

Drainage Strategy Report

Coleg Gwent Knowledge Quarter

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Document control sheet

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1 Introduction

Stantec UK Ltd have been commissioned by WEPCo on behalf of Coleg Gwent to prepare this Drainage Strategy Report to support the proposed redevelopment of the demolished Newport Leisure Centre located along Usk Way, Newport.

This report considers the following elements and is under continuous review as more information is received and the site layout develops:

- A brief overview of the development proposals
- A review of the existing site and the drainage philosophy
- An overview of the existing site, its drainage, and the current flood risks.
- A feasibility assessment on the SuDS hierarchy surface water destinations.
- A description of the proposed philosophy for managing surface water runoff across the site.
- A description of the impermeable areas considered, along with hydraulic control measures.
- Review of the remaining SuDS standards and the schemes compliance.
- A description of the proposed philosophy for managing foul water.

Several sources of information have been used to compile this drainage strategy. Whilst 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 Stantec cannot be held responsible.



2 Site Location and Description

The proposed development is situated on the site of the former Newport Centre, located in Newport City Centre, at the junction of The Kingsway and Usk Way (NP20 1UH). The site is set within a developed urban area, at an approximate level of 9.0m AOD. The site is bounded by commercial developments to the north and west, which include the Kingsway centre and Friars Walk Shopping Centre. To the south there is a small area of residential development; whilst to the east of the site lies Usk Way (A4042), beyond which, there is the University of South Wales, Newport Campus and the Newport City Footbridge over the River Usk. The site has the following Grid Reference: ST314878

The latest survey works for the site and surrounding area were undertaken by HSP on 18/06/26. These comprised a topographical survey, together with GPR and CCTV surveys of the existing on-site and off-site drainage networks. Reference should be made to HSP drawing 0001, included within **Appendix A** of this report. The survey identified the site as being relatively flat, with a maximum level difference of 1.879 m. The lowest recorded level is located to the south-west of the proposed site along Emlyn Street at 7.776 m AOD, while the highest recorded level is located immediately north of the proposed building on Usk Way at 9.655 m AOD. Post-demolition, levels within the ground associated with the proposed building footprint range between 9.0 m AOD and 9.5 m AOD, with the existing surrounding surface contours generally falling away from the proposed building footprint towards the adjacent highways.

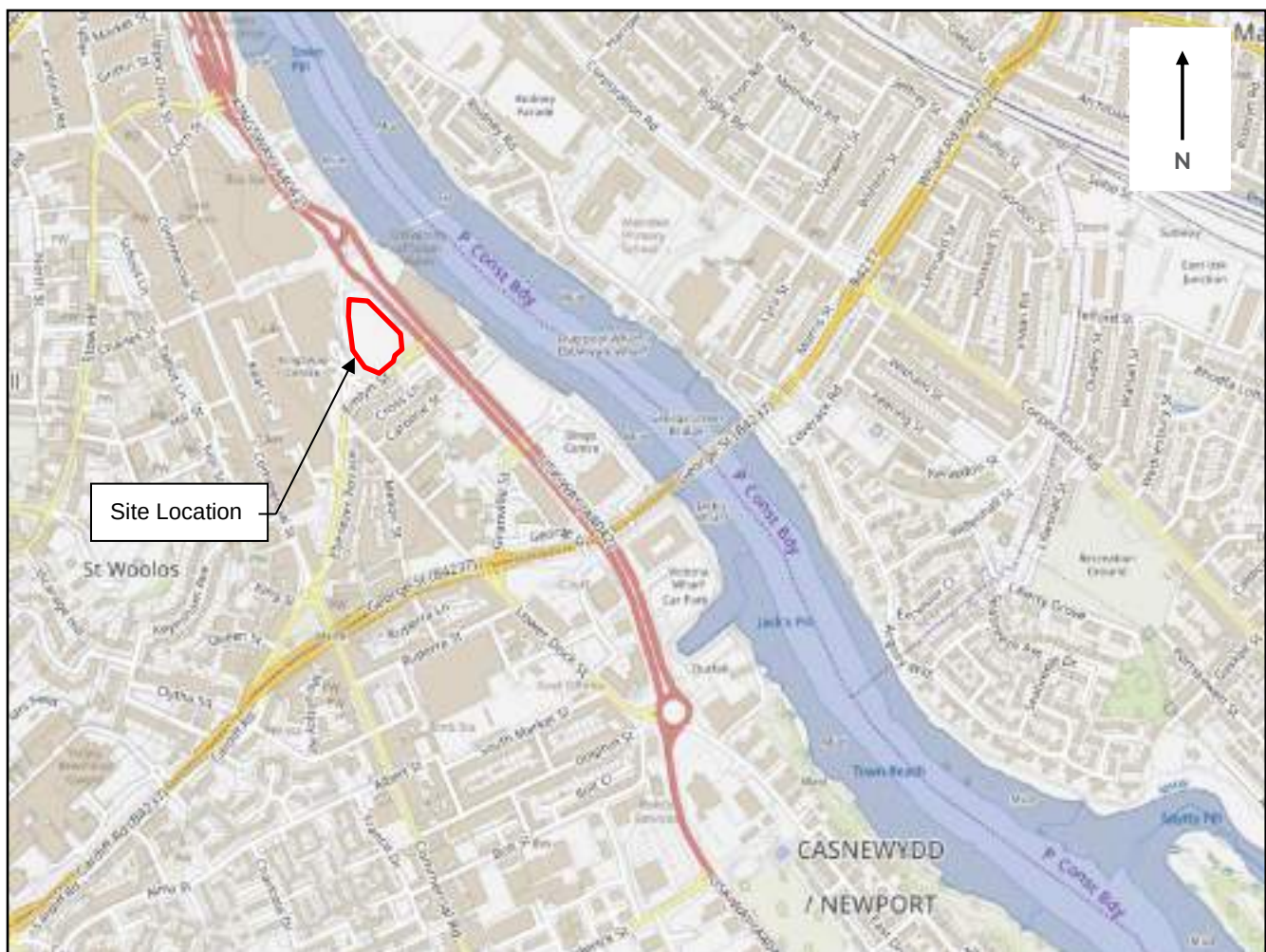


Figure 2-1. Site Location Plan

Table 2-1: Site Information

Address	Kingsway Centre Usk Way Newport NP20 1UH
Grid reference	ST314878
Coordinates (Easting, Northing)	331413, 187882
Latitude, Longitude	51.585600, -2.9913366
What3Words	camera.races.moment



Figure 2-2. Satellite Visual of Site (pre-demolition, accessed 16th June 2026)

The brownfield site is irregularly shaped with an approximate site area of 0.87ha. The site currently accommodates unmade ground, post demolition of the Newport Leisure Centre.

The building is arranged within the centre of the site, offering some improved pedestrian access along Usk way to the east, a new service yard and some limited parking to the south, and a new open public realm to the west, linking the Kingsway Car-Pak and Emlyn Street to Friars Walk Shopping Centre. There is also a new public realm area to the north, offering the active frontage to the community spaces discussed above. This new public realm acts as an extension to the existing space associated with the commercial units in Friars Walk.



Figure 3-1. Proposed Site Plan

3.1 Constraints

The proposed development is located on a constrained Brownfield city centre site, bounded by existing highways on all sides, an existing multi-storey car park to the west, commercial developments to the northwest, and significant DCWW assets and associated service infrastructure. An extract of the constraints plan is provided below.

The principal constraints influencing the development include flood risk and the corresponding finished floor level requirements, the presence of existing DCWW assets and their easement zones, statutory undertaker apparatus (with easements to be confirmed), and the surrounding highway levels, particularly along the southern boundary adjacent to the multi-storey car park access.



Figure 3-2. Extract from the Constraints Plan

In addition to these spatial constraints, the development is required to comply with the Statutory Standards for Sustainable Drainage Systems (SSDS). Infiltration has been discounted due to unfavourable ground conditions (presence of Made Ground), and the water authority is seeking for discharge to the existing combined sewer network to be avoided. An alternative viable discharge solution to the River Usk has been identified however, this is complicated by the need to account for submerged outfall conditions, which introduces additional hydraulic constraints.

Furthermore, the SSDS requires the achievement of runoff “interception” through the incorporation of SuDS features such as permeable paving and swales. Due to the extensive constraints and restrictive zones across the site, full compliance with interception criteria is unlikely to be achievable. A pragmatic approach will therefore be required, with agreement to be sought with the local authority SAB officer.

3.2 Access Arrangements

The proposed development has been designed to prioritise pedestrian movement and integration with the surrounding city centre while accommodating the operational and emergency vehicle access necessary to support the college. Existing footways and controlled crossing points provide pedestrian and cycle connectivity on all sides of the site, with the principal entrance positioned on the northern elevation, aligning with the Kingsway Shopping Centre and University of South Wales frontages.



Figure 3-3. Extract of the architect's site layout showing the fire tender access

Vehicular access has been limited to those movements necessary for the operation of the development, including emergency access, servicing, refuse collection and deliveries. Fire tender access is provided from the north via the proposed public realm and taxi pull in loop, maintaining access to both the college and adjacent multi-storey car park following the proposed stopping-up of the existing access road between the two buildings. Vehicle tracking has confirmed that emergency access requirements can be accommodated (refer to Figure below).

Operational access is provided from Emlyn Street via the existing southern bell mouth, which will be altered under a Section 278 Agreement with Newport City Council. This access will serve the secure service yard, including the motorsport facility, refuse store, MEP compound, delivery vehicles and associated minibuses and maintenance vehicles. A separate application will also be required to secure the necessary Traffic Regulation Orders associated with these alterations.

Alterations to the existing highway infrastructure are proposed to rationalise vehicle access and improve the surrounding public realm. One existing dropped kerb access will be retained to serve the proposed electrical substation, while two redundant accesses will be removed and reinstated with conservation kerbing to match the existing highway. Localised level adjustments will be undertaken to tie into the surrounding footway, and an allowance should be made within the works to reinstate full-height kerbs where required (refer to Figure below).

Further highway improvements are proposed along Usk Way to provide dedicated taxi pick-up and drop-off facilities together with associated public realm works. These modifications, together with the southern access alterations, stopping-up works and any additional highway improvements identified through the planning consultation process, are expected to be delivered under a coordinated Section 278 Agreement with Newport City Council. Ongoing discussions with the Highway Authority will continue during the next design stage to confirm the extent of works required between the site lease boundary and adopted highway.

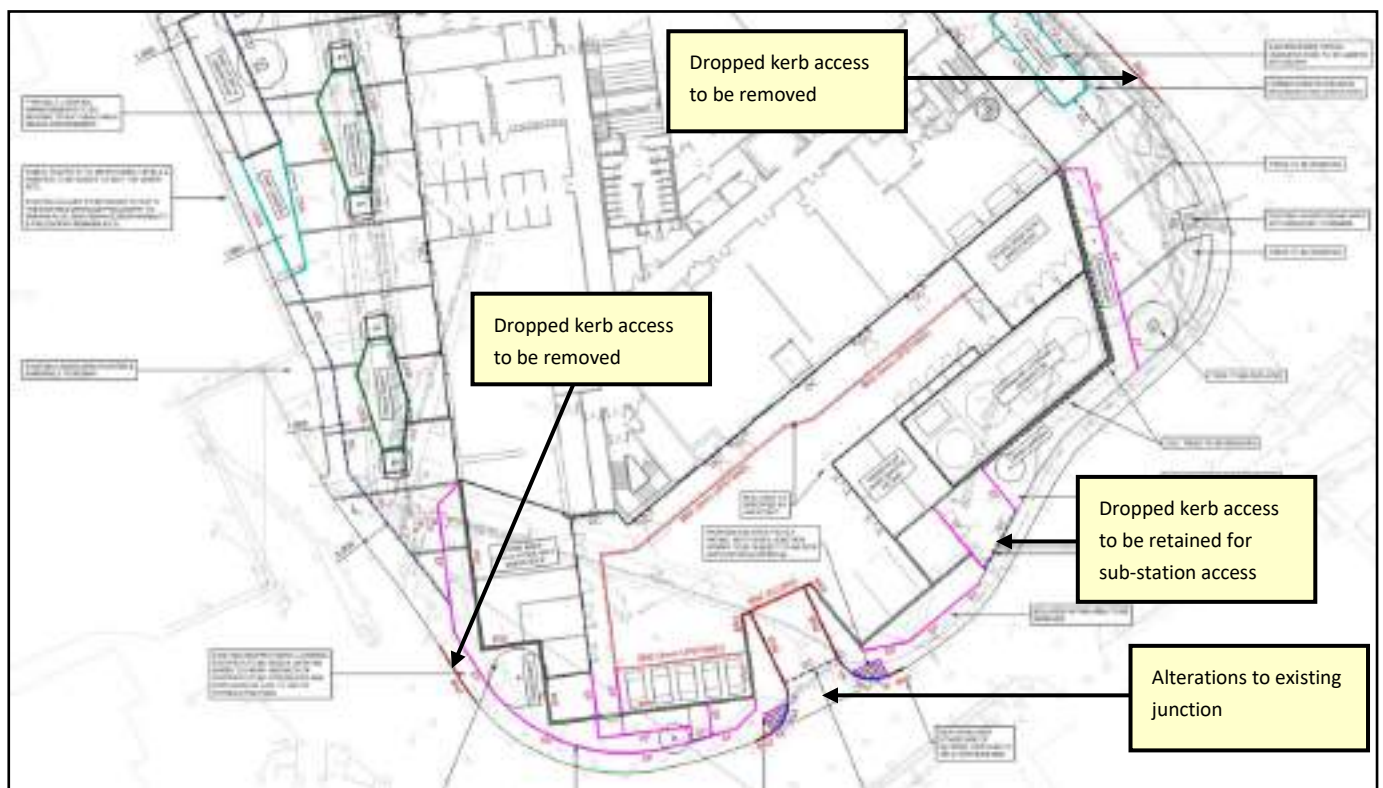


Figure 3-4. Extract of drawing 10000 indicating the existing access points / alterations

4 Flood Risk

Welsh Government planning policy identifies flood risk as a material planning consideration. NRW's Flood Map for Planning identifies the site within Flood Zone 3 (Sea), indicating a tidal flood risk that required assessment through a Flood Consequences Assessment.



Figure 4-1. Extract of NRW's Flood Map for Planning

To support the outline planning application (Ref. 22/0814), JBA Consulting prepared a Flood Consequences Assessment (FCA), which informed the grant of outline planning permission in October 2022. The planning permission included conditions requiring an updated FCA to demonstrate that the detailed proposals would not increase flood risk to the development or surrounding land, and that finished floor levels (FFLs) would be established in accordance with the approved flood mitigation strategy.

To discharge these conditions, JBA Consulting prepared an FCA Addendum (April 2026) together with a Flood Response Plan (June 2026) to support the reserved matters application. These documents update the hydraulic modelling using the latest topographical survey, NRW tidal flood model and current climate change guidance whilst assessing the fixed development proposals. Reference should be made to the following documents for full details:

- HHX-JBAU-XX-XX-RP-Z-0001-S3-P01 – Newport Centre FCA
- PZN-JBA-XX-XX-RP-Z-0001-S3-P01 – Newport Leisure Centre FCA Update
- PZN-JBA-XX-XX-RP-PL-0001-S3-P02 – Flood Response Plan

The proposed Coleg Gwent campus represents a defined educational use and has therefore been assessed over a 75-year design life, consistent with Welsh Government guidance for less vulnerable development.

Updated hydraulic modelling confirmed that tidal floodwater approaches the site predominantly from the south and east during the design events. To satisfy the planning conditions, a range of finished floor levels was assessed to achieve an appropriate balance between improving flood resilience and avoiding increases in flood risk to neighbouring land.

An initial finished floor level of 9.55 mAOD was tested to provide protection during the 0.1% AEP plus climate change event. However, modelling demonstrated that this increased flood depths to surrounding properties through displacement of floodwater. An iterative assessment identified 9.40 mAOD as the optimum finished floor level for the main college building, exceeding the 9.26 mAOD minimum design level established within the original FCA whilst avoiding any significant increase in flood risk to third parties. With this arrangement, the building remains flood-free during the 0.5% AEP plus climate change event and experiences only shallow flooding during the more extreme 0.1% AEP event. Comparative modelling also confirms that the proposed development does not result in any significant increase in flood risk elsewhere.

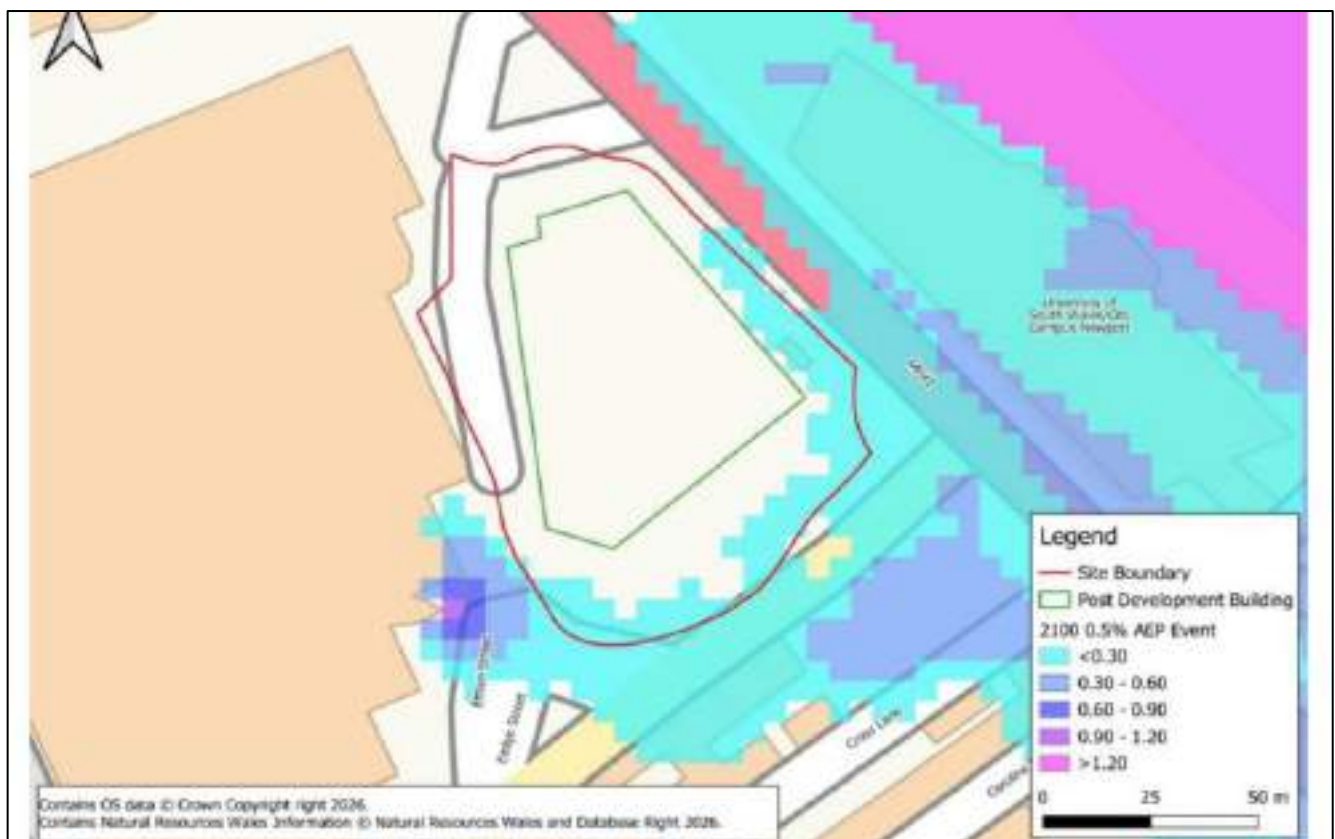


Figure 4-2. Extract from JBA's FCA addendum showing flood depths for the 0.50% AEP event

The updated hydraulic modelling demonstrates that the proposed development achieves an appropriate balance between mitigating tidal flood risk whilst avoiding adverse impacts on surrounding land and property. The adopted finished floor level of 9.40 mAOD, together with the accompanying Flood Response Plan, satisfies the flood-related planning conditions and provides an appropriate level of resilience for the proposed development.

External plant, service areas and ancillary structures have generally been designed with finished floor levels targeting 9.27 mAOD, ensuring they remain free from flooding during the 0.5% AEP plus climate change event in accordance with the original Flood Consequences Assessment. Accordingly, the adopted levels strategy provides an appropriate balance between flood resilience, planning compliance and minimising off-site impacts, forming the basis of the Stage 3 design.

5 Existing Drainage Arrangements

A review of DCWW statutory sewer records, historical drainage drawings and site investigations, including CCTV surveys, has been undertaken to establish the existing drainage infrastructure serving the site and surrounding highway network. This information has informed the proposed drainage strategy and identified the principal constraints requiring consideration during the next stage of design. Existing drainage arrangements are illustrated on Stantec drawings NE0101-STN-XX-XX-DR-C-00400 to 00404. (**Appendix B**).

5.1 Public Sewers

The site is surrounded by DCWW public combined water sewers which can also be seen in the DCWW map extract below. In summary:

- Deep below Usk Way is a strategic concrete 3850mm concrete combined sewer. It is understood that this was constructed to intercept and remove a number of overflows to the River Usk.
- An 880mm diameter combined water sewer runs along the eastern boundary in Usk Way. This sewer cut back into the site within its south-eastern corner and increases to a 970 x 620mm brickwork sewer.
- 375mm diameter crosses through the south-western part of the site which makes connection to 870 x 710 brickwork sewer within Emlyn Street, ultimately out falling to the 970 x 620mm brickwork sewer that runs along the eastern boundary of the site.

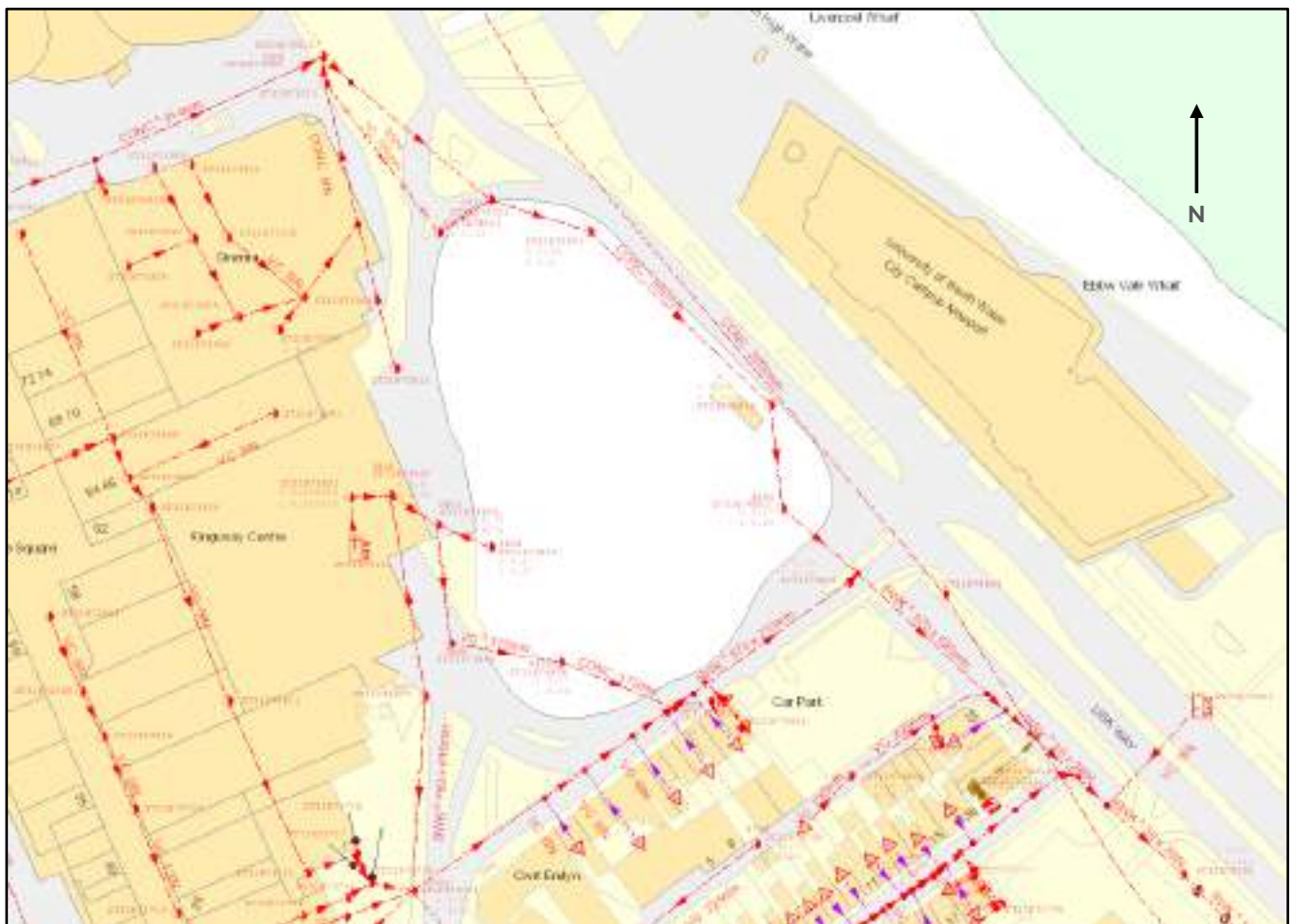


Figure 5-1. Extract of DCWW's Public Sewer Map

Highway Drainage

The new building is surrounded by adopted highway on all sides, whilst that on the western side will be stopped up as part of the scheme, the remaining three sides will continue to be served by the existing highway drainage infrastructure.

To the south-west of the site, the current adopted extents and portion of private road are served by traditional gullies. This area is believed to drain to the combined sewer system considering available drainage information.

To the east of the site is Usk Way, as part of the Newport Centre Regeneration Works in 2006, alterations to Usk Way led to new highway drainage being installed, typically in the form of beany block kerb drains. Historic drainage drawing records obtained (produced by Capita Symonds) for the 2006 redevelopment scheme suggest that at least part of Usk Way, local to the development site, drains to a dedicated surface water sewer which conveys flows south of the site. Ultimately surface water is discharged east below Usk Way, opposite the Canal Parade, passing through the car park south of the USW building, before Discharging to a shared headwall situated on the Usk riverbank.

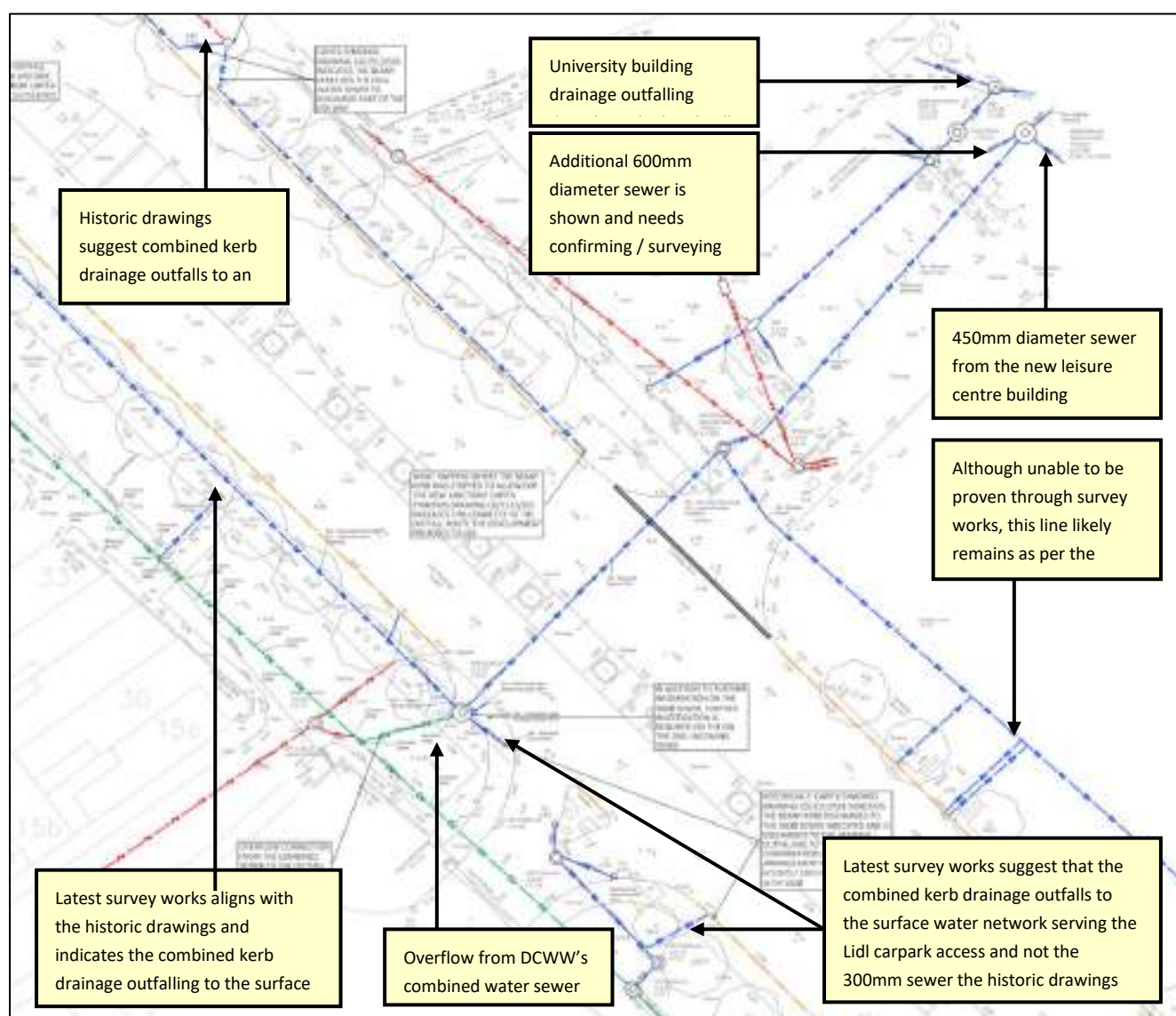


Figure 5-2. Extract of the overall existing drainage - sheet 3

With the aim of proving the connectivity of the highway drainage, an extensive CCTV drainage survey has been undertaken for the site and the local area, and has in part validated the historic drawings, in particular the western part of Usk Way. However, further survey works are still required to understand the full extents of the catchment, as well as the drainage infrastructure serving the eastern part of Usk Way and subsequently, the central reservation. A copy of the annotated existing drainage drawings has been included within **Appendix B**, outlining the areas requiring further survey work.

The Usk Way catchment has been broken down and considered as five separate areas:

1. **Usk Way East, north of the USW Car Park (Area = 3,350m²):** The historic drainage drawings produced for the Usk Way regeneration suggest the area utilises an old foul water line that crossed east to west below Usk Way, before connecting to the combined sewer.
2. **Usk Way West, north of the Lidl Car Park (Area = 3,325m²):** Whilst changes have been made to accommodate the new taxi drop off area and the Lidl car park, the drainage mechanism for the area has remained in line with our expectations and as per the Capita Symonds drawings. The area drains via combined kerb drainage before conveying flows to a 300mm diameter sewer within the footpath area, before connecting to the 600mm diameter sewer that cross Usk Way.
3. **Usk Way East, south of the Emlyn Street and north of the USW Car Park (Area = 1,345m²):** The historic drawings show a potential outfall to the 600mm diameter sewer that conveys flows to the headwall and The Usk River. Whilst the Capita Symonds drawing identify this sewer as a 450mm diameter, we know the sewer has been upgraded to a 600mm sewer as validated by the CCTV survey.
4. **Usk Way West, south of the Lidl Car Park (Area = 620m²):** The latest survey information for the area indicates that the combined drainage kerb discharges to a surface water sewer, serving the Lidl car park junction, before discharging to the combined sewer. This suggests that the introduction of the Lidl Car Park and its access junction altered the drainage philosophy for the area, the historic drawings showing the drainage kerb to discharge to the surface water network that convey flows to the River Usk, as per the area to the north of the junction.
5. **Usk Way East, south of the USW Car Park (Area = 2,855m²):** Whilst the drainage survey was unable to access the key manholes for the area due to the hoarding line associated with the new leisure centre development; we're confident the drainage for the area remains as per the Capita Symonds drawings. Discussions with the on-site team and a review of their on-site service records indicated an existing surface water sewer fronting their site and running parallel with Usk Way. The sewer ultimately discharged to the 600mm diameter surface water sewer that conveyed runoff to the River Usk, in line with our expectations.

Directly to the north of the site is the taxi drop off area that serves the Kingsway Shopping Centre, the area was completed following the regeneration works associated with Usk Way and therefore, isn't shown on the historic drainage drawings by Capita Symonds referenced above. At this point in time, it is unclear as to whether this area drains to the combined sewer network that runs through the area or whether it is somehow served by the new surface water network serving Usk Way, discussed above. Given that the only surface water drainage at this part of Usk Way, is combined kerb drainage, the area likely discharges to the combined sewer. Further survey work is required to confirm this.

Reference should be made to drawing: NE0101-STN-00-XX-DR-C-80100 (**Appendix C**) for the extents of catchments described above.



5.2 Private Arrangements

A comprehensive set of existing drainage drawings are shown by Stantec drawings NE0101-STN-XX-XX-DR-C-00400 - 00404. These have been prepared to demonstrate the overall connectivity of the existing on-site drainage network to the wider local networks. The demolition phase resulted in the removal of the majority of the private drainage networks, particularly below the old building extents; therefore, only limited extents to the periphery remain.

Surface Water Drainage

From the available information it has been identified that a number of dedicated surface water drainage systems historically served the site. This appears to have comprised at least six points of connection to the combined sewer network that surrounds / crosses through the site (**Figure 5-2**).

Ultimately, all surface water from the old leisure centre building and external car park are conveyed to the 880mm diameter combined water sewer that runs along the eastern boundary in Usk Way.

At least three of the six discharge directly to the 880mm diameter combined water sewer on the eastern boundary; one of the six discharges north to a small section of adopted sewer prior to discharging to the main 880mm sewer. The remaining two points of off-site discharge are to the west of the site and discharge to the 375/450mm diameter combined water sewer on the west side; flows are conveyed south and then east before out falling to the main 880mm diameter sewer, just south-east of the development.

Foul Water Drainage

Three main sections of private dedicated foul water drainage have been identified.

- A 300mm diameter sewer to the north-east part of the site discharges to the 880mm diameter combined water sewer that runs along the eastern boundary of the site. The large connection is assumed to have been provided as an outlet for the old swimming pools back wash waste and drain down.
- A 150mm diameter connection centrally located on the western boundary makes connection to the 225mm diameter combined water sewer spur on the west side of the site. This then conveys flows to the 375/450mm diameter combined water sewer on the west / south side of the development.
- A 150mm diameter southern connection to the 375mm diameter sewer that crosses through the south-west corner of the site.



6 Proposed Surface Water Drainage

The proposed surface water drainage design will have to consider the sequential approach as defined by the National Planning Policy Framework (NPPF), the Sustainable Drainage Systems (SuDS) Manual and Part H of Building Regulations. Since 2019, all new developments where the construction area is 100m² or more, will require SuDS for the sustainable management of surface water runoff. SuDS on new developments must be designed and built in accordance with the Statutory SuDS Standards published by Welsh Ministers and SuDS schemes must be approved by the local authority acting in its SuDS Approving Body (SAB) role, prior to construction work being undertaken. The principles which underpin the design of surface water management schemes to meet the 6 Standards. SuDS schemes should aim to address the following:

- Manage water on or close to the surface and as close to the source of the runoff as possible,
- Treat rainfall as a valuable natural resource
- Ensure pollution is prevented at source, rather than relying on the drainage system to treat or intercept it
- Manage rainfall to help protect people from increased flood risk, and the environment from morphological and associated ecological damage resulting from changes in flow rates, patterns and sediment movement caused by the development
- Take account of likely future pressures on flood risk, the environment and water resources such as climate change and urban creep
- Use the SuDS Management Train, using drainage components in series across a site to achieve a robust surface water management system (rather than using a single “end of pipe” feature, such as a pond, to serve the whole development)
- Maximise the delivery of benefits for amenity and biodiversity
- Seek to make the best use of available land through multifunctional usage of public spaces and the public realm,
- Perform safely, reliably, and effectively over the design life of the development considering the need for reasonable levels of maintenance,
- Avoid the need for pumping where possible
- Be affordable, considering both construction and long-term maintenance costs and the additional environmental and social benefits afforded by the system

There are six mandatory standards to be achieved within the National SuDS standards, S1 to S6. The following sections demonstrate compliance with each of these standards. The proposed drainage strategy is presented by Stantec drawing ref NE0101-STN-00-XX-DR-C-30000 (**Appendix E**).



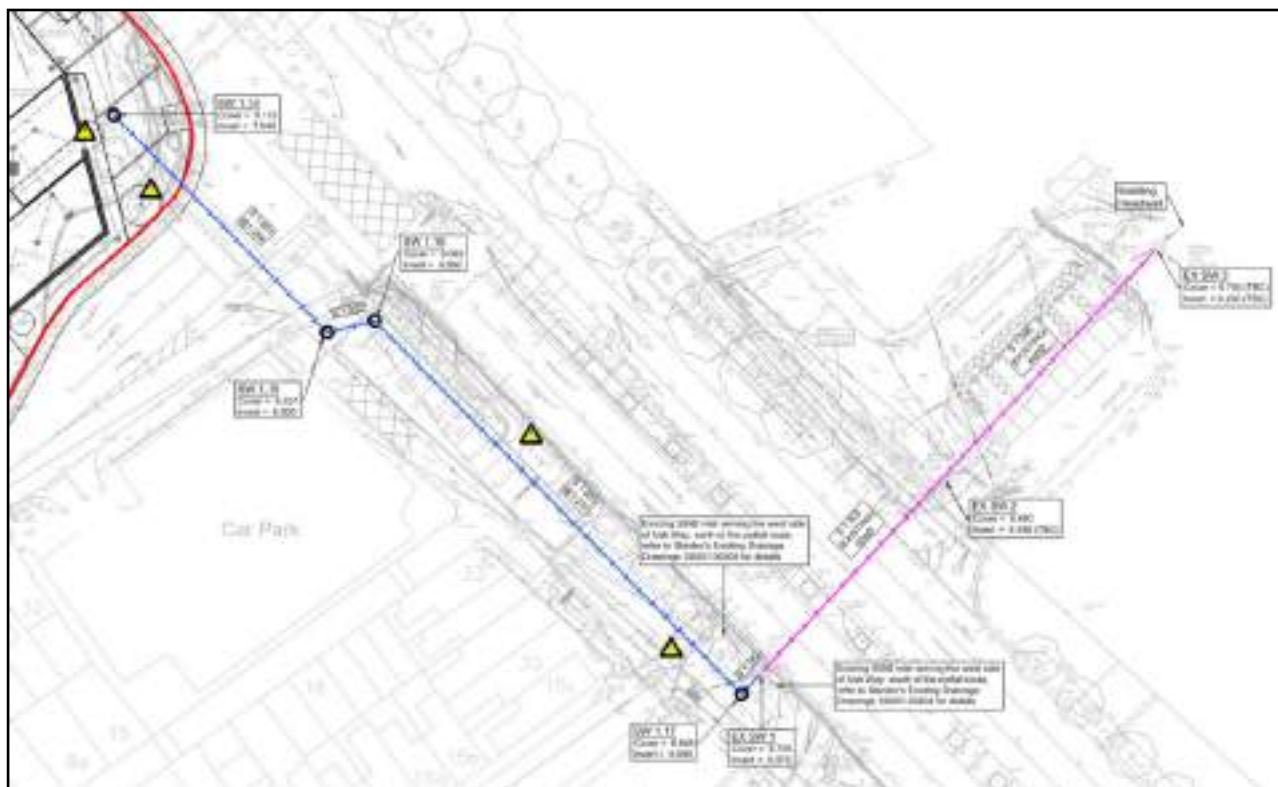
6.1.1 Standard S1: Surface Water Run-off Destination

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.

Table 6-1. Priority Levels for Surface Water Runoff Destination

Priority Level	Assessment
1) Collected for Use	Rainwater harvesting for non-portable use should be considered first and foremost to be included where possible on new developments. The system is to be designed based on the regular daily demand for non-portable water from surface water runoff. A rainwater harvesting tank has been sized to capture and intercept surface water runoff from the entirety of the roof, serving WC's & any bib taps. Calculations have been undertaken by Stormsaver Ltd to meet the latest British Standard for rainwater harvesting (BS16941-1:2024) and has resulted in a 100,000 litre tank (3m diameter x 14.65m long).
2) Infiltrated to Ground	3 no. infiltration tests were carried out across the development site area as part of the Phase 2 site investigation to BRE365. The results recorded ranged from 6.9×10^{-6} to 1.95×10^{-4} m/s. Whilst these show some infiltration potential, it is noted that the tests were conducted in Made Ground and groundwater levels were reported within 2.0m of the existing ground level. It is considered on the basis then that infiltration is not a reliable form of surface water runoff discharge particularly when you also factor the spatial constraints of the site, DCWW sewer protection zones, building proximity, and the site conditions which wholly compromise of made ground back fill for which infiltration cannot be relied upon.
3) Discharged to a Surface Water Body	Approximately 65m east of the site is the River Usk. Following extensive discussions with the local authority and with an appraisal of the historic Usk Way drainage drawings (Appendix A), an existing outfall to the River Usk has been identified. The headwall is shared by Usk Way, the University building and most recently, the new Leisure Centre. The existing sewer serving Usk Way has been confirmed as a 600mm diameter sewer and runs from west to east opposite Canal Parade, just north of the Lidl car park. The sewer runs below the car park to the south of the University building. Ultimately, all flows from our development will be discharged to the south of the site. A new line will be required to connect flows from our site to the existing infrastructure below Usk Way. After crossing Emlyn Street, the new line is proposed to run parallel with the rear of Emlyn Street carpark / Canal Parade, thus avoiding, as far as practically possible, the extensive services within the footpath. Reference should be made to Stantec's drawing NE0101-STN-00-XX-DR-C-30200 for the proposed outfall route.
4) Discharged to Surface Water Sewer	The proposed level 3 discharge solution would make use of a connection that serves the existing NCC highway drainage network. An alternative discharge arrangement could include via the existing highway drainage route described in the earlier existing highway drainage section of this report however this would require the upgrading/replacement of the pipe to cater for the additional runoff flows of the development.





6.1.2 Standard 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.

The hydraulic control and storage approach is subject to consultation with SAB and NRW where required on the surface water runoff destination, control, and form. As discussed in **Section 6.1.1**, the proposed runoff destination is the River Usk, located 65m to the east of the development. An existing surface water sewer that runs below Usk Way is sought to be utilised to convey flows to the existing headwall discharging into the River Usk.

Strategy / Mechanisms

The surface water drainage strategy has been developed to maximise the use of SuDS components within the constraints of the brownfield city centre site, whilst recognising the restrictions imposed by existing levels, statutory undertaker apparatus, DCWW easements and the proposed public realm.

The building roof is served by an isolated drainage network that discharges to the proposed rainwater harvesting system, independent of the external surface water drainage network. All ancillary structures will be provided with green roof systems to reduce runoff volumes, provide interception and deliver wider biodiversity and amenity benefits.

The northern part of the site is drained predominantly by a rain garden located outside the DCWW easement zones. Site levels have been arranged to maximise the contributing catchment draining towards this feature, where runoff is conveyed through the engineered growing medium before entering a perforated pipe underdrain. The underdrain subsequently conveys flows to the wider drainage network on the western side of the building. An overflow structure is incorporated within the rain garden to ensure runoff is safely conveyed during exceedance events or when the available storage has been utilised.

The western side of the building is constrained by both the proposed landscape arrangement, which seeks to break up the extent of hardstanding, and the presence of multiple statutory undertaker easements. Consequently, much of this area is drained via proprietary drainage channels that collect runoff and convey it to the downstream network. A small rain garden has been incorporated adjacent to the cycle store, capturing as much runoff as the available levels and surrounding constraints allow.

The service yard to the south of the building lies outside the principal DCWW easement zones, allowing permeable paving to be incorporated across the majority of the area. Surface water infiltrates the permeable surfacing into the underlying granular sub-base before being collected by perforated pipe underdrains, which discharge to the wider drainage network via the southern site access. This provides both source control and water quality treatment prior to discharge.

To the east of the building, a series of rain gardens have been proposed within the DCWW easement associated with the existing 880 mm diameter combined sewer. Ongoing discussions with DCWW are required to confirm acceptance of these features within the easement. Subject to agreement, the proposed arrangement satisfies the objectives of the Statutory Standards for Sustainable Drainage Systems by providing source control, attenuation and water quality treatment for runoff from the adjacent Usk Way frontage. The proposals also respond to the wider landscape aspirations of the development by creating a tree-lined corridor that mirrors the existing avenue on the opposite side of Usk Way, integrating drainage infrastructure with the public realm.

The individual SuDS components combine to provide a treatment train that maximises source control where practicable, conveys runoff safely through the site and ultimately discharges surface water to the River Usk via the existing highway drainage infrastructure and shared headwall.



Hydraulic Control

The proposed hydraulic control and attenuation strategy has been developed in consultation with the SAB and NRW to demonstrate that surface water runoff from the development can be managed safely whilst accounting for both tidal influence at the proposed outfall and uncertainty associated with the existing highway drainage network.

Hydraulic calculations have been undertaken using InfoDrainage, with FEH rainfall applied to the 1 in 100-year return period event, including a 40% allowance for climate change. All standard storm durations have been assessed, with the shorter duration events identified as the critical design case.

The proposed development has been modelled using conservative runoff parameters, with summer and winter runoff coefficients (Cv) of 1.0 and a time of concentration of 5 minutes adopted for both the proposed impermeable areas including the adjacent Emlyn car park. These assumptions represent rapid runoff from predominantly impermeable urban catchments and ensure the attenuation requirements are not underestimated. Conversely, the existing Usk Way highway catchments have been modelled using runoff coefficients of 0.75 (summer) and 0.84 (winter), together with a time of concentration of 15 minutes, reflecting the larger contributing catchments and their existing drainage characteristics. An allowance for urban creep has not been applied, as the hydraulic model incorporates the full extent of the proposed development and associated impermeable areas, with no reasonable opportunity for future increases in impermeable coverage.

The roof drainage network has been modelled independently of the external drainage system. Although a 100 m³ rainwater harvesting tank forms part of the proposed development, it has not been included within the hydraulic model and has been assumed to provide no attenuation benefit. This represents the conservative worst-case scenario in which the tank is full prior to the onset of the design storm. The proposed drainage strategy therefore demonstrates compliance independently of the rainwater harvesting system, with any available storage during operation providing additional resilience beyond that presented in the hydraulic assessment.

The proposed drainage strategy discharges surface water to the River Usk via the existing highway drainage infrastructure and shared headwall. The submerged outfall assessment has applied the Mean High Water Spring Tidal event, with an allowance for climate change up to the year 2100. Results have been provided by JBA Consulting and indicate a maximum river level of 7.34 mAOD at the outfall location. JBA noted that this approach assumes Newport City Council SAB accepts that the 1% AEP plus climate change fluvial event is unlikely to coincide with the 0.5% AEP plus climate change tidal event.

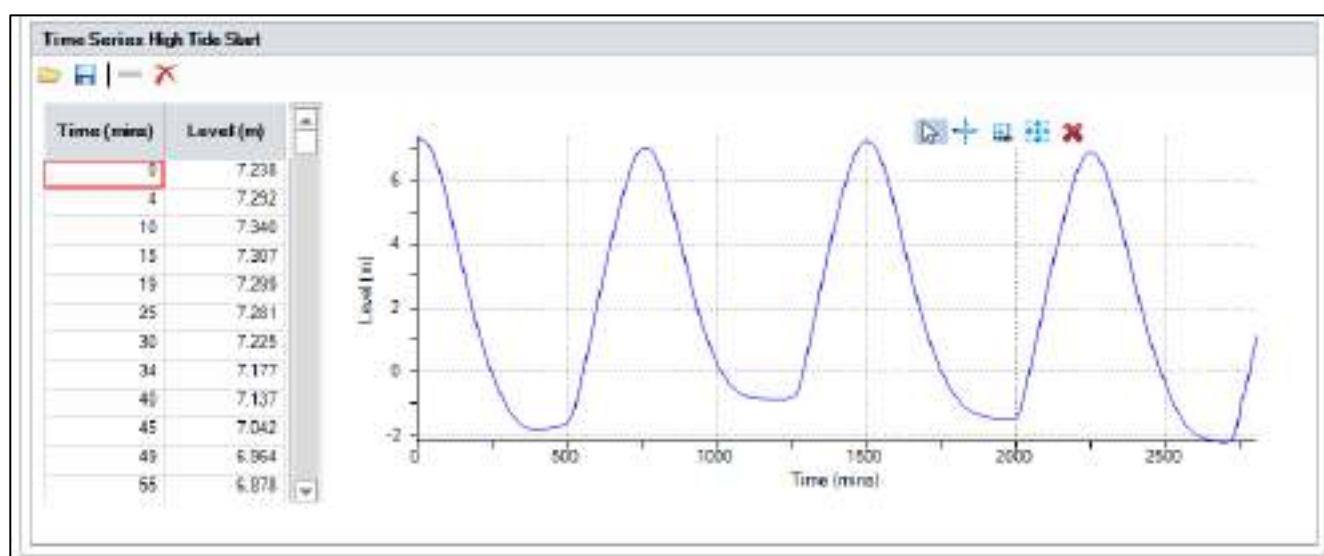


Figure 6-2. Extract of the submerged outfall conditions used within Infodrainage

To account for uncertainty associated with the existing drainage network, the hydraulic model has also been developed on a conservative basis by including the wider Usk Way highway catchment currently understood to discharge to the existing 600 mm diameter surface water sewer. Whilst CCTV surveys and historic drainage records have confirmed the connectivity of parts of the network, the drainage arrangements serving some sections of Usk Way remain unconfirmed. Consequently, the full identified catchment has been included within the model until further survey information becomes available.

This approach represents a robust worst-case assessment. Should Stage 4 investigations confirm that sections of the highway drainage network discharge to the adjacent combined sewer, rather than the surface water system, there may be opportunities to optimise the proposed infrastructure, including reducing the diameter of the proposed 675 mm connection beneath Usk Way, without altering the overall drainage philosophy or discharge strategy.

The hydraulic modelling demonstrates that the proposed drainage strategy can accommodate the combined effects of extreme rainfall, climate change, tidal influence at the outfall and uncertainty within the existing highway drainage network. The assessment has been undertaken using conservative hydrological and hydraulic assumptions and therefore provides a robust basis for progression to Stage 4, whilst retaining flexibility to refine the detailed design as additional survey information becomes available. A summary of the hydraulic modelling results is provided in **Appendix D**.



Figure 6-3. Extract of drawing: NE0101-STN-00-XX-DR-C-30400

Interception

Interception has been considered in accordance with the Welsh Government Statutory Standards for Sustainable Drainage Systems, which seek to replicate Greenfield runoff conditions by preventing runoff from the majority of frequent, low-intensity rainfall events. Compliance is generally demonstrated by achieving interception during approximately 80% of summer rainfall events and 50% of winter rainfall events through the use of appropriate SuDS components.

The proposed development incorporates a rainwater harvesting system serving the entirety of the main roof. The system has been designed in accordance with BS 16941-1:2024, with the storage volume sized to satisfy both the anticipated non-potable water demand and the interception criteria. In addition, the ancillary buildings will incorporate green roof systems, ensuring that runoff from all proposed roof areas is intercepted in accordance with the principles of CIRIA C753.

Achieving full compliance with the interception criteria for the external hardstanding is constrained by the existing site conditions. Extensive statutory undertaker apparatus, DCWW sewer easements and the predominantly resurfaced nature of the external works significantly restrict opportunities to introduce additional SuDS features. Nevertheless, the design has maximised the provision of rain gardens and other vegetated SuDS features wherever practicable, including ongoing discussions with DCWW regarding the incorporation of additional features within sewer easement zones to the east of the proposed building. The proposed interception strategy, together with the areas where full compliance cannot reasonably be achieved, is illustrated on Stantec Drawing NE0101-STN-00-XX-DR-C-40100.

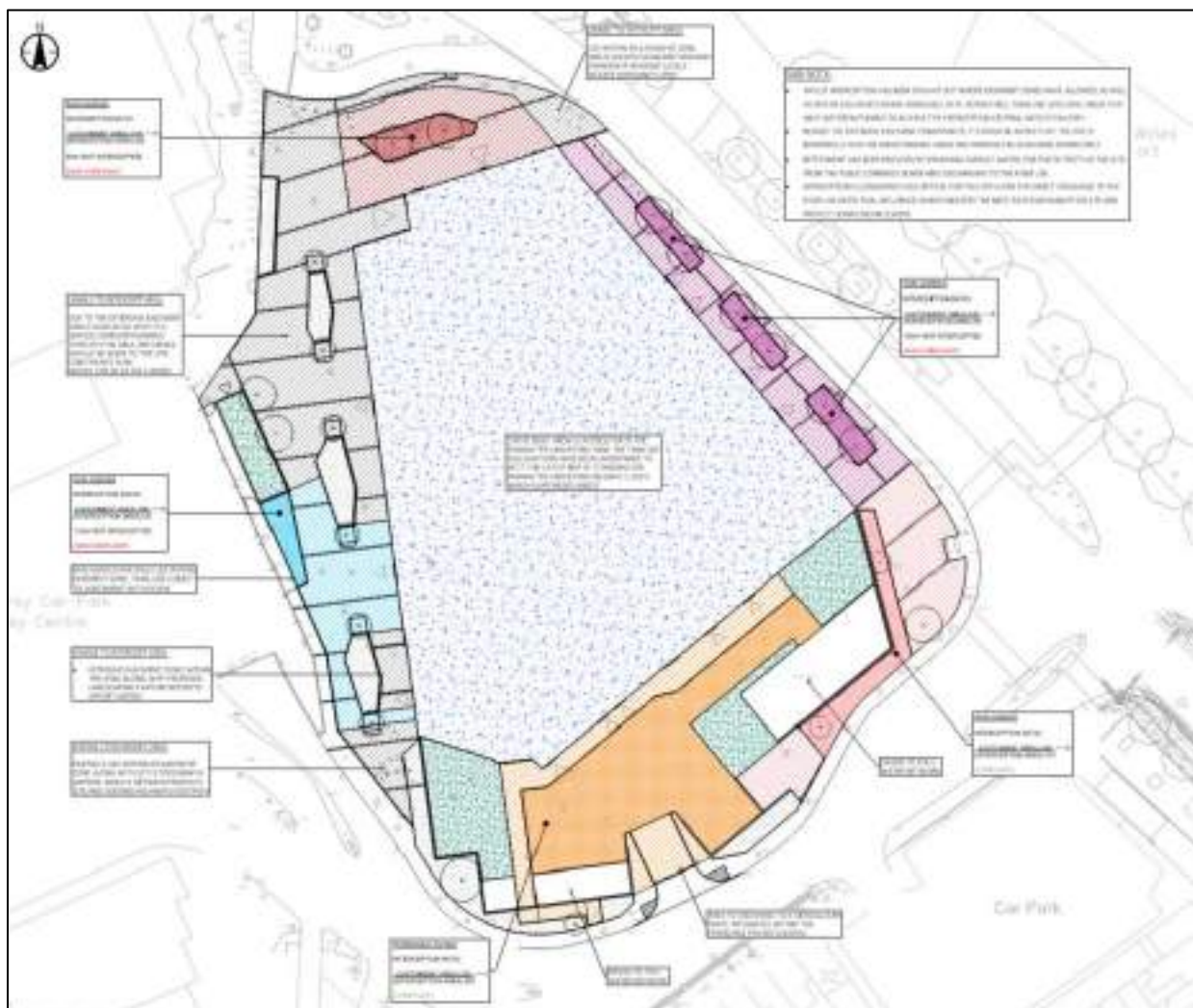


Figure 6-4. Extract from drawing: NE0101-STN-00-XX-DR-C-40100

During the SAB pre-application discussions, the SAB Officer suggested that rainwater harvesting of the external hardstanding be explored alongside the proposed roof drainage. This option has not been progressed for both qualitative and quantitative reasons. From a water quality perspective, runoff from trafficked external areas is expected to contain elevated sediment loads and pollutants, increasing treatment requirements, maintenance burden and reducing the quality of harvested water. From a hydraulic perspective, the proposed rainwater harvesting system has been sized by Stormsaver in accordance with BS 16941-1:2024 based on the anticipated non-potable water demand of the development, resulting in a 100 m³ storage tank, the largest proprietary tank currently available. The proposed roof area alone comprises approximately 3,720 m² and would generate around 186 m³ of runoff during a rainfall event producing 50 mm over one hour, exceeding the available storage capacity and activating the overflow arrangement before any runoff from the external hardstanding could be captured. Increasing the storage capacity beyond 100 m³ would therefore provide little practical benefit, as the governing constraint is the building's water demand rather than the available storage volume. Routing runoff from the external hardstanding through the rainwater harvesting system would therefore increase system complexity without materially improving interception performance or compliance with the Statutory Standards.

Whilst full compliance with the interception criteria for external hardstanding has not been achievable, the proposed strategy represents the maximum practicable provision of SuDS features within the constraints of the site. In particular:

- The design maximises the provision of rain gardens and other vegetated SuDS features wherever practicable, including ongoing discussions with DCWW regarding opportunities within sewer easement zones;
- The majority of the external hardstanding comprises resurfacing works to existing paved areas, limiting opportunities for additional interception measures;
- All roof runoff is intercepted through the proposed rainwater harvesting and green roof systems; and
- The wider drainage strategy removes surface water runoff from the existing public combined sewer network and discharges it to the River Usk, representing a significant betterment over the existing drainage regime.

The proposed interception strategy will continue to be developed in conjunction with DCWW and the SAB during the pre-application process. Ongoing discussions with DCWW seek to maximise the provision of rain gardens and other SuDS features within sewer easement zones, reducing the current interception shortfall. Agreement on these additional SuDS opportunities is considered important to demonstrating compliance with the Statutory Standards and therefore represents one of the principal remaining risks to the forthcoming SAB application.



Exceedance Flows and Flood Pathways

Exceedance flows from the proposed SuDS features have been reviewed alongside the proposed levels strategy to assess the impact of localised feature failure or surcharge. Exceedance routes generally direct runoff away from the building and towards the adjacent public highways. These flows would then be intercepted by the existing highway drainage infrastructure, including gullies and beany kerbs, before entering the wider highway drainage network.



Figure 6-5. Extract of the Exceedance Plan drawing: 40400

6.1.3 Standard S3: Water Quality

This standard requires surface water runoff to be managed such that it does not adversely affect the quality of the receiving water environment or downstream drainage systems. Compliance with the standard will be demonstrated using the Simple Index Assessment (SIA) methodology set out within CIRIA C753, comparing the pollution hazard associated with each proposed land use against the treatment provided by the proposed SuDS features.

Pollution hazard indices have been selected from Table 26.2 of CIRIA C753 for the proposed land uses, whilst the treatment performance of the proposed SuDS features has been assessed using the corresponding mitigation indices from Table 26.4.

Table 6-2. Extract of C753's Table 26.2 - Hazard Indices for Different Land Use Classifications

Land Use	Hazard Level	TSS	Metals	Hydrocarbons
Commercial Roof	Low	0.30	0.20	0.05
Car parking with infrequent change	Low	0.50	0.40	0.40

Table 6-3. Extract of C753's Table 26.4 - Indicative Mitigation Indices for Discharge to Surface Water

Feature	TSS	Metals	Hydrocarbons
Permeable Pavement	0.70	0.60	0.70
Swale / Green Roof	0.50	0.60	0.60

Runoff from the main college building will be intercepted by the proposed rainwater harvesting system before ultimately discharging to the foul water network for non-potable reuse. The ancillary buildings will incorporate green roof systems, providing the required level of treatment whilst also contributing towards the wider SuDS objectives discussed previously.

The southern service yard will be constructed using permeable paving, providing the level of treatment required for the anticipated low frequency of vehicle movements. Areas associated with building servicing or where there is an increased risk of pollution will discharge to the foul water network, preventing contaminated runoff from entering the surface water drainage system.

The remaining external areas comprise predominantly pedestrianised public realm with a relatively low pollution hazard. Whilst sections of these areas benefit from rain gardens and other vegetated SuDS features, opportunities to provide additional treatment are constrained by existing statutory undertaker apparatus and DCWW sewer easements. Discussions with DCWW are ongoing to determine whether further SuDS features can be accommodated within these easement zones, particularly adjacent to Usk Way where additional treatment opportunities have been identified.

Overall, the proposed treatment train provides an appropriate level of water quality treatment across much of the development whilst maximising the use of SuDS features within the physical constraints of the site. Localised treatment shortfalls remain within limited areas of the public realm; however, these correspond to low pollution hazard land uses and will continue to be reviewed with the SAB during the detailed design stage. Should additional treatment be required to demonstrate compliance with the Simple Index Assessment, proprietary treatment measures can be incorporated into the design where practicable.



6.1.4 Standard S4 & S5: Amenity & Biodiversity

The proposed surface water drainage strategy has been developed to deliver benefits beyond the management of surface water runoff by integrating SuDS features into the wider public realm. Rain gardens and green roofs have been incorporated throughout the development to provide multifunctional infrastructure that contributes to amenity, biodiversity, water quality and climate resilience whilst remaining integral to the drainage strategy.

The rain gardens have been positioned within the public realm where they will be visible and accessible to users of the development. Set approximately 200 mm below the surrounding hardstanding, they provide surface water storage whilst introducing vegetated features that soften the predominantly hard urban environment. In addition to managing runoff, these features contribute to the character of the public realm, improve visual amenity and provide opportunities for natural planting to become established within the development.

The proposed green roofs and rain gardens also contribute towards the wider environmental objectives of the drainage strategy by providing interception, water quality treatment and habitat creation. Whilst detailed planting proposals will be developed during the subsequent design stages, the SuDS features have been arranged to establish a network of vegetated areas across the site that will enhance biodiversity compared with the existing predominantly hard surfaced conditions.

The proposed SuDS strategy therefore delivers multiple benefits beyond drainage alone, combining effective surface water management with enhancements to the public realm, ecological value and long-term environmental performance, whilst responding to the constraints associated with a constrained brownfield city centre redevelopment.

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.

6.1.5 Standard S6: Construction, Maintenance and Integrity

The proposed surface water drainage strategy uses a combination of traditional drainage techniques and SuDS features to collect and convey runoff across the site. The SuDS features allow the functionality of the system to be visually inspected without the need for specialist training or lifting chamber covers; where chamber covers do need to be lifted and the below ground pipework inspected, the networks have been kept as shallow as practically possible; similarly, the foul water network has been kept as shallow as possible whilst adhering to good practice and relevant legislation.

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).

Generally, it is considered the proposed system will not be offered for adoption as it will serve a privately owned development, therefore the maintenance of the drainage will be managed and maintained by the estate management team who will be responsible for all inspection and maintenance activities. Adoption of the offsite surface water connection through Emlyn Walk will however be sought.

The maintenance requirements and regime of the proposed system will be developed to support the wider maintenance strategy for the site. 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.



7 Proposed Foul Water Strategy

It is proposed to discharge foul water flows from the site to the existing DCWW combined sewers both on the East and West side of the site via new connections. This will be subject to DCWW consent and approval via S106 Agreement.

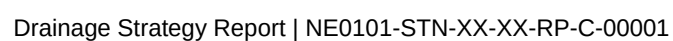
All on site sewerage systems will be designed and constructed to comply with building regulations requirements with any adopted elements in accordance with the latest edition of "Sewers for Adoption" and any of the adopting authority's (DCWW) specific requirements. Stantec drawing NE0101-STN-XX-XX-DR-C-30300 (**Appendix E**) shows the proposed foul drainage layout and its proximity to other existing/proposed services.

The proposed building will contain several sources of kitchen associated foul water discharge, the majority coming from the ground floor café and production kitchen, and training kitchen on the first floor. All new developments with this category of wastewater under Building Regulations part H are required to be intercepted by a grease trap before being discharged into the downstream sewer network. Based on an estimated number of meals/day produced by each café/kitchen, a grease trap was specified to intercept all 3 of the aforementioned areas using a supplier's size recommendation. The proposed drainage layout is intended to isolate and direct the kitchen wastewater through a grease trap before it is conveyed to the wider system.

A diversion of a DCWW 375mm diameter combined water sewer is proposed so that it is redirected via Emlyn Street which will remove a development constraint for the southwestern part of the site. Having assessed the localised network and wider asset base within the catchment and due to the strategic nature of the sewer, DCWW have indicated that all diversionary works related to this are undertaken in house as a rechargeable scheme.

Stantec drawing NE0101-STN-XX-XX-DR-C-00410 - DCWW Sewer Diversion Plan (*Error! Reference source not found.*) presents the preliminary diversion route. At the time of writing, DCWW had requested further survey information and consultation on site to progress the diversion assessment.





Appendices



Appendix A Historic Drainage Drawings



NOTES:

1. POSITIONS OF EXISTING CHAMBERS AND PIPE RUNS HAVE BEEN PROVIDED BY VARIOUS SOURCES, BUT NOT ALL INFORMATION HAS BEEN VERIFIED. EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.
2. WHERE PROPOSED PIPE RUNS ENTER EXISTING DRAINAGE SYSTEMS DESIGNING MAY BE REQUIRED AND WILL BE ASSESSED WITH THE ENGINEER ON SITE.
3. ALL OUTFALLS ON COMBINED SEWER DRAINAGE SYSTEMS ARE TO HAVE A MINIMUM PIPE DIAMETER OF 225mm AND A MINIMUM COVER OF 750mm WHEN CONNECTING PIPE IS UNDER THE CARRIAGEWAY AND 600mm ELSEWHERE.
4. INVERT LEVELS OF FIN DRAIN CONNECTIONS TO MANHOLES NOT SHOWN, REFER TO SCHEDULES IN APPENDIX 5/1.
5. FOR NEW LENGTHS OF COMBINED DRAINAGE AND KERB BLOCKS IN AREAS OF NEW PAVEMENT CONSTRUCTION TYPE 1G, GRANULAR SUB BASE TO PAVEMENT TO BE THICKENED LOCALLY.

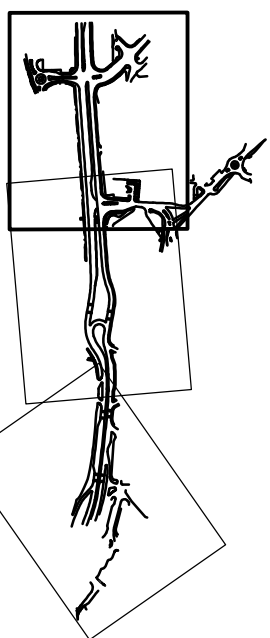
KEY:

EXISTING DRAINAGE

- SURFACE WATER SEWER
- - - FOLL WATER SEWER
- GY EXISTING GULLY
- GY* GULLY TO BE BACKFILLED WITH ST1 CONCRETE
- EXISTING CHAMBER
- EXISTING CHAMBER TO BE DEMOLISHED
- RAISE OR LOWER EXISTING COVER AND FRAME (INCLUDES BOTH CHAMBERS AND GULLY'S)
- EXISTING SEWER TO BE ABANDONED

PROPOSED DRAINAGE

- O PROPOSED MANHOLE / CATCHPIT
- 225mm Ø PROPOSED CATCHPIT GULLY
- 225mm Ø PROPOSED CARRIER DRAIN
- 225mm Ø PROPOSED FILTER DRAIN
- Ø PROPOSED TRAPPED GULLY (150ø D16)
- PROPOSED FIN DRAIN TYPE 6 (REFER TO HOD DRAWINGS F18 & F19)
- PROPOSED COMBINED DRAINAGE AND KERB BLOCKS WITH OUTFALL POSITION



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ISSUE	AMENDMENTS	DRAWN	CHKD	DATE
F	NO OUTFALLS ADDED ACCESS CHAMBER CHANGED TO ST1 LINED	DS	DW	APR '06
E	GRANVILLE LANE AMENDED DRAINAGE AMENDED IN THIS AREA	DS	DW	NOV '06
D	DUMFRIES PLACE, GRANVILLE ST AND BINGO CENTRE JUNCTION AMENDED	DS	DW	OCT '06
C	CHANGED NEW LAYOUT: OUTFALL ADDED TO NEW LAYOUT	DS	SH	JUL '06
B	PIPE UPDATED TO DESIGN M481106*	JB	SH	MAR '06
A	MANHOLES ADDED AND NUMBERING AMENDED CARRIER DRAIN RUNS ADDED	SH	DW	FEB '06



Newport CITY COUNCIL
CNGOR DINAS
Casnewydd

NEWPORT CITY CENTRE
REGENERATION

HIGHWAY DRAINAGE

SHEET 1 OF 4

CAPITA SYMONDS

Capita Owen Consulting Ltd
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Tel: 01633 463333 Fax: 01633 463399

DRAWN R.J. ARTHUR JAN 2006 SCALE: 1:500

CHECKED S. HAMBLETON FEB 2006

DRG. No. CG/15/13/501 REVISION F



NOTES:

1. POSITIONING OF EXISTING CHAMBERS AND PIPE RUNS HAVE BEEN PROVIDED BY VARIOUS AGENCIES. THE EXISTING CHAMBERS HAVE BEEN VERIFIED. EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.
2. WHERE PROPOSED PIPE RUNS ENTER EXISTING DRAINAGE SYSTEMS DESLTING MAY BE REQUIRED AND WILL BE AGREED WITH THE ENGINEER ON SITE.
3. ALL OUTFALLS ON COMBINED KERR DRAINAGE SYSTEMS ARE TO HAVE A MINIMUM PIPE DIAMETER OF 225mm AND A MINIMUM COVER OF 750mm WHEN CONNECTING PIPE IS UNDER THE CHAMBER AND 600mm ELSEWHERE.
4. INFERIOR LEVELS OF THE PIPE DRAIN CONNECTIONS TO MANHOLES NOT SHOWN, REFER TO SCHEDULES IN APPENDIX 5/1.
5. FOR NEW LENGTHS OF COMBINED DRAINAGE AND KERR BLOCKS IN AREAS OF NEW PAVEMENT CONSTRUCTION TYPE 1C, GRANULADA SUB BASE TO PAVEMENT TO BE PAVED ONCE LOCALLY.

KEY:

EXISTING DRAINAGE

- | | | |
|---|----|---|
| — | — | SURFACE WATER SEWER |
| — | — | FOLI, WATER SEWER |
| — | — | EXISTING GULLY |
| — | — | GULLY TO BE BACKFILLED WITH ST1 CONCRETE |
| □ | 6Y | EXISTING CHAMBER |
| ✱ | — | EXISTING CHAMBER TO BE DEROUSHED |
| ⊗ | — | RAISE OR LOWER EXISTING COVER AND FRAME
(INCLUDES BOTH CHAMBERS AND GULLY'S) |
| — | — | EXISTING SEWER TO BE ABANDONED |

PROPOSED DRAINAGE

- PROPOSED WASHLE / CATCHIT
● PROPOSED CATCHIT GULLY
--- 2256 D6 ---
--- 2256 D6 ---
--- 2256 F021 ---
--- 2256 F021 ---
D 3U



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ISSUE	AMENDMENTS	DRAWN	CHKD	DATE
D	EXEMPTED FROM CHAMBER 400 FOR MIS-DETERMINED	OS	SH	JUL 06
C	MI-58 DELETED, MI-56, 57 & 512 RE-LOCATED, PROPOSED 225MM LENGTH OF FIN DRAWN DELETED	OS	SH	JUL 06
B	YREF UPDATED TO DESIGN MARKING	JB	SH	MAR 06
A	MANUALS 58, 40250 AND UNDERSTANDING MECHANED CARRIER BURN PILES ADDED EXISTING BURN MARKS AS ABANDONED	SH DAW	SH	FEB 06



NEWPORT CITY CENTRE
REGENERATION

Newport
CITY COUNCIL
CYNGOR DINAS
Casnewydd

HIGHWAY DRAINAGE
SHEET 2 OF 4

CAPITA SYMONDS

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DRG. No.		CG/1513/502	
		REVISION	D
		REF.	