Conwy County Borough Council

Llandudno Junction Waste Transfer Site

Drainage Strategy

LJW-JPS-XX-XX-RP-D-0001

Rev: P01

July 2023

JPS CIVIL + STRUCTURAL ENGINEERS

Document History

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P01	Drainage Strategy	JR	RAH	06/07/2023
Revision	Purpose Description	Originated	Authorised	Date

Contents

1 Introduction

1.1 Commission

JP Structural Design were appointed by Conwy County Borough Council (CCBC) to carry out a Drainage Strategy (DS) for the proposed Waste Transfer Site at Ffordd Maelgwn, Llandudno Junction, Conwy, LL31 9PN.

1.2 Limitations

The findings of this Strategy have been based on data available at the time of the study and on the review of available information that has been undertaken to date. They relate to the current development proposals as outlined in **Appendix A**. Should the proposed end use of the site change after the completion of this assessment, then the findings of this report will need to be reviewed and updated accordingly.

2 Existing Site and Proposed Development

2.1 Site Location

The proposed development is located approximately 0.3km to the south of Llandudno Junction within Tre Marl Industrial Estate. The site is at Ordnance Survey National Grid Reference SH 796 775.

2.2 Site Description

The proposed site covers an area of 0.930ha as shown on the site information drawing in **Appendix A**. Access to the site is provided from the east via Ffordd Maelgwn.

The site is formed by a vacant site which was previously a car breaker / scrapyard and the turning head for Ffordd Maelgwn in the south. It is bounded to the west and north by a wooded area. The southern and eastern boundaries of the site are formed by adjacent industrial sites and existing infrastructure associated with Tre Marl Industrial Estate.

A review of the topographical survey shows that the former car breaker / scrapyard section of the site is typically comprised of "hardcore" and concrete surfacing. The turning head for Ffordd Maelgwn is comprised of macadam surfacing and grass verges, there is an area of unmade land in the southwest. The survey indicates that the site has a high point of 8.410m (Above Ordnance Datum) AOD located in the northwest of the site. The low point of the site is in the southeast of the site at 6.800m AOD. The site has levels of 6.920m AOD and 8.300m AOD in the southwest and northeast respectively. The survey also indicates a small embankment along the northern boundary of the site that rises at a gradient of approximately 1:3. The existing topographic survey is provided within **Appendix B**.

2.3 Existing Drainage

Public sewer records were obtained from Dŵr Cymru Welsh Water (DCWW) and are provided in **Appendix C**. The records indicate that there is a 150mm diameter public foul water sewer network, a pumping station, rising main and a combined sewer overflow located approximately 150m east of the site. The foul sewers flow in a southern and western direction towards the pumping station. The pumping station appears to pump flows via the rising main in a northeastern direction. The combined sewer overflow is located to the southeast of the pumping station and discharges to the adjacent unnamed watercourse. The previously described details are shown on the existing drainage plan in **Appendix D**.

A CCTV drainage survey was undertaken by MetroRod on the 23.05.2023 the findings of which are shown on the existing drainage plan in **Appendix D**. The survey indicated the following:

- There is a 300mm diameter surface water drain situated within Ffordd Maelgwn to the south of the site. Road gullies within Ffordd Maelgwn were confirmed to discharge to this drain.
- There is a network of 100mm diameter surface water drains that serve the site and discharge to the 300mm diameter surface water drain within Ffordd Maelgwn.
- It is believed there is a perforated land drain situated along the west perimeter of the site. Unfortunately, this drain was unable to be fully surveyed due to root ingress. Therefore, details of this drain will need to be confirmed prior to the commencement of works on site.

2.4 Existing Waterbodies

The site lies approximately 250m to the north of the tidal Afon Conwy which flows in a north-westerly direction towards the Irish Sea. The Afon Conwy is classed as a Main River. There are formal raised tidal defence embankments located to the north and south of the A547 bridge crossing.

A tributary of the Afon Conwy, the Afon Wydden is located approximately 150m to the west of the site. The Afon Wydden is classed as a Main River and in this location is in culvert.

Another tributary of the Afon Conwy, the Afon Ganol West is located approximately 1.0km to the east of the site. The Afon Ganol West is also a Main River.

There are no canals or reservoirs within the vicinity of the site.

2.5 Ground Conditions

The surface geology of the site has been reviewed from the British Geological Survey (BGS) online geology maps. The geology map indicates that the site is superficially underlain by "Till, Devensian - Diamicton. Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.." The bedrock geology is described as "Denbigh Grits Formation - Mudstone, siltstone and sandstone. Sedimentary bedrock formed between 433.4 and 427.4 million years ago during the Silurian period."

According to the Soilscapes soils dataset (http://www.landis.org.uk/soilscapes/), soil conditions at the site and within the surrounding area are loamy and clayey floodplain soils with naturally high groundwater.

2.6 Existing Flood Risk

Figure 1 of TAN15 defines three development advice zones as follows:

- Zone A: Considered to be of little or no risk of fluvial or tidal/coastal flooding.
- Zone B: Areas known to have been flooded in the past evidenced by sedimentary deposits.
- Zone C: Based on (the Natural Resources Wales) flood outline, equal to or greater than 0.1% (river, tidal or coastal). Zone C is subdivided into the following two zones:
    - Zone C1: Areas of the floodplain which are developed and served by significant infrastructure, including flood defenced.
    - Zone C2: Areas of the floodplain without significant flood defence infrastructure.

The development advice zones are shown on the Development Advice Map and are defined by the predicted extent of the 1 in 1,000 (rivers and sea) annual exceedance probability (AEP) event (Zone C) and British Geological Survey drift data (Zone B).

The Development Advice Map is shown on the site information drawing in **Appendix A** and indicates that the site is in Zone A.

2.7 Proposed Development

The scheme consists of the construction of a new Waste Transfer Site. The site will encompass a transfer station building, associated external hard standing areas including a car parking area and the existing turning head for Ffordd Maelgwn. Based upon the latest development plans the final impermeable area generated by the proposals will be approximately 0.691ha as shown on the site information plan in **Appendix A. Appendix E** contains the site proposals, **Appendix F** the preliminary drainage layout and **Appendix G** the surface water calculations.

3 Drainage Proposals

3.1 Foul Drainage

The foul drainage disposal is proposed to follow the requirements of Building Regulations 2010 Part H (2015 Edition), Drainage and Waste Disposal and Sewers for Adoption 7th Edition. Part H1 of the above document contains the following requirements:

"An adequate system of drainage shall be provided to carry foul water from appliances within the building on to the following, listed in order of priority."

a) A public sewer or where that is not reasonably practicable

b) A private sewer communicating with a public sewer, or where that is not reasonably practicable,

c) Either a septic tank which has appropriate form of secondary treatment or another wastewater treatment system; or, where that is not reasonably practicable,

d) A cesspool

The proposed peak foul discharge generated by the development has been calculated based upon an assumed number of 25 members of staff. Therefore, allowing a typical usage of 50 l/person/day over a 12 hour day with a peak factor of 6, generates a peak foul flow of 0.17l/s.

It is therefore likely that the foul drainage peak discharge will increase following completion of the development. However, it is anticipated that this increase will not have a negative impact on the existing public sewer network.

A pre-development enquiry response has been received from DCWW (refer to **Appendix H**), who advocated that foul flows generated by the proposed development can be accommodated within the public sewerage system. They have advised that the flows should be connected to the foul sewer at or downstream of manholes SH79777501 located in Ffordd Maelgwn to the east.

It is proposed that runoff from the vehicle wash facility and excess runoff from the will discharge to the proposed foul drainage network. The proposed silt trap and class 2 full retention petrol interceptor are deemed to be sufficient to remove the suspended sediments and treat the runoff from this area. It is proposed to discharge foul flows from the site to the existing foul sewer to the east of the site via a new connection to manhole DCWW reference SH79777550. This is indicated on the preliminary drainage layout presented in **Appendix F.**

3.2 Surface Water Drainage

3.2.1 Surface Water Drainage Guidance and Policy

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 scheme as stated in section 2 of the "Statutory National Standards for Sustainable Drainage Systems (Wales)" (SNSSUDS) document 2018.

From the 7th January 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 100m² to comply with the SuDS Approval Bodies (SAB's) design guidance and minister's 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 in order to comply with the SNSSUDS. S1 is a hierarchy standard with standards S2-S6 being fixed.

3.2.2 S1 – Surface Water Runoff Destination

In accordance with Welsh Government guidance, surface water runoff should be disposed of according to the following hierarchy:

a) Rainwater collected for use;
b) Infiltrated to ground;
c) To a surface water body;
d) To a surface water sewer, highway drain or another drainage system;
e) To a combined sewer.

It is necessary to identify the most appropriate method of controlling and discharging surface water. The design should seek to improve the local run-off profile by using systems that can either attenuate run-off and reduce peak flow rates or positively impact on the existing flood profile.

3.2.2.1 Rainwater Collected for Use

Due to the nature of the development as a bulking station, it is considered impracticable for grey water harvesting type solutions to be considered.

3.2.2.2 Infiltrated to Ground

As detailed in Section 2, the site is underlain by soils with impeded drainage. Additionally, the existing drainage present on site discharges to the existing 300mm diameter surface water drain situated within Ffordd Maelgwn to the south of the site. On this basis it is reasonable to conclude that the disposal of surface water by infiltration is unlikely to be feasible.

3.2.2.3 To a Surface Water Body

It is proposed to discharge surface water runoff from the site to the existing 300mm diameter surface water drain situated within Ffordd Maelgwn to the south of the site as indicated on the preliminary drainage layout presented in **Appendix F**.

3.2.3 S2 - Surface Water Runoff 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 1 in 100-year return period with mitigating proposals developed for the scheme.

3.2.3.1 Interception of Runoff

Permeable paving is proposed within the car park which will provide interception of runoff for small rainfall events, in these instances the demand will likely outweigh the first 5mm of collection so it is assumed that storm water would be intercepted.

3.2.3.2 Hydraulic Control

Runoff rates from the existing impermeable area that contribute surface water runoff to the existing surface water sewer have been calculated using the Modified Rational Method within the "Pre-development discharge" function of Causeway Flow. The following parameters were used in the calculation.

- The site has a total area of 0.930ha of which the impermeable area currently comprises 0.910ha. The existing access road Ffordd Maelgwn comprises 0.046ha of impermeable area, this will continue to drain as existing therefore, this area will be removed from the calculations. (refer to **Appendix A)**. Therefore, the calculations will be based on an impermeable area of 0.864ha.
- Cv is the volumetric runoff coefficient = Pr/PIMP = 0.75 where Pr is Percentage Runoff and PIMP is Percentage Impermeable Area.
- The time for runoff to flow to the discharge point has been set at 15 minutes.

The peak discharges of surface runoff from impermeable areas of the existing site are shown in the table 1 below:

Above Exceedance Probability of rainfall event	Existing Discharge Rate (l/s)
1:1	66.0
1:2	85.4
1:30	161.6
1:100	209.0

Table 1.0 – Peak Runoff Rate – Existing Site

It is proposed to restrict surface water runoff to the existing 1:1 event rate as presented in Table 1.0, with a 90% betterment post development thus equating to 6.6l/s.

Attenuation storage will be provided to restrict surface water runoff generated across roofs and hardstanding. The attenuation storage facility has been modelled using Causeway Flow (refer to **Appendix G**). In accordance with statutory guidelines, the development of this site should not increase flood risk elsewhere and as such, all runoff from the site should be contained within the site boundary for up to and including a 1 in 100-year design period storm, plus 30% climate change.
Based on a peak discharge rate of 6.6l/s, a total storage volume of 320.2m³ would be required. It is proposed that this storage is provided within a geo-cellular attenuation tank and an offline attenuation basin. The geo-cellular attenuation tank would require an area of 196m² and a depth of 1.2m. The attenuation basin would have a base area of 51m², a top of bank area of 201m², 1:3 side slopes and a depth of 1.12m. The proposed attenuation basin is to be located to the southwest of Ffordd Maelgwn. Additional storage is provided in the proposed network of pipes and manholes. A preliminary surface water drainage layout is provided in **Appendix F**.

3.2.3.3 Exceedance Flows and Flood Pathways

The proposed improvement works will include the installation of half battered kerbs around the perimeter of the site to contain surface water runoff within the hard standing areas.

Where flows exceed the capacity of the storage, flows will overtop the system and be contained within these hard standing areas. The design of which shall be such to contain flows to the preferential areas to the south and west of the site where possible.

3.2.3.4 Flood Risks to People

As mentioned above the level design of the external areas will seek to contain flows within the hard standing external areas and direct flows away from the buildings,

3.2.4 S3 – Water Quality

This standard requires treatment of surface water runoff to prevent negative impacts on the receiving water quality and/or protect downstream drainage systems including sewers.

The roof water and car parking areas have hazard levels ranging from very low to low, with low levels of contamination. The proposed permeable paving is deemed to be sufficient to remove the suspended sediments from the car park surface water prior to discharge to the unnamed watercourse.

The external areas of the site not including the car park have a high hazard level. The proposed catch pits, sumps within road gullies and linear channels and the use of a class 1 full retention petrol interceptor are deemed to be sufficient to remove the suspended sediments from these areas prior to discharge to the 300mm diameter surface water drain.

Attenuation basins can provide water quality benefits via the settlement of pollutants in still or slow-moving water, absorption by the soil and biological activity.

3.2.5 S4 – Amenity

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

It is proposed that the attenuation basin could incorporate diverse plants, wetland planted areas and wildflower mixes to enhance their beauty and amenity contribution to the site.

However, it should be noted that as these proposals are for the development of a new waste transfer site which is "closed off" from the public, it will not be possible to add further amenity benefits enjoyable by the public within the confines of the proposed development.

Additionally, due to the nature of the development in relation to the existing site and the constraints of the topography, there is limited available space for additional SuDS features to provide additional amenity.

3.2.6 S5 – Biodiversity

This standard requires that the surface water management system should maximise biodiversity benefits. The SuDS scheme biodiversity strategy should revolve around the creation of significant and varied habitat to increase the overall biodiversity of the site and ecological value.

The attenuation basin could include a variety of structurally diverse planting that will help make a positive contribution to biodiversity – providing habitat and food for invertebrates and birds.

However, as previously stated, there is limited available space for additional SuDS features to provide additional biodiversity.

The attenuated discharge can help reduce the impact of heavy flows on the downstream system and this can help facilitate biodiversity delivery in those areas.

3.2.7 S6 – Design of Drainage for Construction, Operation and Maintenance and Structural Integrity

The proposed system will not be required for adoption as it does not serve more than one property. However, it will still be designed to the standards set out in CIRIA C753.

The construction of most of the surface water drainage will only require the use of standard civil engineering and landscaping operations, e.g. excavation, filling, grading, pipe-laying, chamber construction, topsoiling, seeding and planting, which a competent contractor would be expected to be able to undertake. Specific method statements may be required for the installation of proprietary drainage products such as attenuation tank, rainwater butts and porous paving as workers may not be aware of the specific installation requirements, to ensure the structural integrity of the features.

Due to the site's function as a waste transfer site, maintenance can and will be carried out by the existing on site staff as part of their regular duties. Exact details of the maintenance regime will be determined through workshops with the client at detailed design stage.

Inspections of the SuDS features will be required during construction phase at frequent intervals to ensure correct installation. Regular inspections of SuDS features will need to be undertaken upon construction completion to ensure amenity, water quantity and water quality standards and a maintenance plan to do so will be required upon handover of the site to client. The surface water drainage proposals for this site should include the following maintenance measures:

- Cleaning and maintenance of road gullies and linear drainage to maintain effective drainage.
- Cleaning and maintenance of pipe network and manholes / catchpits to maintain effective drainage.
- Cleaning and maintenance of attenuation basin / tank to maintain effective drainage.
- Cleaning and maintenance of flow control device and its sump to maintain effective drainage.
- Permeable paving to be regularly inspected and cleaned to ensure that the system is working efficiently.

4 Conclusions

4.1 Recommendations

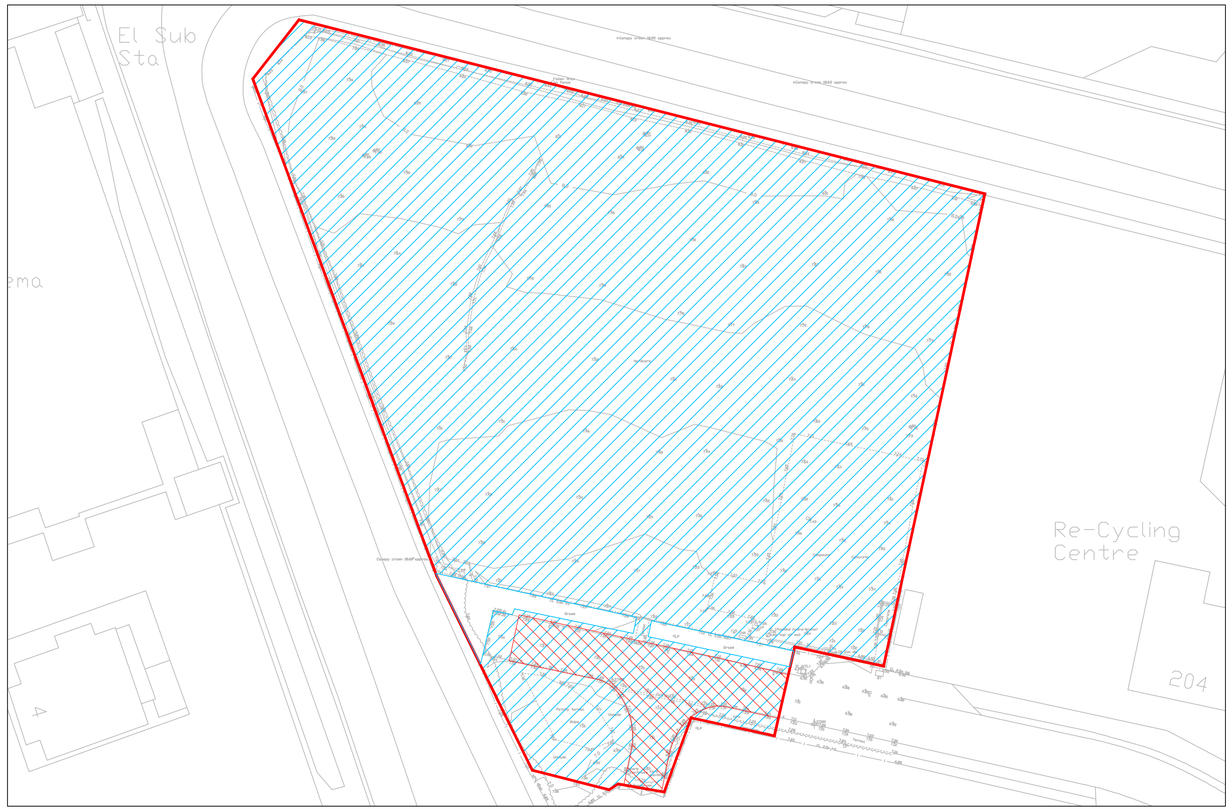
The 150mm diameter public foul sewer network, pumping station, rising main and combined sewer overflow were not surveyed as part of the CCTV survey undertaken by MetroRod. Additionally, the perforated land drain situated along the west perimeter of the site was unable to be fully surveyed due to root ingress. These details will need to be confirmed prior to the commencement of works on site. Before the detailed design stage, it is also recommended that soakaway testing is undertaken in accordance with BRE365 guidance to verify the on-site infiltration potential of the underlying ground.

4.2 Conclusions

The proposed development is not expected to be affected by general objections in respect to draining the site. There will be suitable conditions imposed to ensure that the drainage proposals are designed and constructed in accordance with relevant statutory requirements, including Building Regulations 2010 and the requirements of Conwy County Borough Council's SuDS Approving Body.

5 Appendices

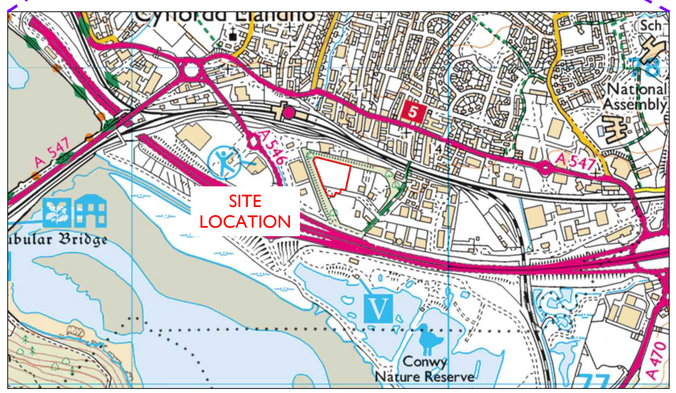
Appendix A – Site Information Drawing



EXISTING IMPERMEABLE AREA
APPROX SCALE 1:500

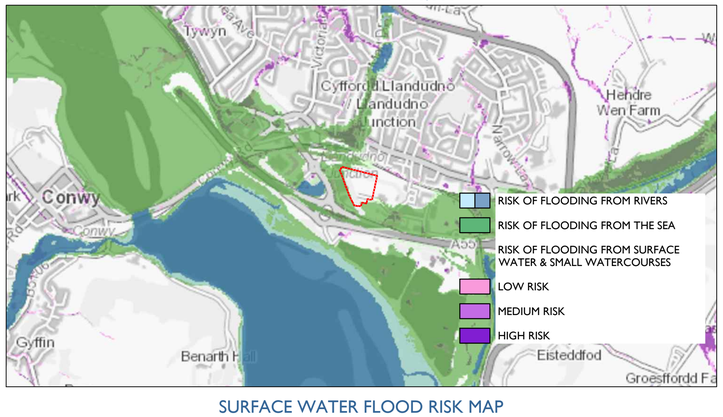
PROPOSED IMPERMEABLE AREA
APPROX SCALE 1:500

APPROX SCALE 1:125,000



APPROX SCALE 1:10,000

DEVELOPMENT ADVICE MAP
APPROX SCALE 1:10,000



SURFACE WATER FLOOD RISK MAP
APPROX SCALE 1:10,000

SITE CO-ORDINATES

OS X (Eastings)	279627
OS Y (Northings)	377678
Nearest Post Code	LL31 9PN
Nat Grid	SH796776 / SH7962777678

AREAS

SITE BOUNDARY
9,300m² (0.930 ha)

EXISTING IMPERMEABLE AREA
(AREA A - HARD STANDING AREA)
9,100m² (0.910 ha)

EXISTING IMPERMEABLE AREA
(AREA B - FFORDD MAELGWN)
460m² (0.046 ha)

TOTAL CATCHMENT AREA PRE-DEVELOPMENT
8,640m² (0.864 ha)

IMPERMEABLE AREA
(AREA A)
6,910m² (0.691 ha)

IMPERMEABLE AREA (AREA B)
TO DRAIN AS EXISTING
460m² (0.046 ha)

REV	DESCRIPTION	BY	CHK	APR	DATE
-	-	-	-	-	-

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PURPOSE OF ISSUE	STATUS
PRELIMINARY	P

PROJECT
LLANDUDNO JUNCTION
WASTE TRANSFER SITE

TITLE
DRAINAGE SCHEME
SITE INFORMATION

CLIENT
CONWY COUNTY
BOROUGH COUNCIL

DRAWN BY	CHECKED BY	APPROVED BY
JR	RH	MM
DATE	SCALE (@ A1)	PROJECT NUMBER
04.07.2023	AS SHOWN	16019

DRAWING NUMBER	REV
LJW-JPS-XX-XX-DR-C-1011	P01

Appendix B – Topographic Survey

ANNOTATION LEGEND

AV	AIR VALVE
BH	BOREHOLE
Bin	LITTER BIN
BL	BED LEVEL
Bol	BOLLARD
BS	BUS STOP
BT	BRITISH TELECOM COVER
CRack	CABLE RACK
CATV	CABLE TELEVISION
Cab	CABINET
CCTV	CLOSED CIRCUIT TELEVISION
CL	COVER LEVEL
Clawdd	HEDGE/WALL MOUND
Col	COLUMN
Cover	COVER (OTHER)
Conc	CONCRETE
Cul	CULVERT
DC	DRAIN CHANNEL
Dia	DIAMETER
Dis	DISUSED
Dilap	DILAPIDATED
DK	DROP KERB
DP	DRAIN PIPE
DSW	DRY STONE WALL
EK	EDGING KERB
Elec	ELECTRICITY COVER
EL	EAVES LEVEL
EP	ELECTRICITY POLE
ER	EARTHING ROD
FFL	FINISHED FLOOR LEVEL
FH	FIRE HYDRANT
Fig	FEEDS INTO GROUND
FL	FLOODLIGHT
FP	FENCE POST
FS	FLAG STAFF
G	GULLY
Grav	GRAVEL
H/C	HARDCORE
IC	INSPECTION COVER
IL	INVERT LEVEL
K	KERB
LB	LETTER BOX
LP	LAMP POST
MH	MANHOLE
Mkr	MARKER
Mkrs	MARKERS
MP	MARKER POST
NB	NOTICE BOARD
NP	STREET NAME PLATE
P	POST
Pav	PAVED
PH	POST HOLE
PLP	PEDESTRIAN LAMP POST
RE	RODDING EYE
RL	RIDGE LEVEL
RS	ROAD SIGN
RW	RETAINING WALL
RWP	RAIN WATER PIPE
Sap	SAPLING
SB	STAGGERED BARRIERS
SL	SOFFIT LEVEL
SP	SIGN POST
Stay	STAY WIRE
St	STUMP
ST	STOP TAP
STG	STOP TAP GAS
STW	STOP TAP WATER
Sub-Stn	SUB STATION
SV	STOP VALVE
SVG	STOP VALVE GAS
SVW	STOP VALVE WATER
T	TREE
Tac	TACTILE PAVING
TL	TRAFFIC LIGHT / THRESHOLD LEVEL
TP	TELEPHONE POLE
Trans	TRANSFORMER
UTL	UNABLE TO LIFT
VP	VENT PIPE
W	WATER
WL	WATER LEVEL
WO	WASH-OUT POINT
WM	WATER METER
WP	WASTE PIPE

FENCE TYPE ABBREVIATIONS

BW	BARBED WIRE
CB	CLOSE BOARDED
CI	CORRUGATED IRON
CL	CHAIN LINK
CP	CONCRETE POST
IR	IRON RAILING
MR	METAL RAILING
PAL	PALISADE
R	RAILING
SEC	SECURITY
SP	STOCK PROOF
WM	WIRE MESH
WP	WOODEN POST

All efforts have been made to identify all visible features above ground - it is possible that features may have been obscured at the time of survey due to parked vehicles, debris or vegetation.

No allowance has been made for sub-surface entry into manholes, other chambers or voids below ground level. Therefore, any details relating to depths, pipe sizes, flow directions etc were taken from above ground and as such will be approximate only. The routes of buried services shown on this drawing may be assumed and may require further work to validate their positions.

All critical measurements should be checked on site prior to design and no liability will be taken for this survey if passed on to third parties. If there is any conflict between the detail shown on this drawing and those shown on other drawings, Co-Surveys Ltd should be informed as soon as possible and prior to any design or construction works taking place.

Station	Easting	Northing	Level	Station description
STN01	279663.64	377602.00	7.08	Road nail
STN02	279630.67	377608.91	7.27	Road nail

PROJECT

TOPOGRAPHIC SURVEY SITE AT FFORDD MAELGWN LLANDUDNO JUNCTION

CLIENT CONWY COUNTY BOROUGH COUNCIL
ENVIRONMENT, ROADS & FACILITIES
MOCHDRE OFFICES
MOCHDRE
CONWY LL28 5AB

ORIGINAL DRAWING BY

Co - Surveys Ltd
Survey House
Unit 7 Parc Caer Seion
CONWY
LL32 8FA
Tel (01492) 593367
mail@co-surv.com

THE SURVEY ASSOCIATION FULL MEMBER 14 February 2023

NOTES

GRID - Related to OSGB36 via GNSS and OSTN15 at STN01
Scale factor 1.0

LEVELS - Related to OS Newlyn Datum via OSGM15

SURVEYED	PROCESSED	APPROVED
AJ/COH	JDL	AJ/COH

SCALES
HORIZONTAL 1:250
VERTICAL N/A

DRAWING REFERENCE
10827 / 1 (sheet 1 of 1)

Sheet reference: 1 Scale 1:250 (when plotted at 1:1 on A1 sheet)

Appendix C – Public Sewer Records

Dŵr Cymru
Welsh Water

Llandudno Junction Recycling Centre Ffordd Maelgwn Conwy LL31 9XX

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.

RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former S24 sewers (for indicative purposes only)

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF) . It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

Map Ref:	279650,377671
Map scale:	1:1250
Printed by:	Zara Howells
Printed on:	01 Dec 2022

Appendix D – Existing Drainage Layout

EXISTING DRAINAGE NOTES

THE LOCATION LINE & LEVEL OF ALL KNOWN EXISTING DRAINAGE PIPEWORK INDICATED ON THIS DRAWING IS APPROXIMATE AND FOR GUIDANCE PURPOSES ONLY.

IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE THEIR EXACT LINE AND LEVEL, BY WAY OF HAND EXCAVATED TRIAL PITS, PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION WORKS ON SITE. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS AND MAINTAIN THE STRUCTURAL INTEGRITY OF ALL ABOVE AND BELOW GROUND SERVICE INSTALLATIONS.

KEY

- FWS — EXISTING FOUL WATER SEWER
- EXISTING SW DRAIN
- EXISTING FOUL WATER DRAIN
- PM — EXISTING PUMP MAIN
- ⊠ RG — EXISTING ROAD GULLY

CCTV SURVEY UNABLE TO PASS DUE TO MASS ROUTES

EX MH 3
CL 7.410
IL 5.840

EX MH 1
CL 7.300
WW 6.660
IL 6.020

EX MH 2
CL 7.040
IL 6.660

EX MH 5
CL 6.800
IL UNK

EX MH 4
CL 6.990
IL 5.690

EX MH 6
CL 6.400
IL UNK

EX MH 9
CL 6.400
IL 6.100

EX MH 7
CL 5.400
IL UNK

EX MH 8
CL 5.400
IL UNK

EX MH 9
CL 5.300
IL UNK

DCWW
REF: SH79777501
CL 5.300
IL UNK

DCWW
REF: SH79777550
CL 4.800
IL UNK

DCWW
REF: SH79778501

DCWW
REF: SH79778505

EXISTING PUMP STATION
DCWW REF: 3116
TREMARL

EXISTING HEADWALL
IL UNK

EXISTING COMBINED
SEWER OVERFLOW
IL UNK

50m 300Ø @ 1:333

FFORDD MAELGWN

Weighbridge

Re-Cycling Centre

Stad Ddiwydianol Tre Marl (Industrial Estate)

Maelgwyn (PH)

A55

REV	DESCRIPTION	BY	CHK	APR	DATE
P02	EX MH9 ADDED	JR	RH	JP	27.06.2023

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PURPOSE OF ISSUE: PRELIMINARY	STATUS: P
PROJECT: LLANDUDNO JUNCTION WASTE TRANSFER SITE	
TITLE: DRAINAGE SCHEME EXISTING LAYOUT	
CLIENT: CONWY COUNTY BOROUGH COUNCIL	
DRAWN BY: JR	CHECKED BY: RH / APPROVED BY: JP
DATE: 15.06.2023	SCALE (@ A1): 1:500 / PROJECT NUMBER: 16019
DRAWING NUMBER: LJW-JPS-XX-XX-DR-C-0501	REV: P02

Appendix E – Development Proposals

T3

QMS

09
Bailer / Ramp

7.0 m

8.5 m

7.5 m

7.5 m

10
Cardboard Bay

11
Bulky Waste Bay

10.0 m

12
AHP

13
Dry Litter Bin

18.0 m

14
Litter Bin Waste

9.0 m

10.0 m

Firewater Tank

11.3 m

15
Residual Bay 01

10.0 m

22.2 m

16
Residual Bay 02

10.0 m

10.0 m

08
Baled Card

10.0 m

5no Fleet Parking

12no Car Parking

Cycle Shelter

PPE
Storeage

Portakabins

07
Quarantine Bay

6.5 m

8.0 m

Animal Fridge

Glass Skip

13.2 m

Spare Skip

SDA Skip

LDA Skip

Spare Skip

Wood Waste Skip

Ad Blue
Tank

Rad Diesel
Tank

Television Skip

Mattresses
Skip

06
Fridge / Freeze

4.0 m

13.5 m

14.3 m

13.5 m

05
Tyres

4.0 m

Gas Cage /
Chemsafe/
Battery St

4.0 m

Vehicle Wash

4.0 m

3.5 m

3.5 m

4.0 m

Weighbridge

4.0 m

Weighbridge

9.0 m

9.0 m

9.0 m

03
Rubble

10.0 m

02
Street Sweeping

01
Garden Waste

Rubble Skip

Sweep Skip

Garden Waste
Skip

Existing turning head
reduced in length

Substation

Attenuation
Pond

North

M 5 10 15 20 25

General Notes

1. Contractor to verify all dimensions and check level datums on site
2. All of the designs are the sole property of TACP Architects Ltd and may not be used without their written agreement
3. All prints, specifications and their copyright are the property of TACP Architects Ltd
4. Do not scale off drawings
5. All dimensions shall be checked on site before commencment of shop drawings, manufacture and all discrepencies must be reported to TACP Architects Ltd

Revisions

Rev	Date	Description	By	Check
P01	20/02/23	Issued for Information	KA	DM
P02	20/03/23	Updated in accordance with clients comments	DW	KA
P03	31/03/23	Updated location of Portakabin and Substation. Revised vehicle entrance access	AKT	KA
P04	14/04/23	Sub-station relocated and weighbridges moved	KA	
P05	30/05/23	Cycle shelter indicated, PPE storage location revised	KA	
P06	16/06/23	Mattress skip location revised in-accordance with cleints requests, vehicular barriers indicated to central island area	KA	

Client

Conwy County Council

Project Title

Llandudno Junction Waste Transfer Site

Sheet Name

Site layout

Purpose of Issue

Status

Scale	Date	Drawn By	Checked By	Office
1 : 200@A1	20/02/23	KA	DM	Wrexham

Job Number	Project•Originator•Zone•Level•Type•Role•Number	Revision
22044	LJW-TACP-PS-XX-DR-A-7001	P06

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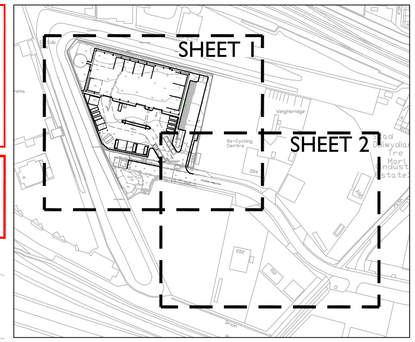
TACP Architects Ltd

Architecture ● Interior Design ● Healthcare Planning ● Conservation ● Masterplanning ● Sustainable Design

Appendix F – Proposed Drainage Layout

NOTE
THE EXISTING DRAINAGE AND CONNECTIONS AS SHOWN HAVE BEEN TAKEN FROM A NUMBER OF SOURCES INCLUDING CCTV DRAINAGE SURVEY UNDERTAKEN BY METRO ROD AND SITE SURVEY UNDERTAKEN BY JP STRUCTURAL DESIGN AND WILL NEED TO BE VERIFIED.

NOTE
** IT MUST BE CONFIRMED PRIOR TO THE ABANDONMENT OF ANY EXISTING DRAIN THAT THE DRAINAGE DOES NOT SERVE ANY AREA TO REMAIN.



SITE PLAN
SCALE 1:2500

SMH 1.0
CL 8.000
IL 7.250

1.000 80m 225Ø @ 1:100

SMH 1.1
CL 8.000
IL 6.450

1.001 9.2m 225Ø @ 1:20

SCP 1.2
CL 8.100
IL 6.010 (225Ø)
IL 5.935 (300Ø)
BL 5.635
(300mm SUMP)

ATTENUATION TANK
223.4m³ OF ATTENUATION CONSISTING OF AQUACELL 'CORE-R' GEOCELLULAR BLOCKS - 56 UNITS x 7 UNITS x 3 UNITS (28.0m x 7.0m x 1.2m AT 95% VOID RATIO) TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S GUIDANCE & RECOMMENDATIONS
CL 8.100
TOP 7.125
IL 5.925
1 YEAR CRITICAL WATER LEVEL 6.162m AOD
2 YEAR CRITICAL WATER LEVEL 6.245m AOD
30 YEAR CRITICAL WATER LEVEL 6.605m AOD
100 YEAR +30%CC CRITICAL WATER LEVEL 7.118m AOD

SMH 2.0
CL 8.000
IL 6.900

SMH 2.0
CL 8.000
IL 6.600

ASSUMED FFL +8.000

30.5m 150Ø @ 1:100

FMH 1.0
CL 7.900
IL 7.015

2.000 80m 225Ø @ 1:150

SMH 2.1
CL 7.950
IL 7.200 (150Ø PERF)
IL 6.060 (225Ø)
IL 5.985 (300Ø)
BL 5.685
(300mm SUMP)

150Ø PERF

SMH 3.0
CL 7.870
IL 7.000

SMH 3.1
CL 7.700
IL 6.500 (150Ø)
IL 6.425 (225Ø)

3.000 19m 225Ø @ 1:33

23m 150Ø @ 1:100

2.001 6m 300Ø @ 1:90

SCP 1.3
CL 8.100
IL 5.915
BL 5.615
(300mm SUMP)

FMH 2.1
CL 7.880
IL 6.595

SMH 3.2
CL 7.750
IL 6.020 (225Ø)
IL 5.945 (300Ø)

150Ø PERF

FMH 3.0
CL 7.500
IL 7.000
(OUTLET)

SMH 4.0
CL 7.600
IL 7.000

4.000 14.6m 150Ø @ 1:29

FMH 1.1
CL 7.600
IL 6.785

3.001 30.5m 225Ø @ 1:75

16.5m 150Ø @ 1:100

SMH 3.3
CL 7.580
IL 5.915

3.002 6.5m 300Ø @ 1:238

'SPEL' CLASS 2
FULL RETENTION SEPARATOR
MODEL FR030 SC 4420(l) x 1875(Ø) x 2150(h)
INLET LEVEL 6.360
OUTLET LEVEL 6.300
WITH CONTROL PANEL KIOSK WITH SOLAR POWERED HIGH LEVEL ALARM WARNING BEACON

FMH 1.2
CL 7.580
IL 6.430

'SPEL' VEHICLE WASH SILT TRAP
CL 7.400
IL 7.135

7m 150Ø @ 1:20

35.3m 150Ø @ 1:100

1.003 30m 300Ø @ 1:232

CCTV SURVEY UNABLE TO PASS DUE TO MASS ROUTES

** IT MUST BE CONFIRMED PRIOR TO THE ABANDONMENT OF ANY EXISTING DRAIN THAT THE DRAINAGE DOES NOT SERVE ANY AREA TO REMAIN.

'SPEL PURACEPTOR' CLASS 1
FULL RETENTION SEPARATOR
MODEL P065/1C/SC 4810(l) x 2700(Ø) x 3050(h)
INLET LEVEL 5.865
OUTLET LEVEL 5.765
WITH CONTROL PANEL KIOSK WITH SOLAR POWERED HIGH LEVEL ALARM WARNING BEACON

3.003 11m 300Ø @ 1:238

6.8m 150Ø @ 1:100

SMH 1.4
CL 7.130
IL 5.785

SCP 1.5
CATCHPIT WITH WITH VORTEX FLOW CONTROL DEVICE TO LIMIT FORWARD FLOW TO 6.6l/s
AT 1.3m
CL 7.200
L 5.710
BL 5.210 (500mm SUMP)

SMH 5.2
CL 7.250
IL 6.030

FMH 1.3
CL 7.200
IL 6.255

1.004 8m 300Ø @ 1:221

SMH 5.1
CL 7.200
IL 6.130

5.002 17.8m 300Ø @ 1:231

1.005 8.2m 300Ø @ 1:225

7.5m 150Ø @ 1:100

SMH 5.0
CL 7.420
IL 6.185

EX MH 3
CL 7.410
IL 5.840

5.001 11m 300Ø @ 1:200

50m 300Ø @ 1:333

SMH 6.0
CL 7.250
IL 5.810

FMH 1.4
CL 7.100
IL 6.180

EX MH 5
CL 6.800
IL UNK

ALTHON ONE PIECE GLASS REINFORCED CEMENT HEADWALL REF H3C TO SUIT 300Ø PIPE. IL - 6.230

5.000 9m 300Ø @ 1:200

8m 150Ø @ 1:100

FMH 1.5
CL 6.950
IL 6.100

EX MH 4
CL 6.990
IL 5.690

ATTENUATION BASIN
TOP LEVEL 7.350
BASE LEVEL 6.230
TOP AREA 201m²
BASE AREA 51m²
SIDE SLOPES 1:3
STORAGE VOLUME 131.8m³

50.6m 150Ø @ 1:84

FFORDD MAELGWN

CONTRACTOR TO DETERMINE EXACT LINE AND LEVEL OF EXISTING 300Ø SURFACE WATER DRAIN PRIOR TO THE COMMENCEMENT OF THE WORK AND REPORT FINDINGS TO THE ENGINEER

PROPOSED MANHOLE TO BE CONSTRUCTED ON LINE OF EXISTING SURFACE WATER DRAIN. ASSUMED IL 5.710

SMH 1.6
CL 7.000
IL 5.710

FMH 1.6
CL 6.500
IL 5.500

24.2m 150Ø @ 1:97

FMH 1.7
CL 6.400
IL 5.250

Re-Cycling Centre

204

NOTES

1. THE WORKS SHALL BE IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS, NATIONAL BUILDING SPECIFICATION (NBS) AND SEWERS FOR ADOPTION, 7TH EDITION.

2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS DRAWINGS, ARCHITECTS DRAWINGS, MECHANICAL AND ELECTRICAL DRAWINGS AND SPECIFICATIONS.

3. THE LOCATION, LINE & LEVEL OF ALL KNOWN EXISTING BURIED SERVICE MAINS AND DRAINAGE PIPEWORK INDICATED ON THE DRAWINGS ARE APPROXIMATE AND FOR GUIDANCE PURPOSES ONLY. IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE THEIR EXACT LINE & LEVEL, BY WAY OF HAND EXCAVATED TRIAL PITS, PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION WORKS ON SITE. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO MAINTAIN THE STRUCTURAL INTEGRITY OF ALL ABOVE AND BELOW GROUND SERVICE MAINS / DRAINAGE INSTALLATIONS.

4. THE CONTRACTOR MUST COMPLY WITH ALL CURRENT LEGISLATION RELATING TO HEALTH & SAFETY.

5. THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF ALL TEMPORARY WORKS, AND IS ALSO RESPONSIBLE FOR THE SAFE MAINTENANCE AND STABILITY OF EXISTING BUILDINGS AT ALL TIMES.

6. THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE MITIGATION OF ALL OCCURRENCES OF GROUND WATER DURING THE CONSTRUCTION PERIOD.

7. THE CONTRACTOR SHALL MAKE ALLOWANCE FOR RAISING / LOWERING ALL EXISTING ACCESS COVERS & FRAMES TO SUIT NEW FINISHED LEVELS.

8. ALL SOFT / HARD PAVED AREAS AFFECTED BY THE WORKS SHALL BE FULLY REINSTATED UPON COMPLETION OF THE WORKS. ALL SURFACE MARKINGS DAMAGED BY THE WORKS SHALL BE FULLY REINSTATED.

9. ALL SURPLUS EXCAVATED MATERIAL SHALL BE DISPOSED OF OFF SITE.

10. ALL LEVELS ARE TO ORDNANCE DATUM

KEY

- FWS — EXISTING FOUL WATER SEWER
- EXISTING SW DRAIN
- EXISTING FOUL WATER DRAIN
- PM — EXISTING PUMP MAIN
- ⊠ RG — EXISTING ROAD GULLY
- **EXISTING DRAIN TO BE ABANDONED
- PROPOSED FOUL SEWER
- PROPOSED SW SEWER
- PROPOSED FILTER DRAIN
- PROPOSED ATTENUATION CRATES
- PROPOSED PERMEABLE PAVING
- LINEAR DRAINAGE CHANNEL CHANNEL (SU - UNIVERSAL SUMP UNIT WITH AIR TRAP)
- ⊠ RG — PROPOSED TRAPPED ROAD GULLY (150Ø OUTLET)
- ○ RWP — PROPOSED RAIN WATER DOWN PIPE (100Ø OUTLET)
- ○ FO — PROPOSED FOUL OUTLET (100Ø OUTLET)

REV	DESCRIPTION	BY	CHK	APR	DATE
-	-	-	-	-	-

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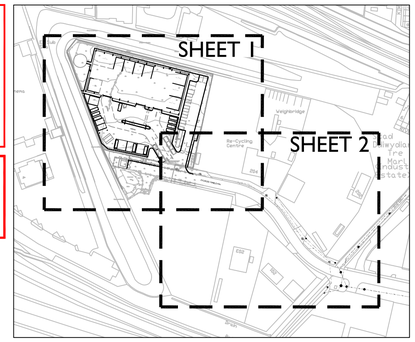
PURPOSE OF ISSUE: PRELIMINARY	STATUS: P
PROJECT: LLANDUDNO JUNCTION WASTE TRANSFER SITE	
TITLE: DRAINAGE SCHEME PROPOSED LAYOUT 1 OF 2	
CLIENT: CONWY COUNTY BOROUGH COUNCIL	
DRAWN BY: JR	CHECKED BY: RH / APPROVED BY: JP
DATE: 27.06.2023	SCALE (@ A1): 1:250 / PROJECT NUMBER: 16019
DRAWING NUMBER: LJW-JPS-XX-XX-DR-C-0502	REV: P01

NOTE
THE EXISTING DRAINAGE AND CONNECTIONS AS SHOWN HAVE BEEN TAKEN FROM A NUMBER OF SOURCES INCLUDING CCTV DRAINAGE SURVEY UNDERTAKEN BY METROROD AND SITE SURVEY UNDERTAKEN BY JP STRUCTURAL DESIGN AND WILL NEED TO BE VERIFIED.

NOTE
** IT MUST BE CONFIRMED PRIOR TO THE ABANDONMENT OF ANY EXISTING DRAIN THAT THE DRAINAGE DOES NOT SERVE ANY AREA TO REMAIN.



SITE PLAN
SCALE 1:2500

Re-Cycling Centre

204

203

202

201

FFORDD MAELGWN

x 2750(h)
INLET LEVEL 6.360
OUTLET LEVEL 6.300
WITH CONTROL PANEL KIOSK
WITH SOLAR POWERED HIGH LEVEL ALARM WARNING BEACON

'SPEL PURACEPTOR' CLASS 1 FULL RETENTION SEPARATOR MODEL P065/1C/SC
4810(l) x 2700(Ø) x 3050(h)
INLET LEVEL 5.865
OUTLET LEVEL 5.765
WITH CONTROL PANEL KIOSK
WITH SOLAR POWERED HIGH LEVEL ALARM WARNING BEACON

SMH 1.4
CL 7.130
IL 5.785

SCP 1.5
CATCHPIT WITH WITH VORTEX FLOW CONTROL DEVICE TO LIMIT FORWARD FLOW TO 6.6l/s AT 1.3m
CL 7.200
L 5.710
BL 5.210 (500mm SUMP)

FMH 1.4
CL 7.100
IL 6.180

EX MH 5
CL 6.800
IL UNK

FMH 1.5
CL 6.950
IL 6.100

EX MH 4
CL 6.990
IL 5.690

CONTRACTOR TO DETERMINE EXACT LINE AND LEVEL OF EXISTING 300Ø SURFACE WATER DRAIN PRIOR TO THE COMMENCEMENT OF THE WORK AND REPORT FINDINGS TO THE ENGINEER

PROPOSED MANHOLE TO BE CONSTRUCTED ON LINE OF EXISTING SURFACE WATER DRAIN. ASSUMED IL 5.710

SCP 1.6
CATCHPIT WITH WITH VORTEX FLOW CONTROL DEVICE TO LIMIT FORWARD FLOW TO 6.9l/s AT 1.2m HEAD
CL 7.000
IL 5.710
BL 5.210 (500mm SUMP)

FMH 1.6
CL 6.500
IL 5.500

EX MH 6
CL 6.400
IL UNK

FMH 1.7
CL 6.400
IL 5.250

EX MH 9
CL 6.400
IL 6.100

FMH 1.8
CL 6.200
IL 5.000

EX MH 7
CL 5.400
IL UNK

EX MH 8
CL 5.400
IL UNK

FMH 1.9
CL 5.200
IL 4.520

EX MH 9
CL 5.300
IL UNK

DCWW
REF: SH79777501
CL 5.300
IL UNK

DCWW
REF: SH79777550
CL 4.700
IL 4.200 (ASSUMED)

BREAK INTO EXISTING MANHOLE TO FACILITATE CONNECTION OF NEW 150Ø FOUL SEWER ASSUMED IL 4.200

EXISTING HEADWALL
IL UNK

EXISTING COMBINED SEWER OVERFLOW
IL UNK

EXISTING PUMP STATION
DCWW REF: 3116
TREMARL

DCWW
REF: SH79778501

DCWW
REF: SH79778505

50.6m 150Ø @ 1:84
24.2m 150Ø @ 1:97
24.2m 150Ø @ 1:100
34.5m 150Ø @ 1:72
32m 150Ø @ 1:100
8m 150Ø @ 1:100
7.5m 150Ø @ 1:100
1.005 9.2m 300Ø @ 1:223
1.004 9m 300Ø @ 1:221
1.003 30m 300Ø @ 1:23
3.003 11m 300Ø @ 1:238
20m 150Ø @ 1:21

NOTES

1. THE WORKS SHALL BE IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS, NATIONAL BUILDING SPECIFICATION (NBS) AND SEWERS FOR ADOPTION, 7TH EDITION.

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10. ALL LEVELS ARE TO ORDNANCE DATUM

KEY

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- SW — EXISTING SW DRAIN
- FWD — EXISTING FOUL WATER DRAIN
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- **EXISTING DRAIN TO BE ABANDONED
- PROPOSED FOUL SEWER
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- LINEAR DRAINAGE CHANNEL CHANNEL (SU - UNIVERSAL SUMP UNIT WITH AIR TRAP)
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- RWP — PROPOSED RAIN WATER DOWN PIPE (100Ø OUTLET)
- FO — PROPOSED FOUL OUTLET (100Ø OUTLET)

REV	DESCRIPTION	BY	CHK	APR	DATE
-	-	-	-	-	-

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PURPOSE OF ISSUE: PRELIMINARY	STATUS: P
PROJECT: LLANDUDNO JUNCTION WASTE TRANSFER SITE	
TITLE: DRAINAGE SCHEME PROPOSED LAYOUT 2 OF 2	
CLIENT: CONWY COUNTY BOROUGH COUNCIL	
DRAWN BY: JR	CHECKED BY: RH	APPROVED BY: JP
DATE: 27.06.2023	SCALE (@ A1): 1:250	PROJECT NUMBER: 16019
DRAWING NUMBER: LJW-JPS-XX-XX-DR-C-0503	REV: P01

Appendix G – Surface Water Calculations

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
100	30	0	0

Node 1.5 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	1.005	Sump Available	✓
Replaces Downstream Link	✓	Product Number	CTL-SHE-0117-6600-1200-6600
Invert Level (m)	5.750	Min Outlet Diameter (m)	0.150
Design Depth (m)	1.200	Min Node Diameter (mm)	1200
Design Flow (l/s)	6.6		

Node BASIN Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	6.230
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	51.0	0.0	1.120	201.0	0.0	1.121	0.0	0.0

Node TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	5.925
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	196.0	0.0	1.200	196.0	0.0	1.201	0.0	0.0

Node Carpark 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.230	Slope (1:X)	80.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.300
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.35	Length (m)	40.500		

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1.0	10	7.346	0.096	17.7	0.0270	0.0000	OK
15 minute winter	1.1	11	6.513	0.063	17.2	0.0179	0.0000	OK
180 minute winter	1.2	140	6.163	0.228	5.3	0.4022	0.0000	OK
180 minute winter	1.3	140	6.162	0.247	11.1	0.4367	0.0000	OK
180 minute winter	1.4	140	6.162	0.377	5.7	0.6656	0.0000	SURCHARGED
180 minute winter	1.5	140	6.162	0.412	8.3	0.7281	0.0000	SURCHARGED
15 minute summer	1.6	1	5.710	0.000	6.6	0.0000	0.0000	OK
15 minute winter	2.0	11	6.699	0.099	17.8	0.0281	0.0000	OK
180 minute winter	2.1	140	6.162	0.177	5.3	0.2003	0.0000	OK
15 minute winter	3.0	10	7.025	0.025	2.8	0.0279	0.0000	OK
15 minute winter	3.1	10	6.491	0.066	11.3	0.0751	0.0000	OK
180 minute winter	3.2	140	6.162	0.217	7.9	0.2452	0.0000	OK
180 minute winter	3.3	140	6.162	0.247	9.5	0.4360	0.0000	OK
180 minute winter	PI	140	6.162	0.397	9.2	5.1509	0.0000	SURCHARGED
15 minute summer	5.0	1	6.185	0.000	0.0	0.0000	0.0000	OK
15 minute summer	BASIN	1	6.230	0.000	0.0	0.0000	0.0000	OK
180 minute winter	TANK	140	6.162	0.237	15.7	44.1499	0.0000	OK
180 minute winter	5.2	140	6.162	0.132	1.2	0.1490	0.0000	OK
15 minute summer	4.0	1	7.000	0.000	0.0	0.0000	0.0000	OK
15 minute winter	5.1	10	6.177	0.047	4.0	0.0529	0.0000	OK
15 minute summer	Carpark 1	1	7.230	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1.0	1.000	1.1	17.2	1.389	0.331	1.0002	
15 minute winter	1.1	1.001	1.2	17.3	1.987	0.151	0.0801	
180 minute winter	1.2	1.002	TANK	5.1	1.135	0.046	0.0587	
180 minute winter	1.3	1.003	1.4	5.7	0.395	0.079	1.9991	
180 minute winter	1.4	1.004	1.5	6.2	0.323	0.083	0.5418	
180 minute winter	1.5	Hydro-Brake®	1.6	6.6				108.5
15 minute winter	2.0	2.000	2.1	16.8	1.008	0.397	1.3522	
180 minute winter	2.1	2.001	1.3	5.2	0.537	0.044	0.3359	
15 minute winter	3.0	3.000	3.1	2.8	0.495	0.025	0.0781	
15 minute winter	3.1	3.001	3.2	11.2	1.093	0.186	0.3989	
180 minute winter	3.2	3.004	3.3	7.6	0.534	0.105	0.4052	
180 minute winter	3.3	4.004	PI	9.2	0.586	0.120	0.6879	
180 minute winter	PI	4.004-	1.5	8.3	0.128	0.121	0.2746	
15 minute summer	5.0	5.001	5.1	0.0	0.000	0.000	0.0377	
15 minute summer	BASIN	5.000	5.0	0.0	0.000	0.000	0.0000	
180 minute winter	TANK	1.002-	1.3	-10.6	-0.721	-0.096	0.0609	
180 minute winter	5.2	5.003	3.2	1.2	0.142	0.016	0.8320	
15 minute summer	4.0	4.000	3.1	0.0	0.000	0.000	0.0559	
15 minute winter	5.1	5.002	5.2	3.9	0.528	0.054	0.2914	
15 minute summer	Carpark 1	3.000_1	2.1	0.0	0.000	0.000	0.0000	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1.0	10	7.360	0.110	22.9	0.0313	0.0000	OK
15 minute winter	1.1	11	6.523	0.073	22.2	0.0207	0.0000	OK
180 minute winter	1.2	156	6.249	0.314	6.4	0.5555	0.0000	SURCHARGED
180 minute winter	1.3	136	6.245	0.330	14.1	0.5827	0.0000	SURCHARGED
180 minute winter	1.4	144	6.245	0.460	5.7	0.8131	0.0000	SURCHARGED
180 minute winter	1.5	136	6.245	0.495	9.1	0.8738	0.0000	SURCHARGED
15 minute summer	1.6	1	5.710	0.000	6.6	0.0000	0.0000	OK
15 minute winter	2.0	11	6.716	0.116	23.0	0.0327	0.0000	OK
180 minute winter	2.1	152	6.246	0.261	6.5	0.2950	0.0000	OK
15 minute winter	3.0	10	7.028	0.028	3.6	0.0314	0.0000	OK
15 minute winter	3.1	10	6.499	0.074	14.5	0.0839	0.0000	OK
180 minute winter	3.2	144	6.244	0.299	9.2	0.3386	0.0000	OK
180 minute winter	3.3	144	6.244	0.329	10.9	0.5819	0.0000	SURCHARGED
180 minute winter	PI	144	6.244	0.479	10.5	6.2245	0.0000	SURCHARGED
180 minute winter	5.0	140	6.244	0.059	0.7	0.1048	0.0000	OK
180 minute winter	BASIN	156	6.243	0.013	0.5	0.6599	0.0000	OK
180 minute winter	TANK	144	6.245	0.320	19.6	59.6346	0.0000	SURCHARGED
180 minute winter	5.2	144	6.244	0.214	1.4	0.2425	0.0000	OK
15 minute summer	4.0	1	7.000	0.000	0.0	0.0000	0.0000	OK
180 minute winter	5.1	140	6.245	0.115	1.4	0.1295	0.0000	OK
15 minute summer	Carpark 1	1	7.230	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1.0	1.000	1.1	22.2	1.478	0.428	1.2110	
15 minute winter	1.1	1.001	1.2	22.4	2.122	0.196	0.0970	
180 minute winter	1.2	1.002	TANK	6.1	1.188	0.055	0.0704	
180 minute winter	1.3	1.003	1.4	5.7	0.392	0.078	2.1246	
180 minute winter	1.4	1.004	1.5	6.2	0.321	0.083	0.5418	
180 minute winter	1.5	Hydro-Brake®	1.6	6.6				132.5
15 minute winter	2.0	2.000	2.1	21.9	1.077	0.516	1.6449	
180 minute winter	2.1	2.001	1.3	6.3	0.534	0.054	0.4318	
15 minute winter	3.0	3.000	3.1	3.6	0.531	0.032	0.0913	
15 minute winter	3.1	3.001	3.2	14.3	1.121	0.237	0.5854	
180 minute winter	3.2	3.004	3.3	8.5	0.516	0.117	0.4896	
180 minute winter	3.3	4.004	PI	10.5	0.590	0.137	0.7324	
180 minute winter	PI	4.004-	1.5	9.1	0.131	0.133	0.2746	
180 minute winter	5.0	5.001	5.1	-0.7	0.119	-0.009	0.1914	
180 minute winter	BASIN	5.000	5.0	-0.5	0.149	-0.007	0.0471	
180 minute winter	TANK	1.002-	1.3	-13.5	-0.697	-0.121	0.0704	
180 minute winter	5.2	5.003	3.2	1.3	0.138	0.017	1.2267	
15 minute summer	4.0	4.000	3.1	0.0	0.000	0.000	0.0652	
180 minute winter	5.1	5.002	5.2	1.4	0.398	0.019	0.9076	
15 minute summer	Carpark 1	3.000_1	2.1	0.0	0.000	0.000	0.0000	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1.0	10	7.417	0.167	43.3	0.0473	0.0000	OK
360 minute winter	1.1	336	6.606	0.156	7.4	0.0442	0.0000	OK
360 minute winter	1.2	304	6.609	0.674	7.4	1.1903	0.0000	SURCHARGED
360 minute winter	1.3	320	6.608	0.693	14.4	1.2240	0.0000	SURCHARGED
240 minute winter	1.4	240	6.606	0.821	8.6	1.4499	0.0000	SURCHARGED
240 minute winter	1.5	232	6.605	0.855	11.5	1.5104	0.0000	SURCHARGED
15 minute summer	1.6	1	5.710	0.000	6.6	0.0000	0.0000	OK
15 minute winter	2.0	11	6.784	0.184	43.6	0.0522	0.0000	OK
240 minute winter	2.1	236	6.607	0.622	9.8	0.7031	0.0000	SURCHARGED
15 minute winter	3.0	10	7.038	0.038	6.9	0.0429	0.0000	OK
240 minute winter	3.1	236	6.605	0.180	6.3	0.2039	0.0000	OK
240 minute winter	3.2	236	6.605	0.660	12.8	0.7465	0.0000	SURCHARGED
240 minute winter	3.3	232	6.605	0.690	13.9	1.2192	0.0000	SURCHARGED
240 minute winter	PI	232	6.605	0.840	13.6	10.9088	0.0000	SURCHARGED
240 minute winter	5.0	236	6.605	0.420	13.8	0.7420	0.0000	SURCHARGED
240 minute winter	BASIN	236	6.605	0.375	13.3	28.5427	0.0000	SURCHARGED
240 minute winter	TANK	232	6.605	0.680	29.4	126.6830	0.0000	SURCHARGED
240 minute winter	5.2	236	6.605	0.575	12.5	0.6503	0.0000	SURCHARGED
15 minute summer	4.0	1	7.000	0.000	0.0	0.0000	0.0000	OK
240 minute winter	5.1	236	6.605	0.475	14.4	0.5371	0.0000	SURCHARGED
15 minute summer	Carpark 1	1	7.230	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1.0	1.000	1.1	42.1	1.680	0.810	1.9924	
360 minute winter	1.1	1.001	1.2	7.4	1.357	0.065	0.3178	
360 minute winter	1.2	1.002	TANK	8.0	1.128	0.072	0.0704	
360 minute winter	1.3	1.003	1.4	4.6	0.302	0.063	2.1246	
240 minute winter	1.4	1.004	1.5	5.5	0.332	0.073	0.5418	
240 minute winter	1.5	Hydro-Brake®	1.6	6.6				159.7
15 minute winter	2.0	2.000	2.1	41.2	1.227	0.972	2.7139	
240 minute winter	2.1	2.001	1.3	9.0	0.509	0.077	0.4490	
15 minute winter	3.0	3.000	3.1	6.9	0.632	0.062	0.1457	
240 minute winter	3.1	3.001	3.2	6.3	0.821	0.104	1.1212	
240 minute winter	3.2	3.004	3.3	10.5	0.492	0.144	0.4898	
240 minute winter	3.3	4.004	PI	13.6	0.547	0.177	0.7324	
240 minute winter	PI	4.004-	1.5	11.5	0.163	0.167	0.2746	
240 minute winter	5.0	5.001	5.1	-13.8	-0.279	-0.178	0.7807	
240 minute winter	BASIN	5.000	5.0	-13.3	-0.510	-0.170	0.6338	
240 minute winter	TANK	1.002-	1.3	-20.6	-0.494	-0.185	0.0704	
240 minute winter	5.2	5.003	3.2	-12.5	-0.177	-0.172	1.3905	
15 minute summer	4.0	4.000	3.1	0.0	0.000	0.000	0.0987	
240 minute winter	5.1	5.002	5.2	-12.3	0.396	-0.169	1.6277	
15 minute summer	Carpark 1	3.000_1	2.1	0.0	0.000	0.000	0.0000	

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 99.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1.0	12	7.982	0.732	72.8	0.2071	0.0000	FLOOD RISK
360 minute winter	1.1	352	7.119	0.669	12.3	0.1893	0.0000	SURCHARGED
360 minute winter	1.2	344	7.120	1.185	11.2	2.0939	0.0000	SURCHARGED
360 minute winter	1.3	360	7.118	1.203	21.8	2.1260	0.0000	SURCHARGED
360 minute winter	1.4	344	7.117	1.332	6.8	2.3544	0.0000	FLOOD RISK
360 minute winter	1.5	352	7.116	1.366	9.8	2.4128	0.0000	FLOOD RISK
15 minute summer	1.6	1	5.710	0.000	6.6	0.0000	0.0000	OK
15 minute winter	2.0	11	7.774	1.174	73.4	0.3321	0.0000	FLOOD RISK
480 minute winter	2.1	456	7.119	1.134	10.0	1.2827	0.0000	SURCHARGED
480 minute winter	3.0	464	7.118	0.118	1.6	0.1330	0.0000	OK
480 minute winter	3.1	464	7.117	0.692	6.4	0.7832	0.0000	SURCHARGED
360 minute winter	3.2	352	7.118	1.173	15.3	1.3263	0.0000	SURCHARGED
360 minute winter	3.3	352	7.118	1.203	11.9	2.1253	0.0000	SURCHARGED
360 minute winter	PI	352	7.117	1.352	11.7	17.5598	0.0000	FLOOD RISK
360 minute winter	5.0	352	7.117	0.932	16.9	1.6474	0.0000	FLOOD RISK
360 minute winter	BASIN	352	7.118	0.888	16.8	98.0694	0.0000	FLOOD RISK
360 minute winter	TANK	352	7.118	1.193	31.0	222.2074	0.0000	SURCHARGED
360 minute winter	5.2	352	7.117	1.087	14.7	1.2299	0.0000	SURCHARGED
480 minute winter	4.0	464	7.118	0.118	0.3	0.0209	0.0000	OK
360 minute winter	5.1	352	7.117	0.987	17.0	1.1164	0.0000	FLOOD RISK
15 minute summer	Carpark 1	1	7.230	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1.0	1.000	1.1	62.1	1.721	1.196	2.6794	
360 minute winter	1.1	1.001	1.2	11.2	1.281	0.098	0.3656	
360 minute winter	1.2	1.002	TANK	11.9	1.309	0.107	0.0704	
360 minute winter	1.3	1.003	1.4	-6.4	0.346	-0.088	2.1246	
360 minute winter	1.4	1.004	1.5	6.7	0.278	0.090	0.5418	
360 minute winter	1.5	Hydro-Brake®	1.6	7.0				228.3
15 minute winter	2.0	2.000	2.1	64.8	1.630	1.531	3.2204	
480 minute winter	2.1	2.001	1.3	9.1	0.479	0.078	0.4490	
480 minute winter	3.0	3.000	3.1	1.6	0.419	0.014	0.3914	
480 minute winter	3.1	3.001	3.2	6.0	0.708	0.100	1.2072	
360 minute winter	3.2	3.004	3.3	8.8	0.477	0.121	0.4898	
360 minute winter	3.3	4.004	PI	11.7	0.568	0.152	0.7324	
360 minute winter	PI	4.004-	1.5	9.8	0.140	0.144	0.2746	
360 minute winter	5.0	5.001	5.1	-16.9	-0.276	-0.217	0.7807	
360 minute winter	BASIN	5.000	5.0	-16.8	-0.503	-0.215	0.6338	
360 minute winter	TANK	1.002-	1.3	21.8	-0.512	0.196	0.0704	
360 minute winter	5.2	5.003	3.2	-14.7	-0.209	-0.203	1.3905	
480 minute winter	4.0	4.000	3.1	0.4	0.035	0.013	0.2495	
360 minute winter	5.1	5.002	5.2	-14.5	0.343	-0.200	1.6277	
15 minute summer	Carpark 1	3.000_1	2.1	0.0	0.000	0.000	0.0000	

Appendix H – DCWW 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 Jason Russell
JP STRUCTURAL DESIGN LTD
Honeycomb West
Chester
Cheshire West and Chester
CH4 9QH

Date: 19/06/2023
Our Ref: PPA0007931

Dear Mr Russell

Grid Ref: 279634 377656
Site Address: Ffordd Maelgwn Llandudno Junction
Development: WTS Llandudno Junction (25 employees)

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 domestic foul only connection for 25 employees at Waste Transfer Station at Llandudno Junction and acknowledge that the site is allocated within the Local Development Plan (LDP) (Safeguarded Employment and Improvement Site, policy EMP/1, 4, 5). In reference to our representations during the LDP consultation process, namely the 'Statement of Common Ground', we can confirm that an assessment has been undertaken of the public sewerage and watermains systems to accommodate this proposal and informs our appraisal as follows.

Public Sewerage Network

The proposed development site is located in the immediate vicinity of a mixed sewerage system, comprising combined, foul and surface water public sewers, which drains to Ganol Wastewater Treatment Works (WwTW) via Tremarl Sewerage Pumping Station (SPS).

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 7th January 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 Conwy 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 & Guidance note.

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

We have considered the impact of foul flows generated by the proposed development and concluded that flows can be accommodated within the public sewerage system. We advise that the flows should be connected to the foul sewer at or downstream of manholes SH79777501 located in Ffordd Maelgwn to the east. Should a planning application be submitted for this development we will seek to control these points of communication via appropriate planning conditions and therefore recommend that any drainage layout or strategy submitted as part of your application takes this into account. 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.

Foul Water Drainage – Sewage Treatment

No problems are envisaged with the Waste Water Treatment Works for the treatment of domestic discharges from this site. 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 issuing of a Discharge Consent is independent of the planning process and a consent may be refused although planning permission is granted.

Potable Water Supply

We anticipate this development will require the installation of a new single water connection to serve the new premise. The provisions of Section 45 of the Water industry Act 1991 apply. We therefore rely on the Local Planning Authority to control the delivery of any required reinforcement or offsite works by way of planning condition at planning application stage. Capacity is currently available in the water supply system to accommodate the development. Initial indications are that a connection can be made from the 125mm MDPE diameter watermain in 279654, 377602 location. We reserve the right however to reassess our position at planning application stage to ensure there is sufficient capacity available to serve the development without causing detriment to existing customers' supply as demands upon our water systems change continually.

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

<u>Please Note</u> 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.