Taylor Wimpey South Wales

Environmental Permit Application – Supporting Notes

Nyth y Dryw Phase 2, Sebastopol, Cwmbran

Project No. 320300-004

January 2022

RSK GEOSCIENCES

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RSK Environment Limited (RSK) has prepared this document at the instruction Taylor Wimpey South Wales.

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CONTENTS

1 INTRODUCTION

This document is presented in support of an application for an Environmental Permit to discharge surface waters from the Nyth y Dryw, Phase 2 development site. Additional and supporting information to that provided in the application forms is included, and the application forms referenced the various sections herein.

Sections 1 and 2 also provide a non-technical summary of the planned discharge.

The site is located to the south of Sebastopol, Cwmbran in South Wales. Nyth y Dryw Phase 2 currently comprises a series of fields located immediately west of the existing Taylor Wimpey Nyth y Dryw development, which is currently under construction. The nearest completed public highway on the adjacent Nyth y Dryw development is Clos Glas y Dorlan, NP44 1FA (nearest postcode). A site location plan is included as **Figure 1** with the development boundary for Phase 2 Nyth Y Dryw shown in green on this figure.

A proposed development plan for Phase 2 Nyth y Dryw is also provided as **Figure 2**, which sets out the division of the site between residential housing, infrastructure (foul and storm) and land set aside for public open space (POS).

Phase 2 Nyth y Dryw currently consists of six agricultural fields and rural land parcels that are separated by hedgerow and occasional mature trees. Two existing properties are located adjoining the north-eastern corner of the site. The northern boundary adjoins a woodland. The Monmouth and Brecon Canal is located immediately west of the site, separated by a footpath. Mature trees are present.

Existing residential properties off Five Locks Close are located south-west of the site beyond/across from the canal. Cwmbran House and a second commercial office building are located on the site boundary, beyond the south-western corner.

The site itself consists of six fields. The south-western-most field is overgrown and includes mature trees with grass cover. This field is not subject to proposed development and is to be set aside as POS (reference **Figure 2**). The northern and western fields consist of grass cover with the boundaries of these fields also not proposed to be developed, these areas also being set aside as POS. All of the remaining fields across the site currently comprise grass cover and demarcated by hedgerows. The southern half of the site is dominated by a moderately steeply sided valley with a stream at its base flowing eastwards. The stream is the primary on site discharge point for surface waters for the Nyth Y Dryw Phase 2 development.

The following general construction elements are anticipated as part of the development. A proposed development plan is presented as **Figure 2**:

- Construction of residential units to the central and south-eastern parts of the development parcel, separated by the steep sided valley.
- Construction of several public highways to provide access to new residential areas, including associated infrastructure (foul and storm drainage). Invert levels for the drainage indicates that the drains will be between 2m and 4m depth below ground level owing to the topographical relief across the site.

- Construction of below ground cellular storage crates in the central south-eastern corner of the site, servicing the land north of the steep sided valley. Water storage to have approximately 566m^3 capacity.
- Construction of a 'Criblock' retaining wall along the northern edge of the steep sided valley.
- Construction of an attenuation basin on the southern parcel, south of the valley with storage capacity of 507m^3.
- Construction of surface water outfalls to the stream within the base of the valley including a swale with baffles, cascade and anti-erosion 'Rip Rap' outfall.

All public highways will comprise of standard highway specification. Engineering drawings are presented as **Figures 3A-3D**. Road 1, shown on **Figure 3A**, will be constructed at the start of the build programme, anticipated for April 2022 and will be terminated between chainage 120.00m-130.00m prior to the bridge crossing.

Details of the canal bridge crossing will be subject to future planning consent application and development proposals for land west of the canal and does not form part of this development phase.

The primary surface water receptor is the unnamed stream in the valley that crosses the southern part of the site. This confluences with the Afon Lwyd, located 775 km south-south-east of the site within Cwmbran town centre. The Monmouthshire and Brecon Canal is located approximately 15 m beyond the western boundary at its closest.

Two outfalls are proposed for the drainage of surface waters from Nyth y Dryw, Phase 2, referenced Outfall A and Outfall B, the details of which are discussed in the proceeding sections. The outfall locations are shown on **Figure 1**, along with coordinates.

2 SURFACE WATER DISCHARGE DESCRIPTION

A copy of the engineering drawings for the site are appended as **Figures 3A** to **3D** and should be referred to. The drawings set out the drainage system for surface waters (referenced storm drain) for the development area. The surface water drainage system comprises a series of deep below ground pipes that convey water towards the south-eastern corner of the northern parcel of land, north of the surface water receptor (stream). A below ground cellular storage structure (crates) would be positioned beneath an attenuation basin in the south-eastern corner. An outfall to the stream would be located nearby.

For the southern parcel of land, an attenuation basin would be located on the northern boundary of this area, with site drainage channelled to this structure. The basin has an outfall to the stream, located immediately north of the structure.

A surface water management plan (SWMP), presented within **Appendix A**, has been developed for the site and it is intended that surface water mitigation set out within that report, would be installed at the start of the construction programme, in advance of development (excluding construction of road 1 – the haul road, to provide access for mechanical plant).

Given the topographic gradient across the northern land parcel, all water on this active development area, would drain towards the south-eastern corner and the proposed outfall (A). The northern area generally slopes down towards the south and the stream, therefore surface water mitigation has been established along the southern perimeter of the northern field as set out within the SWMP. The topography of the southern area, slopes down towards the north (for the areas to be developed) and therefore mitigation has been proposed along the northern perimeter of this field.

The outfalls are fitted with a hydrobrake that restricts the discharge of water to between 37.9l/s for outfall A and 12.1l/s for outfall B. However, the SWMP sets out a range of mitigation measures including the use of pumps, in-line pipe reactors for the treatment of waters to remove suspended solids and the use of polishing channels. Due to these treatment techniques, the maximum discharge rate for treated water using a 4-inch pump would be 15l/s, as set out within Section 6 of this report.

Surface water across the site will comprise rainfall, falling onto the development areas, including haul roads, building footings and areas of disturbed ground/exposed soil following the installation of below ground infrastructure. As a result, silt will become entrained within the surface water runoff, for which mitigation has been prescribed to minimise the remobilisation of silt and for the removal of silt from water, prior to discharge to surface waters. The proposed treatment will comprise both passive and active methods to remove silt from wate and therefore an Environmental Permit is being applied for.

3 ENVIRONMENTAL MANAGEMENT SYSTEMS

Taylor Wimpey have environmental management systems in place. These are detailed below.

Taylor Wimpey HSE management system has been built around the requirements of both ISO14001:2004 and OHSAS18001:2018. Taylor Wimpey seek to minimise the impact of their site operations, particularly in relation to climate change, energy, water, waste biodiversity through compliance with these certified systems. Taylor Wimpey is audited on a regular basis with relevant employees provided with specific environmental training.

4 QUALITY OF DISCHARGE WATER

Prior to development works commencing a Geo-environmental Study was undertaken to assess environmental risks at the site resulting from any previous and present uses (**Appendix B**). The report identified localised areas of suspected made ground in the area of the attenuation basin in the south-east of the northern field, with additional localised areas of suspected made ground on the southern boundary and at the future bridge crossing point. If any made ground is encountered within these areas, it will be subject to further delineation and assessment, as required by the planning conditions. The report confirms that the site was largely undeveloped and with predominantly agricultural use prior to commencement of current construction activities, albeit with a few localised areas of suspected made ground. Due to the absence of significant previous contaminative uses the report concludes that nearby surface waters, despite their sensitivity, are at only low risk from contamination on site. It is considered unlikely that the surface water to be discharged from site will contain significant concentrations of any hazardous substances.

During construction work, the storage and use of fuel and lubricating oils and possibly other materials typical of an active construction site, will be necessary. However, all such activities will be undertaken in accordance with current regulations and best practice.

With these controls in place construction activities present a negligible risk of causing hazardous substances to be present in the discharged surface water.

The principal potential contaminant to surface waters is therefore silt (suspended solids) associated with exposed soil and rainfall runoff, which is further assessed in Section 5. The quality of water will also be rainfall dependant and vary over the season.

5 RISK ASSESSMENT

An assessment of the environmental risks of the operations covered under this application for a discharge consent has been prepared in accordance with the principles of the H1 methodology stated below:

- Step 1 – identify risks
- Step 2 – assess risks
- Step 3 – justify appropriate measures (if needed)
- Step 4 – present the assessment.

The development of Nyth y Dryw, Phase 2, is anticipated to commence April 2022 , with an indicative completion date of June 2026.

Step 1: Identify Risks

The H1 overview document identifies the following different types of risk to the environment.

- odour – there are no potentially odorous activities or chemicals associated with the construction work
- noise & vibration – construction noise & vibration will occur but be limited to the allowed working hours (0800-1800 Monday to Friday and 0800 to 1400 Saturday). Noise & vibration resulting from the discharge activity are not envisaged as being significantly more noticeable than from the other construction activities at the site
- accidents – the potential for accidents to occur exists. The potential for contamination of the watercourse will be managed to acceptable levels by the control measures put in place for the construction activities
- fugitive emissions to air and water - no significant risks have been identified. The potential for contamination of the watercourse will be managed to acceptable levels by the control measures put in place for the construction activities
- controlled releases to air – there are no point source emissions to air
- controlled discharges to surface water – as discussed discharge locations have been identified to the stream in the south of the site, reference **Figure 1**.
- controlled discharges to ground or groundwater – there are no point source discharges to groundwater given the impermeability of ground conditions.
- global warming potential – insignificant
- site waste – the quantity of site waste generated will be small and consist primarily of silt/sediment removed from the surface water management system.

Steps 2/3/4 – Assess Risks etc

In accordance with the H1 methodology guidance the following have been assessed.

- accidents
- surface water discharges.

Due to the low permeability of soils at the site and the proximity of nearby surface waters, it is not considered necessary to consider risks to groundwater.

Accidents

The site would be secured by fencing with no public access. Therefore accidental releases as a result of vandalism are not likely. However, the potential for accidents/accidental releases of contaminants cannot be discounted and is assessed.

A risk assessment for accidents, in line with H1 Annex A, follows the next section.

Surface Water Discharges

The water to be discharged comprises solely rainwater having fallen on the development area and flowed across the surface into the surface drainage network, or over ground towards the site boundaries. It may also at times be necessary to pump rainwater (significant groundwater entry is not anticipated) from excavations into the surface drainage network. The amount of surface water run-off requiring discharge will be dependent upon rainfall rates and seasonality. Surface water run-off will be clean and uncontaminated (after solids removal).

Under conditions prior to development works, rainwater falling across the wider development would follow the topography, entering the stream that divides the site. As such, the water to be discharged during this construction period would naturally enter the watercourses identified. Under the proposals for the works there is the potential for additional solids to be mobilised due to the construction activity on site, however as stated above and below, these will be reduced by settlement and filtration methods, and on site management practices set out in the SWMP to reduce silt on roadways. The impact of the discharge of clean and uncontaminated water from the site can therefore be considered to be not significant in terms of the impact on the watercourse.

The water from Outfall A will enter the stream via anti-erosion rip rap.

The water from Outfall B will enter the stream via a swale with baffles to retard flow and an anti-erosion rip rap and cascade as shown on **Figure 1**.

The discharge will be at ambient conditions so there will be no temperature effects as a result of the discharge.

As the discharge will not normally contain any hazardous substances, sanitary determinants or other pollutants, detailed assessments in line with H1 Annexes D1 and D2 are not necessary, as indicated in the flow chart of H1 Annex D. The only assessment required is for accidents. This assessment follows.

Risk Assessment for Accidents

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk?
Leak/spillage of hazardous material on site (e.g. oils and fuels)	Local watercourse	Via infiltration, overland flow or via the surface water drainage system (storm system)	Containment measures for storage. All fuel stored in bunded cells with double walls, additional capacity, dip trays/sump pallet and spill kits. Minimisation of storage volumes to those required for routine operations. Maintenance & inspection	Unlikely	Contamination of local watercourse with hazardous substances.	Low – due to procedures detailed in the Construction Environmental Management Plans (CEMP) (e.g. fuel/oil use and storage, waste/material storage).
Leak of oil/fuel from pumps used as part of water treatment system	Local watercourse	Via infiltration, overland flow or via the surface water drainage system (storm system)		Unlikely		
Discharge of water containing suspended solids (silt)	Local watercourse	Pumped direct, or overland flow from site boundary	Silt mitigation measures set out within site-specific SWMP including silt fences, cut off trenches, temporary holding ponds, pumping, flocculant treatments and settlement cascading basins. Monitoring and testing of discharge to be free of silt.	Low	Contamination of local watercourse with suspended solids (silt).	Low – with treatment, suspended solids to be removed from water prior to discharge.

Spillage of collected solids from settlement system	Local watercourse	Via overland flow or direct ingress, via surface water drainage system	Method statement for cleaning settlement system.	Very unlikely	Contamination of local watercourse with suspended solids (silt).	Low – settlement system to be cleaned in such a way as to prevent silt spillage. To be cleaned by specialist provider.
Failure of pumping equipment – overflow of water from drainage etc.	Local watercourse	Via surface flow or surface water drainage system	Discharge is pumped only via polishing channel. If pump fails water will build up on site within cascading ponds but not enter watercourse.	Unlikely	Contamination of local watercourse with suspended solids (silt).	Low – water is contained on site if pump fails within the cascading attenuation ponds.
Vandalism	Local watercourse	Via surface flow	Site is secure without public access.	Unlikely	Contamination of local watercourse.	Low - due to security arrangements

6 DISCHARGE VOLUMES

The maximum volume of treated effluent (treated surface water) expected to be discharged per day is 1,296m3. This volume is based upon the use of a 4 inch pump, which is the maximum size that can be used in conjunction with an in-line pipe reactor (water treatment system proposed) to allow discharge via a polishing channel. The maximum discharge rate from a 4 inch pipe is 900 litre per minute (15l/second) as set out in the table below.

Pipe size	Maximum discharge rate (L/s)	Maximum discharge rate (L/min)	Maximum discharge rate (L/day)	Volume (m3 per day)
4 inch	15	900 (15L/s x 60 s)	1,296,000 L/day (900 x 60 min = 54,000 L/hour x 24 hour)	1,296

Ground conditions at the site have been found to comprise predominantly low-permeability soils with clay content. As such, it is not expected that groundwater will contribute significantly to the discharge volumes.

7 TREATMENT

Given the nature of ground conditions encountered at the wider Taylor Wimpey development area at Sebastopol, including the adjacent existing Nyth y Dryw construction phase, and the consistency of ground conditions across the area, the use of flocculants is likely to be required in addition to passive silt settlement methods, to ensure that clean, silt free water is discharged to the stream. A SWMP has been prepared and is included at **Appendix A**, which should be read as it sets out in detail the proposed silt management strategy.

Flocculant dosing trials undertaken for the adjacent site have identified that the use of chemical treatment is effective for the removal of suspended solids. A copy of the flocculant dosing trial is presented within **Appendix C**, along with material safety data sheets (MSDS) for the proposed chemicals.

Testing of silt impacted water at the nearby Uplands Development showed the most effective flocculant to be a combination of Water Lynx™ 494 & 360, with reactions occurring very quickly from semi hydrated gel block state and a large heavy floc created.

The initial mixing removed almost the entire fraction of solids from suspension, resulting in an NTU reading of 12 in the water column. Secondary mixing reduced the NTU to 9.31. Further mixing resulted in a complete reduction of the NTU, down to 0, with a clear separation of the solids, forming a medium size ‘floc’.

As set out in the SWMP, it is proposed to deploy the flocculants using in-line pipe reactors and via flocculant laced silt matting positioned within a polishing channel. The location of these silt mitigation structures are presented on **Figure 4** of the SWMP.

The water would be uplifted from a series of temporary holding ponds positioned along the southern boundary of the northern field, or directly from the attenuation basin on the southern field using a traditional 4 inch pump. Interconnected within the pipework would be an in-line pipe reactor. The in-line pipe reactor is a portable dosing unit containing gel flocculant blocks. Each gel block is housed within a durable netting that allow the block to swell when hydrated. When used in the pipe reactor, the blocks are guarded from any form of tampering or accidental damage. The structure of the Water Lynx gel block is such that when it is dehydrated it reverts to a solid gel that is not subject to fragmentation. When hydrated the sheer factor caused by water flowing over the block results in the release of the active chemical component. The blocks only release the active chemical component when water is passed across them. Two main blends that have been identified for use at Sebastopol are Water Lynx 494 and Water Lynx 360. These blends degrade at slightly different rates, with Water Lynx 494 lasting slightly longer. This is mitigated by placing the marginally softer Water Lynx 360 blocks behind (downstream) the Water Lynx 494 blocks in the pipe reactor. The placement and arrangement of blocks in the pipe reactor is an important element in the management system.

Water would be pumped between the temporary holding ponds, eastwards towards a tiered cascading holding pond located in the south-eastern corner of the northern field close to the proposed Outfall A. Water within this silt management structure would be recirculated from the lowest-most pond, up to the highest pond via an additional in-line pipe reactor to allow sufficient time for the chemical dosing to be effective.

Once the required water quality has been achieved, the treated water would be passed through a polishing channel that contains silt mats with a smaller number of flocculant laced silt mats. The purpose of the silt mats in the polishing channels would not to be the primary means of sediment removal. The primary method of sediment removal would be via the application of a flocculant using the in-line pipe reactors, and sediment attenuation within the temporary ponds and cascading pond system. The polishing channels are designed to receive treated water in which the majority of the suspended solids have already been removed, with water passed over the matting prior to discharge as a final polish only.

The sampling point is the last temporary holding pond forming part of the cascading pond system, located in the south-eastern corner of the northern field as set out on the surface water management plan at grid coordinate ST 28976 97149. The is also the monitoring as it represents the final treated water prior to discharge via the polishing channel.

Prior to any discharge of treated water to the surface water receptor, it will be necessary to test and monitor the water quality to ensure that the treatment has been successful and that suspended solids have been removed to the concentration stated within the Environmental Permit.

Water samples would be collected during the treatment process using flocculants and submitted to a laboratory for testing of total suspended solid (TSS) and pH. TSS is measured in milligrams per litre (mg/l), this relates to the dry weight of solids in a litre of water. This test therefore needs to be conducted at a laboratory, because the test requires the sediment to be filtered, dried, and weighed. For this reason it can take several days to receive the results.

It may be necessary to monitor water quality whilst on site and at short notice for decision making on treatment and discharge options. To achieve this, a portable turbidity meter would be used. Turbidity (NTU) is measured in nephelometric turbidity units (NTU), this relates to the transparency or clarity of the water. This test can be conducted in a few minutes in the field using meters.

There is not a direct correlation between TSS and NTU. Therefore it is proposed to establish the relationship between TSS and NTU, using an 18-point calibration curve. This would strengthen confidence in using an NTU value on site during short term decision making to equate to the TSS expressed. It is important to note that it is not an absolute value however, it is considered to be a robust quantitative method for assessing water quality whilst on site in the very short term.

Turbidity measurements would be collected routinely during treatment for the final water (i.e. that leaving the polishing channels) and from directly upstream of the headwall/discharge point to set a baseline condition and to allow for comparison. A reading would also be taken from downstream of the discharge point to demonstrate whether there has been a deterioration of water quality.

The use of a NTU calibration curve and NTU testing as an on site screening criterion would ensure that treated discharge is stopped immediately, if the NTU suggests that the TSS would be exceeded and allows for further corrective actions to be put in place.

Maintenance of the surface water mitigation measures, in the form of the temporary ponds and the polishing channel would be needed throughout the operational functionality of these structures. The maintenance process for the silt polishing channels is set out and would be undertaken during dry weather only. Due to the weight of spent silt matting, a mechanical excavator would be required for their removal. Matting would be lifted and immediately placed into a dumper truck for transport to a skip and subsequent disposal off site at a licenced waste facility. The replacement of silt mats would commence from the basin-end of the polishing channel and progress along the channel towards the outfall. This would ensure that silt mats remain in place down-gradient of the lifting operation to capture any residual silt that may be released during the lifting of the mats. On approach to the outfall during the lifting of the final few mats within the polishing channel, a new silt wattle would be placed across the channel to prevent a sudden, temporary flush of suspended solids to the receiving surface water. This would be supported with the use of a submersible pump and lay-flat hosing to pump silty water back into the attenuation basin and prevent discharge to the receiving water. The use of a dumper truck to transport the matting from the polishing channel to the skip location would also prevent the accidental release of silty water onto the highway during the transport phase.

Residual silt within the attenuation basins would settle onto the bottom of the basins. It would therefore be necessary for the basins to dredged, to remove the build-up of sediment. The dredging would be undertaken using a mechanical excavator or other suitable machinery such as a Truxor suction tube and water filtration system. Prior to undertaking such work, relevant risk assessments and method statements (RAMS) would be submitted to NRW.

Disposal options for the silt would either include:

- Removal of the silt off site to a licenced waste facility (landfill).
- Re-use of the silt on site, subject to waste exemptions (D1 and U1 exemptions). Due to the use of flocculants, it may be necessary to test the soils to ensure that they are suitable for re-use. Should this second option be considered, relevant correspondence with NRW would be undertaken prior to the implementation of the option.

FIGURES

328500 328600 328700 328800 328900 329000 329100 329200 329300

197500 197400 197300 197200 197100 197000 196900

Outfall A

Outfall B

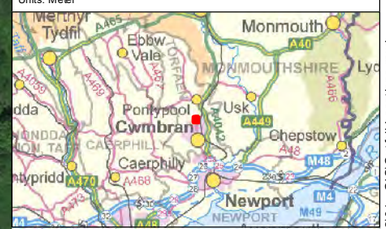
Legend:

Site Boundary

Outfall Locations

I.D	Coordinate
Outfall A	ST 28958 97134
Outfall B	ST 28977 97125

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



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00	19/01/2022	First Draft	DR	AP	AP

Nyth y Dryw, Phase 2
Taylor Wimpey South Wales

TITLE:

Outfall Locations

0 50 100

Metres

SCALE: 1:2,500 @ A3

N W E S

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Legend:

Site Boundary

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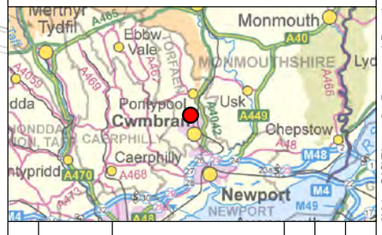
Units: Meter



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Nyth y Dryw, Phase 2
Taylor Wimpey South Wales

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TITLE:
Figure 2:
Proposed Development Plan

0 20 40
Metres
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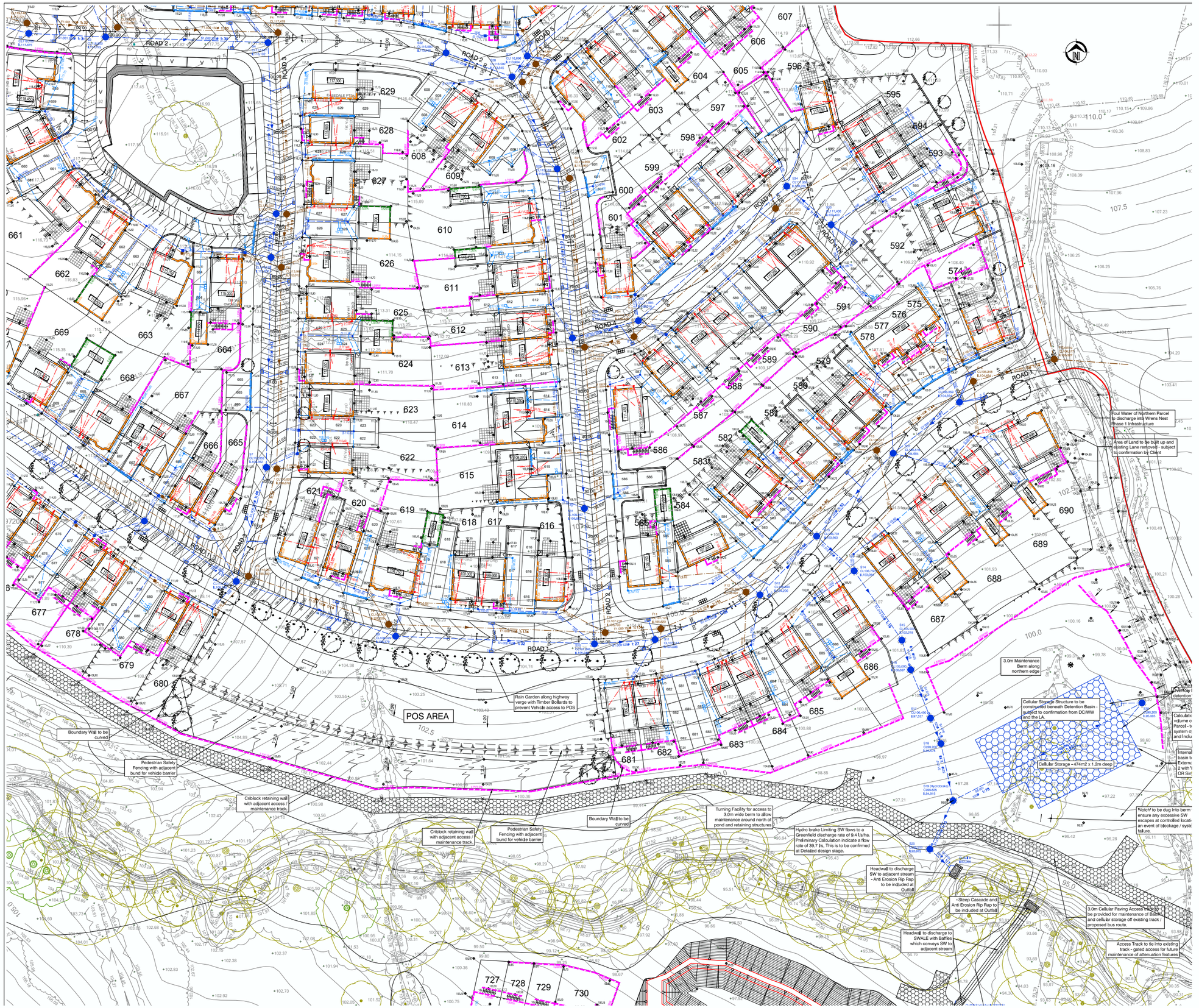

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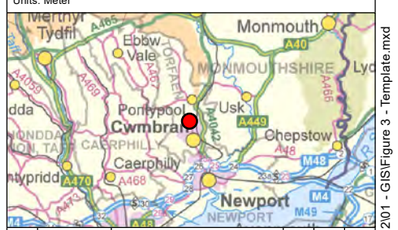

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00	17/12/2021	First Draft	DR	AP	AP

Nyth y Dryw, Phase 2
Taylor Wimpey South Wales

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TITLE:
Figure 3a:
Proposed drainage infrastructure

NOT TO SCALE

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