should shallow groundwater be identified on site during the ground investigations, and it is deemed unachievable to comply with the 1m separation distance, (for example - lack of 1m separation distance in the vicinity of the basin), then the SAB will deem a lower priority destination level can be considered.

In regard to whether partial infiltration is proposed (leaky system), should the proposal for partial infiltration from a feature result in a non-compliance with the 1m separation distance then the SAB request the systems are impermeably lined.

It's noted it appears bioretention areas are proposed as part of the design. As per section 18.2 of the ciria SuDS manual then the max groundwater level should be at

least 1m below the base of the system, or the system will need to be impermeably lined.

It's noted as a detention basin is proposed as part of the design. As per section 22.3 of the ciria SuDS manual then the max groundwater level should be at least 1m below the base of the system, or the system will need to be impermeably lined.

Ground stability:

Based on the presence of made ground on site and due to the likely high groundwater table, it is likely there is an increased risk of instability on site. Should the applicant provide evidence via a geotechnical engineer that infiltration on site may increase the risk of instability to any existing or proposed structures, then the SAB will deem a lower priority destination level can be considered.

In regard to whether partial infiltration is proposed (leaky system), The applicant is informed of the following:

As per section 25.2.3 of the Ciria SuDS manual, any infiltration (partial/full) within 5m of any existing or proposed structure requires an assessment of the risk of instability associated to infiltration from the component.

As per paragraph G2.21 of the SuDS national standards, diffuse infiltration (partial or full) near the surface using larger infiltration components such as permeable surfacing should not normally pose a risk to the structure, however when within 3m of existing or proposed structures an assessment should be provided by a geotechnical engineer as to the risk of instability.

Groundwater contamination:

As noted above, based on the existing site use and construction activities, the presence of made ground is anticipated on site, possibly containing elevated levels of metals, inorganics, PAH's and petroleum hydrocarbons which pose a risk of contamination to groundwater. At full application, should the applicant evidence that infiltration would increase the risk of mobilisation of existing contaminants to ground, then as per section 25.2.4 of the Ciria SuDS manual the SAB would deem a lower priority destination level can be considered. However, evidence to justify the risk of contamination via infiltration should include a full GI with evidence of contaminants testing provided across several excavations with sufficient coverage of the site.

Of note is that should made ground be present on site, all SuDS features should be constructed within natural strata, and should also not infiltrate or partially

infiltrate into any made ground (leaky system), unless it can be evidenced that this will not pose any acceptable risk of groundwater pollution.

It should be noted as per section 20.3 of the Ciria SuDS manual, unlined pavements should not be utilised on brownfield areas unless it has been demonstrated that the risk posed by leaching of contaminants is managed to acceptable levels.

It should be noted as per section 22.3 of the Ciria SuDS manual, unlined basins should not be utilised on brownfield areas unless it has been demonstrated that the risk posed by leaching of contaminants is managed to acceptable levels.

Priority level 3 & 4 –

The applicant is proposing to discharge runoff to the adjacent River Ely via a surface water network at a restricted of 11.6l/s. The SAB note the proposal will not require the use of pumping or extensive infrastructure, and providing the proposal does not increase downstream flood risk (assessment provided in S2) will therefore be suitable to the SAB as in line with section G1.31 of the SUDS national standards. Subsequently, should the applicant suitably evidence the exemption criteria for priority level 2, the SAB have no objection to discharge at this priority level. Whilst it is noted the river is located west of the site, it is considered given the existing runoff to the system that it would not be appropriate to request for a new outfall to the river for the SuDS drainage and the SAB is content with the applicant re-utilising the existing system which drains to the river immediately downstream.

Table 3. Primary and secondary destination of surface water runoff

Priority Level	Primary destination	Secondary destination	Comments
Priority Level 1	N	N	
Priority Level 2	N	N/A	
Priority Level 3	N	Y	
Priority Level 4	Y	N	
Priority Level 5	N	N	

Please note that the Environmental Permitting Regulations (2016) require the applicant/ developer to obtain a bespoke Flood Risk Activity Permit for any works or structures located in, under, over or within 8 metres of the bank top of the River Ely, a designated main river.

It is noted that the applicant intends to utilise an existing connection from the site. However, should a new outfall/connection be required and subsequently proposed, then the applicant should make note of the following where applicable.

*Please note that SAB approval does not provide the right to connect into a culverted watercourse. As per Paragraph G2.3 and G2.4 of the National Standards, the right to connect must be secured from the Landowner who is responsible for the receiving drainage system in which the connection is proposed.

Furthermore, the SAB approval process does not provide consent under Section 23 of the Land Drainage Act 1991 to undertake connection/ outfall works to the ordinary watercourse. This type of consent (Ordinary Watercourse Consent) is regulated by the Lead Local Flood Authority (LLFA). Under this process, the LLFA will review the connection and as to whether the additional flow of water will present an increase in flood risk by reviewing the capacity of the culvert. For more information the applicant is advised to visit RCT's Ordinary Watercourse Consent Webpage which provides Application Guidance, Culverting Policy and contact details to make an application (Section 7)*.

Please note that SAB approval does not provide the right to connect into a drainage system such as a highway drainage system. As per Paragraph G2.3 and G2.4 of the National Standards, the right to connect must be secured from the Landowner who is responsible for the receiving drainage system in which the connection is proposed. It is recommended that the Highways Development Control department are contacted regarding the proposal of runoff to connect into the existing system. Please note the HDC department will be consulted as part of the SAB full application.

It should be noted that SAB approval does not provide the right to connect into Dwr Cymru Welsh Water apparatus. The right to connect must be secured from DCWW via a section 106 agreement. It is recommended that the applicant contacts DCWW prior to the submission of the full application to establish as to whether DCWW would raise any objection to the proposed connection and associated discharge into the DCWW apparatus. Please note the DCWW will be consulted as part of the SAB full application.

In summary, the proposed design **does not include sufficient information to ascertain compliance** with Standard S1.

A likely compliance with Standard S1 can be achieved through the inclusion of the 'further information required' outlined below. However, **compliance is dependent on**

the quality of the information that is provided and cannot be guaranteed without appropriate evaluation of the additional documentation.

Further information required

A ground investigation including infiltration testing in accordance with BRE365 must be completed and submitted at the full applications stage.

Please see Table 4 which summarises the documentation required to satisfy standard S1.

Table 4. Documentation required to satisfy Standard S1 for the Full Application

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S1	Detailed whole Site SuDS Drainage Design Proposals	N	Y
	Geotechnical factual and interpretive report	N	Y
	Permeability testing	N	Y
	Contaminated Land Report	N	Y
	Unstable land report	N	Y

6.2 STANDARD S2 – SURFACE WATER RUNOFF HYDRAULIC CONTROL

Interception of runoff

As per section 24.8 of the Ciria SuDS manual, compliance with the interception criteria should differentiate between winter and summer, with the first 5mm of rainfall expected to be intercepted during 80% of summer events and 50% of winter events.

The drainage proposal appears to include numerous SuDS such as bioretention areas, permeably surfacing and a detention basin which provide some level of interception regardless of whether the features will allow for infiltration or not.

The applicant has provided an interception plan for the proposed drainage system, which outlines whether the proposed SuDS features are compliant with the interception criteria, as outlined in table 24.6 of the Ciria SuDS manual.

For the catchment areas draining to bioretention features, as per 24.6 of the Ciria SuDS manual interception of runoff can be assumed to comply where the impermeable surface draining to the feature is less than 5 times the vegetated surface area receiving the runoff, **providing the feature is unlined (geo-textile surround).**

For the bioretention areas, it's noted the area of the features haven't been detailed, however the layout plan details the 5x areas (area that the bioretention area can accommodate). As per the layout plan the impermeable area draining to their respective bioretention area does not exceed 5x the vegetated surface of the features, with the exception of Catchment 10, where a residual treatment of 39m² is required.

However, for sufficient interception to be offered as per the interception criteria, further information is required as to whether the proposed bioretention areas are to be lined or impermeably lined, as the applicant hasn't provided a construction detail for the bioretention areas which is required.

Should all of the bioretention features need to be lined due to a risk of noncompliance with S2 (As detailed in the box above), then the SAB will deem interception of runoff has been maximised as far as practically possible, providing the following conditions are met:

- The SAB require further information as to how runoff is proposed to drain to the features, for interception to be offered by the features it will need to be demonstrated that all runoff from impermeable areas enters at surface level as

the majority losses occur as runoff soaks into the surface vegetation and is lost to transpiration.

- The SAB will also require further clarification as to the surface gradient of the features. As per section 18.4.1 of the Ciria SuDS manual, the desirable gradient of a bioretention system is either horizontal or as close to horizontal as possible, to ensure flow is evenly distributed across the surface of the feature and for interception to be maximised. Should any substantial gradients be proposed then the SAB will require appropriate interception mechanisms are proposed.

- The SAB will also require the contributing areas, and areas of bioretention areas are detailed on plan ensure they are suitably sized.

For the proposed permeable surfacing areas, as per the interception plan provided the applicant is proposing these areas will only drain their own area.

As per table 24.6 of the Ciria SuDS manual, all permeable surfaces whether lined or not can be assumed to comply provided there is no extra area drained to the permeable surface. As per Drake et al 2012, on average the first 7mm of rainfall is intercepted, while for permeable blockwork the average ranges from 7.3mm to 5mm according to various studies.

Therefore, should the permeable surfacing areas only drain their own areas, providing they are suitably designed they will offer sufficient levels of interception regardless of whether they are lined or not.

For the areas draining to the proposed basin which totals the roof areas, catchment 8 and catchment 11 (8249m²), Ciria states the following regarding interception from basins:

As per table 24.6 of the Ciria SuDS manual, areas of the site drained to detention basins with a flat unlined base can be assumed to comply where the drained impermeable surface area is less than 5 times the vegetated surface area receiving the runoff for any soil type. The area of the basin that is assumed to contribute to interception of runoff should be below the outlet level of the basin.

It's noted the base area of the detention basin beneath the outlet hasn't been detailed on plan, however the model depicts the basin will have a base area of 1644m², which gives a total interception area of 8220m² (assuming the outlet is base), which is slightly less than the total impermeable area requiring interception draining to the feature.

Regardless, for sufficient interception to be offered as per the interception criteria, further information is required as to whether the proposed basin is to be lined or impermeably lined, as the applicant hasn't provided a construction detail for the basin which is required.

Should the basin need to be lined due to a risk of noncompliance with S2 (As detailed in the box above), then the SAB will deem interception of runoff has been maximised as far as practically possible, providing the following conditions are met:

- The SAB will require the contributing areas, and area of basin below outlet are detailed on plan ensure the basin is suitably sized to offer interception.
- The SAB will also require further clarification as to the surface gradient of the feature. As per section 22.2 of the Ciria SuDS manual, the desirable gradient of a basin is either horizontal or as close to horizontal as possible (Doesn't exceed 1:100)., to ensure flow is evenly distributed across the surface of the feature and for interception to be maximised.

In summary, whilst it is clear the design will provide interception via a variety of SuDS features, the SAB cannot currently determine if it is compliant given the lack of detail for these features.

Morphological protection and flood risk mitigation of receiving surface water bodies

As per the drainage strategy and model provided, the applicant is proposing to discharge runoff to the River Ely via an existing surface water network at rate of 11.6l/s.

The applicant has provided a runoff calculation via micro drainage modelling software via the ICP SuDS Mean Annual Flood method. The SAB have reviewed the calculation and note the applicant has inputted an appropriate SAAR value and soil value for the location.

The applicant states the inputted effective contributing area of the site is taken as 1.5ha, which includes 45% of existing impermeable area.

The SAB have reviewed the supplied catchment areas, which shows currently the existing impermeable area of the proposed development is equal to 1ha, with 0.707ha consisting of building area. The current permeable area of the proposed development is equal to 0.9ha. The applicants proposal will result in an increase in impermeable area to 1.28ha, and a reduction in permeable area down to 0.66ha.

The calculation provided by the applicant depicts an existing QBAR rate of 11.6l/s, which the applicant is proposing to restrict discharge to.

Based on the information provided to date, the SAB have no issue with the proposal to discharge at 11.6l/s, providing the proposed impermeable areas on site are all to drain to the system and are included in the hydraulic model. SAB do query how the inputted area in the calculations has been calculated however.

Should this be the case, the SAB deem the proposed discharge rate is suitable and in accordance with paragraph G2.23 and G2.30 of the Statutory Standards.

However, how the drainage feature functions and conveys runoff isn't clear.

The SAB do query that an area of permeable paving at the North is depicted as draining to the existing system, This is unacceptable to the SAB as it will need to be ensured all of the developed areas drain to the proposed system and are restricted to 11.6l/s. Unless it's evidenced the increase in runoff from the feature/s is offset by the basin (discharge combined from both is equal to total discharge from developed areas of 11.6l/s).

Layout provided does also depict the northern section of roof area will be captured by the existing system and will be freely draining. Clarification as to how roof areas are to drain is required, with locality of downpipes requested.

Additionally, the SAB note the external hardstanding areas to the north around building A (C1-3), and the proposed hardstanding along the Western boundary of the site (C19-C23) have no obvious conveyance to the proposed system. Clarification required as to how these areas drain as it should be ensured all of the developed areas drain to the proposed system and are restricted to 11.6l/s, as per above.

Should any proposed developed areas not drain to the system, and drain to the existing, the total discharge will need to demonstrate to equal 11.6l/s from both networks. I.e the increase in runoff from areas draining to the existing are offset.

Noted the existing hardstanding areas such as the car parks will drain as existing and will not be captured by the proposed system and will drain as existing.

Flood Protection for the site

The applicant has provided microdrainage source control calculations of the proposed basin. The SAB have reviewed the model and note the following:

- Unclear as to whether the proposed levels and area for basin are appropriate, as no construction detail has been provided. SAB request site-specific construction detail for basin and base and top area are detailed at full application.
- Unclear as to whether hydrobrake inputs are appropriate, as no construction detail or levels for the either the flow control or basin have been provided. A detail will be required at full application demonstrating inputs are appropriate.
- Cannot determine if contributing area inputted is appropriate as not detailed, however SAB request at full application the total proposed impermeable area is shown in model, while a contributing area plan should also be provided to demonstrate appropriate inputs.
- Cannot determine if rainfall methodology is appropriate as not detailed. At full application, rainfall printout will be required in addition to information regarding the simulation criteria (storm durations, Cv value etc)
- No flooding of system during Q100+40% event while restricting discharge to 11.6l/s, with max level in system being depth of 0.707m. However, cannot validate model due to lack of information.

At full application stage, a full network model is required, with the supporting information evidencing inputs are appropriate. The network model will need to be accompanied by detailed construction details, an engineering layout, contributing area plan, manhole schedule, and cross section and long section drawings where appropriate. The SAB also request the locality of the downpipes is clearly detailed.

Additionally, the SAB note the external hardstanding areas to the north around building A (C1-3), and the proposed hardstanding along the Western boundary of the site (C19-C23) have no obvious conveyance to the proposed system. Clarification required as to how these areas drain as it should be ensured all of the developed areas drain to the proposed system and that this is reflected in the hydraulic model.

The SAB require the collection mechanisms for the generator compound Catchment 11, and Catchment 8 are detailed, as it's currently unclear how runoff from this area will be collected.

The SAB require further information at full application as to the proposed levels across site to ensure the proposed impermeable areas will be collected.

The SAB also note as per section G2.33 of the standards, the proposed drainage system should consider the potential for overland flows to convey onto the site during normal and extreme events. The SAB require the applicant proposes appropriate mitigation to ensure provision to route such flows around the site, or to incorporate them into the site drainage should be made. If they are incorporated into the site drainage, then there is no need to provide attenuation for them.

Extreme event exceedance management of surface water runoff

Applicant has stated in the event of extreme rainfall or poor maintenance of the system, flooding will occur in low points and valleys within the external areas. However, the applicant hasn't provided an exceedance flow plan, which is required at full application stage. SAB request exceedance flow plan is provided which demonstrates where flow would convey during an exceedance event.

Evaluation of impact of potential failure of a drainage system

It appears applicant hasn't incorporated an overflow within either flow control chamber, although no construction detail provided to confirm. The SAB will require at full application the applicant proposes an overflow above the max designed water level in system for Q100+40% cc event in flow control chamber.

The SAB will also require overflows are proposed in the bioretention areas. The SAB will require the applicant evidences the location of each overflow within the bioretention areas, while also demonstrating the surface gradients of the features, to ensure the overflow is positioned appropriately. Should any surface gradients be proposed for the bioretention areas, then the SAB request the applicant positions the overflow at the low point of the feature and incorporates appropriate interception mechanisms so the overflow doesn't constantly take effect.

In summary, the proposed design **does not include sufficient information to ascertain compliance** with Standard S2.

A likely compliance with Standard S2 can be achieved through the inclusion of the 'further information required' outlined below. However, **compliance is dependent on**

the quality of the information that is provided and cannot be guaranteed without appropriate evaluation of the additional documentation.

Further information required

At the full application stage, an engineering layout which includes levels, gradients, locality and storage is required.

Detailed hydraulic calculations will be required to demonstrate the hydraulic suitability of the proposed drainage system. The hydraulic calculations will have to demonstrate that the proposed drainage system can accommodate the Q100 plus climate change event, whilst successfully restricting runoff to 11.6l/s. This will need to be accompanied by a contributing area plan that will depict the contributing areas inputted into the hydraulic calculations at each manhole. A manhole schedule will also be required to support the hydraulic model.

Detailed cross sections and construction drawings will be required to demonstrate suitable design.

Please see table 5 which summarises the documentation required to satisfy standard S2.

Table 5. Documentation required to satisfy Standard S2 for the Full Application

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S2	Drainage Strategy	Y	Y
	Flood Consequence Assessment	Y	N
	Greenfield/ pre-development runoff	Y	Y
	Hydraulic model/ storage calculations	Y	Y
	Schematic Plan	Y	Y
	Contributing area plan	Y	Y
	Cross section drawings and standard detail drawings	N	Y
	Longitudinal section coloured drawings	N	Y
	Natural and artificial drainage catchment and sub-catchment plan	N	Y
	General engineering layout coloured drawings	N	Y

6.3 STANDARD S3 – WATER QUALITY

The proposed re-development of the former British Airways Avionic Engineering (BAAE) site, which consists of 3 buildings, and the redevelopment of the land to provide a new regional, multi-service facility that includes general theatres, day theatres and a series of diagnostics facilities with a co-located training academy, along with associated internal access routes results in pollutant loadings to the surface water runoff (table 6). This assessment will consider the proposed land use and associated treatment from the proposed SuDS.

Table 6. Pollution hazard level and pollution indices for each of the proposed land uses Proposed based on Ciria SuDS Manual C753, table 26.2

Area	Proposed Land Use	Pollution Hazard Level	Total suspended Solids (TSS)	Metals	Hydrocarbons
1	Roof areas (buildings B and C)	Low	0.3	0.2	0.05
2	Roof areas (building A)	Low	0.3	0.2	0.05
3	External hardstanding areas	Very Low	0.2	0.2	0.05
4	Parking areas/ internal access routes	Low	0.5	0.4	0.4
5	Permeable surfaced areas	Low	0.5	0.4	0.4
6	Generator compound (C11) and catchment 8	Low	0.5	0.4	0.4

Table 7. Mitigation indices for proposed SuDS on site

Area	Contaminant	Risk Indices	Permeable paving	Bioretention areas	Basin	Total Mitigation indices	Compliant
1	TSS	0.3	N/A	0.8*	0.5	1.05	Y*
	Metals	0.2	N/A	0.8*	0.5	1.05	Y*
	Hydrocarbons	0.05	N/A	0.8*	0.6	1.1	Y*
2	TSS	0.3	N/A	0.8*	0.5*	1.05	Y*
	Metals	0.2	N/A	0.8*	0.5*	1.05	Y*
	Hydrocarbons	0.05	N/A	0.8*	0.6*	1.1	Y*
3	TSS	0.2	N/A	0.8*	0.5*	1.05	Y*
	Metals	0.2	N/A	0.8*	0.5*	1.05	Y*
	Hydrocarbons	0.05	N/A	0.8*	0.6*	1.1	Y*
4	TSS	0.5	N/A	0.8*	0.5*	1.05	Y*
	Metals	0.4	N/A	0.8*	0.5*	1.05	Y*
	Hydrocarbons	0.4	N/A	0.8*	0.6*	1.1	Y*
5	TSS	0.5	0.7	N/A	0.5*	0.95	Y*
	Metals	0.4	0.6	N/A	0.5*	0.85	Y*
	Hydrocarbons	0.4	0.7	N/A	0.6*	1	Y*
6	TSS	0.5	N/A	N/A	0.5*	0.5*	Y*
	Metals	0.4	N/A	N/A	0.5*	0.5*	Y*
	Hydrocarbons	0.4	N/A	N/A	0.6*	0.6*	Y*

Please note that whilst mitigation indices have been inputted, this is based on assumptions as tt is not currently clear from the submitted information exactly how the system will function. Therefore, it is unclear as to the mitigation indices provided.

Considering this, a risk indices approach as per the Ciria SuDs Manual has been undertaken with the proposal at concept stage (table 7). The results of which found sufficient treatment of runoff is likely to be provided by the design, providing it's evidenced the impermeable areas to in fact drain to the SuDS features and the SuDS features are appropriately designed.

Areas 1-4

For the building areas B and C (area 1), downpipes aren't detailed, therefore it is difficult to ascertain conveyance. However, it is assumed for buildings B and C runoff from the roof area appears to be collected by what may be bioretention areas and conveyed downstream towards a proposed basin. Alternatively, it may be that runoff is conveyed immediately downstream to the basin downstream. Clarification required regarding this as this will impact mitigation indices offered.

For building A (area 2), it is assumed as per the interception plan that all runoff is conveyed to the same network and downstream basin, however the layout plan provided does seem to also depict the northern section will be captured by the existing system and will be freely draining, without passing any treatment mechanisms. Therefore, clarification is required regarding this, as it will need to be ensured the roof area drains to the proposed system.

For the external hardstanding areas to the north around building A (C1-3), it appears these areas will drain to bioretention areas and are then assumed to drain to the proposed network, although this is unclear from plan as this could also be depicted as draining to the existing network, although it is assumed this is not the case. However, clarification is required.

For the external hardstanding areas and parking areas/internal access routes and around the buildings B and C (C4-C10 & C12-C18), it does appear runoff is to be collected by proposed bioretention areas before conveying to the basin.

The proposed hardstanding along the Western boundary of the site (C19-C23) appears to be collected by bioretention areas, however no conveyance to the proposed network is depicted. It is assumed this will be the case, with all runoff from the proposed catchments conveying to the basin.

The level of treatment offered will also depend on conveyance of the features to the SuDS features, as it's currently unclear as to whether the roof areas will drain to bioretention areas prior to the basin, or immediately to the basin, which will impact the level of treatment offered as per the indices approach.

For the hardstanding areas, parking areas/internal access routes and roof areas should they drain to bioretention areas first, (Areas 1-4), while sufficient treatment is likely offered by the bioretention areas per table 7, the SAB require further information is provided as follows:

The area of each raingarden and it's contributing area, to determine if the features are appropriately sized.

- Additionally, for the SAB to determine whether sufficient levels of treatment of runoff are to be provided by the bioretention areas, the SAB require further information as to how runoff will convey to the features. For treatment to be offered, it is required that runoff is conveyed to the features at surface level. While it is assumed this is proposed, it is currently unclear.

- The SAB will also require a construction detail of the features is provided. In regard to the construction, information is required as to the depth of filter medium, hydraulic conductivity, and depth and locality of the overflows. The SAB also require the applicant evidences the area/dimensions of bioretention features on plan to ensure they are appropriately sized to offer treatment of runoff.
- In regard to the hydraulic conductivity of the filter medium. The SAB require a minimum saturated hydraulic conductivity of 100mm/hr-300mm/hr is proposed to ensure the filter medium has sufficient treatment capacity. The SAB note a minimum depth of 400mm should be provided to ensure suitable design for treatment capacity, while a suitable composition in line with box 18.1 of the Ciria SuDS Manual should also be proposed.
- The SAB will also require further information as to the surface gradient of the features. As per section 18.4.1 of the Ciria SuDS manual, the desirable gradient of a bioretention system is either horizontal or as close to horizontal as possible, to ensure flow is evenly distributed across the surface of the feature and for treatment of runoff to be maximised.
- Should any gradient be proposed, the SAB request that check dams are installed along the bioretention area to ensure that the full area of the raingarden is utilised for treatment of small events and ensuring that erosion of the raingarden surface and subsequent sedimentation is less likely to occur, with flow more evenly distributed across the surface of the feature.
- The SAB will also require the applicant evidences the location of each overflow within the bioretention areas on plan, to ensure the overflow is positioned appropriately. Should any surface gradients be proposed for the bioretention areas, then the SAB request the applicant positions the overflow at the low point of the feature and incorporates appropriate interception mechanisms so the overflow doesn't constantly take effect, thus bypassing treatment of runoff.

Additional levels of treatment to these areas will also be offered by the basin downstream. However, the level of treatment offered by the basin will be subject to appropriate design in accordance with section 22.5 of the Ciria SuDS manual.

Overall, it is considered likely that sufficient treatment is provided for the roof and external areas should they drain to the bioretention area and/or basin and these are designed as per the above requirements.

Area 5:

It's noted sections of permeable paving between building A and B, between building B and C, and in the adjacent car parks will drain their own area and convey to the system.

For the permeable surfacing areas, the risk indices approach deems sufficient treatment is to be offered. As per section 20.6 of the Cira SuDS manual, the design of permeable surfacing should ensure that the surface layer has sufficiently small voids to trap silt within the upper 30mm of the surface, and therefore a jointing material consisting of 2/6.3mm should be utilised to meet this requirement for permeable surfacing, while this requirement is also met by suitably designed porous asphalt, and other forms of permeable surfacing.

Area 6:

The generator compound (C11) to the South of the site will consist of hardstanding and will drain immediately to the proposed basin, as will C8, which is located to the West of building B. although the collection mechanisms for these features are unclear.

To determine if sufficient treatment of these areas is to be offered by the design, the SAB require evidence that the basin will be have appropriate design in accordance with section 22.5 of the Ciria SuDS manual. To note, due to the size of the proposed basin, the SAB would expect a sediment forebay is incorporated into the design, which should be 10% of the total area.

The SAB will also require further clarification as to the surface gradient of the feature. As per section 22.2 of the Ciria SuDS manual, the desirable gradient of a basin is either horizontal or as close to horizontal as possible (Doesn't exceed 1:100), to ensure flow is evenly distributed across the surface of the feature and for treatment of runoff to be maximised, ensuring velocities through the basin aren't excessive

As detailed in S1, it is unclear as to whether the applicant is proposing the SuDS features on site are to be lined or unlined. It's important to note that 'leaky systems' are desired by the SAB but should not compromise compliance with the standards (section G1.8). In this instance, should the applicant propose a 'leaky system' for the permeable surfacing, basin and bioretention systems, then the SAB will require that the risk of groundwater pollution via mobilisation of existing contaminants on site is low.

In summary, the proposed design **does not include sufficient information to ascertain compliance** with Standard S3.

A likely compliance with Standard S3 can be achieved through the inclusion of the 'further information required' outlined below. However, **compliance is dependent on the quality of the information that is provided** and cannot be guaranteed without appropriate evaluation of the additional documentation.

Further information required

The SAB require the applicant provides construction details of the proposed SuDS features which demonstrate suitable design for treatment, as outlined in the Ciria SuDS manual. The SAB also require the applicant provides a contributing area plan detailing the impermeable areas draining to each feature and the permeable areas on site receiving the runoff. The plan should also detail the ratio between impermeable and permeable surface for each SuDS feature receiving runoff.

Please see Table 8 which summarises the documentation required to satisfy standard S3.

Table 8. Documentation required to satisfy Standard S3 for the Full Application

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S3	Water quality treatment and pollution prevention strategy and Plan	N	Y
	Contaminated Land Report	N	N

6.4 STANDARD S4 – AMENITY

The applicant is proposing several bioretention areas across the site, in addition to the basin which will be located to the South. The SAB believes this will provide acceptable amenity benefits as the green SuDS features will be easily visible from all areas of the development. The proposed bioretention areas and basin will significantly improve the attractiveness of the site and expand on the desirability of the area by providing attractive, high-quality features.

It is noted a landscape plan will be required to be submitted at full application stage.

In summary, the proposed design **demonstrates a likely compliance** with Standard S4.

Further information required

At full application stage the applicant must evidence that sufficient amenity benefit will be provided by the proposed surface water drainage system, in line with the Statutory standards. This must be demonstrated via an amenity plan and landscape layout drawing.

Please see Table 9 which summarises the documentation required to satisfy standard S4.

Table 9. Documentation required to satisfy Standard S4 for the Full Application

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S4	Amenity Plan	N	Y
	Landscape Plan	N	Y
	Landscape Layout drawings	N	Y

6.5 STANDARD S5 – BIODIVERSITY

The applicant is proposing several raingardens as part of the proposal, in addition to a proposed basin. These green SuDS features will provide habitat for insects and other indigenous wildlife. The applicant has not provided proposed SuDS landscaping proposals at this stage and as such this could not be reviewed. This will be required at full application stage and will be reviewed by RCT's ecologists.

In summary, the proposed design **does not include sufficient information to ascertain compliance** with Standard S5.

A likely compliance with Standard S5 can be achieved through the inclusion of the 'further information required' outlined below. However, **compliance is dependent on the quality of the information that is provided** and cannot be guaranteed without appropriate evaluation of the additional documentation.

Further information required

At full application stage the applicant must evidence that sufficient biodiversity benefits will be provided by the proposed surface water drainage system, in line with the Statutory standards. Furthermore, planning arrangements must be detailed to ensure suitable plant species. This must be demonstrated via a biodiversity plan and landscape layout drawing.

Please see table 10 which summarises the documentation required to satisfy standard S5.

Table 10. Documentation required to satisfy Standard S5 for the Full Application

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S5	Biodiversity Plan	N	Y
	Landscape Plan	N	Y
	Landscape Layout drawings	N	Y

6.6 Standard S6 – Design of Drainage for Construction, Maintenance and Structural Integrity

At this stage the applicant has provided very little information relative to standard S6, therefore, this standard cannot be properly reviewed by the SAB.

Due to the nature of the development, at full application the SAB will require a construction management plan is provided detailing how the SuDS features will be constructed, ensuring sufficient protection of the features during the construction phase.

As per the drainage strategy, the proposed system will not be offered for adoption as it is to serve a private landowner, with maintenance of the drainage managed by an estates management company who will be responsible for all inspection and maintenance activities.

The applicant has provided a maintenance plan as part of the submitted information, however the maintenance plan only contains information in regards to schedules.

The SAB request at full application that the applicant provides clarification within the plan regarding as to who will be responsible for funding the maintenance of the proposed SuDS features. The cost of maintenance will also need to be clearly detailed. The maintenance plan should also clearly detail the design intent, how the SuDS features work and their purpose and potential performance risks, this will need to be particularly emphasised for both the flow control and basin on site.

Within the maintenance plan, maintenance schedules have been provided for the traditional drainage features, flow control chamber, permeable surfacing, basin and bioretention areas. The SAB have reviewed the schedules and note suitability as all schedules are in accordance with Ciria Guidance

A maintenance layout plan has been provided depicting there will be sufficient access for all SUDS features on site, in addition to the flow control chamber, which is suitable. However, SAB request a maintenance strip is provided for the basin.

Applicant hasn’t detailed the estimated cost of construction for the SuDS features on site, which is required at full application.

No manhole schedule has been provided, depicting what chambers and diameters are proposed where., which is required at full application stage. SAB request that nodes are also appropriately annotated.

At the full application stage, full construction details will be required of all drainage elements such as the basin, permeable surfacing, flow control chamber, bioretention areas, and traditional drainage elements. SuDS should be designed in accordance with best practice such as Ciria SuDS Manual C753 and suitable specification of depths and materials detailed.

It's noted for the proposed basin, the SAB would expect a low flow channel, sediment forebay, and maintenance strip is proposed,with details of each provided.

There should be no requirement for pumping and the entirety of the drainage system should drain via gravity.

Of particular note is the proposal for permeable surfacing, a suitable depth of sub-base and capping layer should be proposed depending on the Californian Bearing Ratio (CBR).

Given the proposal for permeable surfacing, it will need to be demonstrated that the surface gradient of the permeable paving areas are 1:20 or shallower. This will need to be demonstrated as a slope greater than this will not allow for all of the surface water to infiltrate as it causes runoff to flow over the component.
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For the detail of the flow control chambers, the SAB request the level of the overflow level, type of overflow, invert level, cover level, hydrobrake details, and chamber details are provided.

Whilst Dwr Cymru Welsh Water have not been consulted as part of the pre-application, on previous sites, they have stated the following regarding the interaction of permeable systems and their adoptable assets “Service strips within permeable paved areas apply for all adoptable drainage, so any pipe that is conveying flows of more than one property, or a single property carrier pipe that leave the curtilage of a property (lateral)”. It is also noted DCWW will not accept any SuDS structure crossing or overlying their existing or any proposed adoptable infrastructure. It was noted in the desktop review that a DCWW combined sewer conveys southwards along the western boundary of the site. DCWW have requested an easement of 3m either side of the centre line on previous applications. It is recommended that DCWW are contacted for advice prior to the SAB full application.

In summary, the proposed design **does not include sufficient information to ascertain compliance** with Standard S6.

A likely compliance with Standard S6 can be achieved through the inclusion of the 'further information required' outlined below. However, **compliance is dependent on the quality of the information that is provided** and cannot be guaranteed without appropriate evaluation of the additional documentation.

Further information required

Further construction details will be required such as specification of all materials in the design and their associated unit costs in order to calculate the non-performance bond of the Sustainable Drainage System (SuDS). Further details are required regarding the construction in terms of management and phasing to ensure a structured approach is utilised.

A Maintenance plan must be provided to ensure the SuDS will be properly maintained and can function across its entire design life. A maintenance plan must include the schedules including activity and frequency, access arrangements for each drainage feature including the flow control chamber and the responsible person to undertake the tasks for each drainage feature. Should the applicant be in any doubt regarding whether the mandatory duty to adopt applies, then please contact the SAB prior to submitting the full application.

Please see table 11 which summarises the documentation required to satisfy standard S6.

Table 11. Documentation required to satisfy Standard S6 for the Full Application

Criteria	Information/ documentation	Provided (Y/N)	Required? (Y/N)
Standard S6	Construction details (to calculate non-performance bond)	N	Y
	Construction Management Plan	N	Y*
	Construction Phasing Plan	N	Y*
	Information and communications plan	N	Y
	SuDS Maintenance Plan	Y	Y
	Specialist drawings	N	N
	General engineering layout coloured drawings	N	Y
	Adoption Plan	N	N

*Please note the asterisk illustrates documentation that is required, but can be conditioned as part of any approval.

7 SUDS Design Review

Applicant hasn't provided any construction details of the proposed drainage system, therefore this has been unable to be reviewed by the SAB.

- Flow control chamber – Detail required.
- Bioretention areas – Detail required. Where varying constructions are proposed i.e. differing inlets then a detail is provided for each of these.
- Permeable surfacing - Detail required.
- Basin – Detail required.
- Chambers and pipework drainage features – Detail required.

8 FURTHER INFORMATION

8.1 USEFUL WEBPAGES

For further information, it is recommended you visit the below webpages:

RCT SAB Pre-application Webpage –
https://www.rctcbc.gov.uk/EN/Resident/ParkingRoadsandTravel/Roadspavementsandpaths/SustainableDrainage/PreapplicationAdvice.aspx

RCT SAB Full application Webpage –
https://www.rctcbc.gov.uk/EN/Resident/ParkingRoadsandTravel/Roadspavementsandpaths/SustainableDrainage/MakeaSustainableDrainageApplication.aspx

RCT Ordinary Watercourse Consent Webpage -
https://www.rctcbc.gov.uk/EN/Business/LicencesandPermits/Otherlicences/OrdinaryWatercourseConsenting.aspx

Natural Resources Wales Environmental Permitting Website -
https://naturalresources.wales/permits-and-permissions/environmental-permits/?lang=en

Welsh Government – Sustainable Drainage Systems on new Developments -
https://gweddill.gov.wales/topics/environmentcountryside/epq/flooding/drainage/?lang=en

Susdrain Website - https://www.susdrain.org/

Wallingford Hydrosolutions – http://www.uksuds.com/drainage-calculation-tools/greenfield-runoff-rate- estimation

Ciria Website - https://www.ciria.org/

Dwr Cymru Welsh Water Website - https://www.dwrcymru.com/en/Developer-Services/Pre-Planning.aspx

Please note:

The advice given in this response represents an informal opinion, provided in accordance with the Council's Pre-Application Service. In particular, it is emphasised that while this pre-application advice will be carefully considered in reaching a decision or recommendation on an application, the final decision on any application that you may make can only be taken after we have consulted statutory consultees. It does not therefore prejudice any decision which the SuDS Approval Body may make should an application be submitted.