

SURFACE WATER MANAGEMENT PLAN

3563 Great Milton Park  
Llanwern, Cot Hill, Newport, NP18 2DP

Plan Reference	Revision Number
SWMP3563	Rev 02 (August 2024)

Prepared by:

Name	Kevin Holmes (RSK)	Signature	
Position	Principal Engineer	Date	06/08/2024

Document Issue Date	09 August 2024
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SURFACE WATER MANAGEMENT PLAN

Amendment and Review Log

All amendments and reviews to this document must be recorded on the log below.

Section amended	Page No.(s)	Submitted by	Date (DD/MM/YY)



# SURFACE WATER MANAGEMENT PLAN

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## Purpose

This document has been prepared to provide a strategy to manage surface water and silt issues that may occur across the site to ensure that all work activities are **Safe by Design** and that everyone is **Operating Responsibly**.

## Scope

This document covers the HS&E requirements to record information in line with the **Water Management Redrow Operating Procedure (ROP012)**. This is intended to be a 'live' document that is reviewed and amended as the site progresses and will be updated as required.

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## SURFACE WATER MANAGEMENT PLAN

### 1.0 Site Details

<b>Site name/address</b>	Great Milton Park, Cot Hill, Llanwern, Newport, NP18 2DP
<b>National Grid Reference</b>	ST 3640 8842
<b>Number of Plots Proposed</b>	Circa. 850 Residential Units
<b>Other Construction</b>	Primary school, village centre commercial units, leisure facilities, sports pitches, allotments, attenuation basins with two foul pumping stations
<b>Site Area (Ha)</b>	c. 56 hectares
<b>General Description</b>	The Great Milton Park development (herein referred to as the site) is bisected by Cot Hill, an existing highway that runs east to west. The southern area, south of Cot Hill, is largely complete and built out. Development to the north of Cot Hill is ongoing.
<b>Pre-construction Condition</b>	Greenfield agricultural land and allotments.
<b>Surrounding Areas</b>	<b>North:</b> Agricultural land and Scotch Wood
	<b>East:</b> Agricultural land and Dockwell Wood
	<b>South:</b> Hartridge Wood and Llanwern Golf Club beyond
	<b>West:</b> Hazel Wood and A465 Southern Distributor Road
<b>Topography/Slope:</b>	The topography generally falls in a south-eastern direction towards Monk's Ditch and Station Road. There is a small catchment to the west that falls in a westerly direction towards the A465 Southern Distributor Road.

### 2.0 Hydrology

<b>Watercourses</b>	<p>Monk's Ditch and Llanwern Ditch are located approximately 100m east and 400m south-east of the site, respectively. Both watercourse flow in a southerly direction and are classed as ordinary watercourses.</p> <p>There is a watercourse that in wet weather, naturally runs through the woodland beyond the sites' northern boundary. It is known anecdotally to flow into the adjoining woodland area.</p> <p>The surface water run off pre-construction naturally falls toward the eastern boundary where it is intercepted by an unnamed tributary to Monk's Ditch, which crosses the agricultural fields to the east of the site.</p> <p>Drainage ditches also run alongside the existing hedgerows throughout the site.</p>
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### 3.0 Hydro-geology

<b>Aquifer characteristics</b>	<p>On review of the Natural Resources Wales (NRW) Interactive Map Viewer, the site is underlain by a Secondary A aquifer and Secondary undifferentiated aquifer relating to the geology.</p> <p>Secondary A aquifer: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.</p> <p>Secondary undifferentiated aquifer: it has not been possible to attribute either a category A or B to a rock type. In most cases this means that it was previously designated as both a minor and non-aquifer in different locations owing to the variable characteristics.</p>
<b>Source protection zones</b>	Information available in the NRW Interactive Map Viewer indicates that the site lies outside of a Source Protection Zone (SPZ).

### 4.0 Ground Conditions

<b>Geology</b>	<p>The 1:50,000 scale geological map of the area indicates that the site is underlain by the Mercia Mudstone Group of the Triassic Period. These rocks are likely to comprise of predominantly red mudstones and subordinate siltstone with occasional sandstones. The geological maps indicates that the southern area of the site is underlain by the Penarth Group of Triassic Period. These rocks comprise of grey to black mudstones with subordinate limestone and sandstones. Near the surface both the Mercia Mudstone and the Penarth Group would be completely weathered to clays. No superficial deposits are indicated to overlie the solid strata.</p> <p>The ground conditions underlying the site have the potential to generate silt in surface water run-off that may remain in suspension for long periods of time and be slow to settle with gravity-based settlement techniques.</p>
<b>Contamination assessment</b>	<p>Previous third party ground investigations did not identify contamination in the near surface soils that could adversely affect groundwater or nearby surface watercourses.</p> <p>The ground investigations concluded that there is a low risk to controlled waters receptors from contamination.</p>
<b>Preliminary Settlement Test</b>	<p>Frog Environmental Limited, collected water samples from the site and undertook a settlement test to examine the rate of natural separation of the solid fraction (suspended solid) from water. The test found that natural settlement over a 2-hour period provided visible reduction in suspended solids although not sufficient for discharge to the surrounding environment. It was considered that any natural settlement will need high retention times to achieve sufficient water quality for discharge.</p> <p>Intervention using appropriate active treatment control measures are deemed necessary to speed up the rate of settlement reducing the required attenuation time on site. A full test report in <b>Appendix C</b>.</p>

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### 5.0 Sensitive Land Uses

#### Sites of Importance

There are a number of Sites of Importance for Nature Conservation within 2km of the site.

- Coed Rhedyn / Scotch Wood SINC – 0.3 km north
- Coldra Wood SINC – 1.1km northwest
- Craig-Y-Perthi Field North SINC - 1.8km east
- Delbury Grasslands SINC – 1.9km north-east
- Dockwell Wood SINC – 0.4km south-east
- Flat Wood SINC – 0.6km north-west
- Hartridge Wood SINC – 0.2km south
- Hartridge Fields SINC – 0.1km east
- Ladyhill Wood SINC – 1.4km west
- Monk's Ditch SINC – 0.7km east
- Ringland Way Marsh SINC – 1.4km west
- Ringland Wood SINC – 0.4km west
- Stock Wood (East & West) – 1.7km north-east

No adverse effects are anticipated on these designations from the proposed development due to their distance and intervening land uses.

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### 5.0 Proposed Drainage

<b>Surface Water</b>	<p>Copies of the engineering drawings for the site are included in <b>Appendix B</b> and should be referred to in conjunction with this report.</p> <p>The drainage includes a strategy to control and restrict the surface water runoff through attenuation features and hydro-brake controls. The sites surface water drainage strategy has been split into four surface water catchments. Currently there are three attenuation basins that have been formed on site.</p> <p>‘Pond 1 Northern Catchment Pond’ located in the south-eastern corner of the site serves the northern area of the development, north of Cot Hill lane, and discharges to Monks Ditch.</p> <p>‘Pond 2 Southern Catchment Pond’ located in the south-eastern corner of the site serves the southern area of the development and is understood to discharge into an existing off site stormwater sewer system beneath Station Road.</p> <p>‘Pond 3 Cot Hill Catchment Pond’ is located near to the the Cot Hill entrance along the eastern boundary. The water discharges into the existing public sewer set within Halle Close.</p> <p>A small area of the northern catchment falls away from Monks Ditch, and has therefore been delineated to create a fourth catchment and is understood to discharge to ground (infiltration).</p> <p>A summary of the proposed discharges, including receiving surface watercourse and associated National Grid References (NGR) is presented below.</p> <table><tr><th>Discharge Point Ref:</th><th>Type of Activity</th><th>Discharge Point NGR</th><th>Receiving Watercourse / Sewer</th></tr><tr><td>HW1</td><td>Water Discharge Activity</td><td>ST 36844 88063</td><td>Monk’s Ditch</td></tr><tr><td>Station Road</td><td>Water Discharge Activity</td><td>ST 36844 88063</td><td>Station Road / Sewer</td></tr><tr><td>MH1401</td><td>Water Discharge Activity</td><td>ST 36114 88470</td><td>Halle Close / Sewer</td></tr></table>	Discharge Point Ref:	Type of Activity	Discharge Point NGR	Receiving Watercourse / Sewer	HW1	Water Discharge Activity	ST 36844 88063	Monk’s Ditch	Station Road	Water Discharge Activity	ST 36844 88063	Station Road / Sewer	MH1401	Water Discharge Activity	ST 36114 88470	Halle Close / Sewer
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<b>Foul Drainage</b>	<p>Copies of the engineering drawings for the site are included in <b>Appendix B</b> and should be referred to in conjunction with this report.</p> <p>All foul drainage will be of new construction. There is a new foul pumping station at the Cot Hill entrance, which pumps foul water collected from its catchment area uphill within the Redrow development where it then enters the foul gravity system on the wider site.</p> <p>The foul water then enters a larger pumping station, which in turn pumps the foul water via a foul rising main to a Dwr Cymru Welsh Water manhole located near Hartridge Wood.</p> <p>Foul drainage serving the existing properties of Cot Hill is being diverted through the Redrow development and discharged to the foul pumping station.</p> <p>There is an existing foul water sewer located beneath Cot Hill Lane that flows from west to east. This sewer has insufficient capacity to accommodate the proposed development.</p> <p>The site has separate foul and storm sewers.</p>																

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### 6.0 Run-off / Sources

<b>Surface Flows</b>	<p>The principal sources of potential pollution to the surface water receptors will be from the on site groundworks, infrastructure and housing plot construction activities.</p> <p>Particular point sources will occur when any works are undertaken in the immediate vicinity of the adjacent watercourse (e.g. construction of surface water drainage headwalls) or dewatering of any excavations.</p>
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### 7.0 Potential Receptors

<b>On-site</b>	<ul style="list-style-type: none"> <li>• Stormwater infrastructure including road gullies</li> <li>• Attenuation ponds</li> <li>• Occupied properties</li> <li>• Retained drainage ditches</li> </ul>
<b>Off-site</b>	<ul style="list-style-type: none"> <li>• Surface water courses – including Monks Ditch, Llanwern Ditch and their associated tributaries</li> <li>• Off site stormwater sewer network</li> <li>• Adjoining highways</li> <li>• Offsite residential properties</li> <li>• LLanwern Golf Club</li> </ul>

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### 8.0 Surface Water Control Measures

Detailed below are standard control measures – these should be adapted and changed as and when required dependent on the site conditions, taking into consideration local weather conditions.

<b>Site Personnel and Documentation</b>	<p>The following measures are to be implemented to increase awareness and ensure surface water management activities are detailed in site documentation:</p> <ol style="list-style-type: none"> <li>1. All subcontractors undertaking groundworks are to consider silt minimisation and management within their RAMS for the works.</li> <li>2. Site-based awareness training (toolbox talk) regarding surface water and silt management issues to be provided for all site ground working staff.</li> <li>3. Water management, including control of materials (e.g., stockpile storage locations) to be included within site induction – information taken from the construction environmental management plan (CEMP) and this plan.</li> <li>4. Weekly site surface water checks to be undertaken as part of the Site Managers HS&amp;E Sample and any further requirements detailed in the CEMP, with support obtained from the appointed environmental consultant if or when required.</li> </ol>
<b>Control Measures throughout Site Works</b>	<ol style="list-style-type: none"> <li>1. Provision of a road sweeper on site and adjacent road network. Frequency and duration of sweeper visits to be continually assessed by site management and increased during times of more frequent vehicle movements (e.g., muck shifts) and periods of poor weather.</li> <li>2. Any grips dug to drain surface water from work areas will have silt mitigation installed so that the water cannot drain freely. Sandbags, straw bales, and silt mats will be used (as appropriate) to slow and pool water and provide silt containment.</li> <li>3. Installation of soil bunds or silt fencing to prevent surface flows to receptors from surrounding work areas.</li> <li>4. Surface run-off will be managed so that any clean flows from non-active areas are diverted away from work areas and excavations and not mixed with silt-containing waters.</li> <li>5. Monitoring of site discharge in accordance with the Water Management ROP.</li> <li>6. Positioning of stockpiled soils within designated areas away from receptors.</li> <li>7. Where practicable, minimising the movement of plant or other traffic in unsurfaced areas. Early installation of asphalt roads, with suitable drainage, to provide clean access routes and use of physical barriers to restrict off-road access where necessary.</li> <li>8. Seeding or turving topsoil at the earliest opportunity – seed stockpiles to prevent run-off where left for significant duration prior to re-use.</li> <li>9. General good housekeeping of the site with organised storage and waste/surplus materials removed quickly.</li> <li>10. Minimise works vehicles movements onto highways.</li> <li>11. On site storage/availability of water management equipment to enable deployment at short notice if required (i.e., during poor weather) and to facilitate on-going maintenance of potential installations. To include:               <ul style="list-style-type: none"> <li>○ Silt Fencing (c. 100m - 1no. roll).</li> <li>○ Sandbags (and material for filling) (c. 20no.).</li> <li>○ Silt matting (c. 5no.).</li> <li>○ 1no. 50mm submersible pump with lay-flat pipe and power source.</li> </ul> </li> </ol>
<b>Additional Control Measures during</b>	<ol style="list-style-type: none"> <li>1. Adoption of a strip and build approach minimising the amount of topsoil and vegetation removed and the area of exposed soils.</li> <li>2. Phasing of the works to ensure surface water drainage works are prioritised to be undertaken as soon as practicable. Headwalls to be installed on the</li> </ol>



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<b>Enabling and Preparatory Works</b> <b>(e.g., bulk earthworks, main drain, and road installation)</b>	<p>attenuation ponds at the time of construction.</p> <ol style="list-style-type: none"> <li>Retention strip of topsoil and vegetation between work areas and the ditches (and site boundaries). To include a step up from stripped area to cause any run-off to pool.</li> <li>For drain diversion works, the replacement section of drainage and any onward connections will be completed prior to intercepting the flow in the existing drain. Where necessary, controlled over pumping will be employed to keep work areas dry.</li> <li>Earthworks will be suspended during particularly wet weather, where feasible.</li> <li>Adequate protection measures must be implemented when over-pumping into the onsite constructed stormwater sewer system. Do not allow the pump hose or strainer to rest on and draw silts from the base of the excavation or area of standing water to avoid mobilisation of settled silt. A sump should be created with clean gravel and pump head fitted within. A big enough perforated pipe is placed vertically to allow the pumps to be installed.</li> <li>Cut catch drains as the project progresses to intercept existing drainage to enable the controlled movement of water onsite.</li> <li>Stockpiled materials within designated area to be located as far as practically possible from any identified receptors or road gullies.</li> <li>Drainage control up-gradient of area of stockpiling to divert water around the stockpiling area. Sediment control (i.e. silt fence) to be placed down-gradient of stockpiles.</li> </ol>
<b>Additional Control Measures during Construction Phase</b> <b>(e.g., plot construction)</b>	<ol style="list-style-type: none"> <li>The placement of gully protection (gully bags) in all gullies during construction, to be inspected and replaced/cleaned when necessary.</li> <li>Avoiding excessive tracking next to any drains/gullies.</li> <li>Washing out only in contained and controlled areas, away from watercourses or drainage.</li> <li>Store materials in locations that have stoned or surfaced access. Provision of a temporary asphalt surface to storage, compound, and car park areas – with appropriate drainage.</li> <li>The installation of hardstanding areas to the front of all plots to enable 'clean' forklift access and installation of hardstanding to other access routes as required during construction.</li> </ol>
<b>Control Measures in Non-active Areas</b>	<ol style="list-style-type: none"> <li>Leaving topsoil and vegetation in place in areas not imminently due for development.</li> <li>Preventing the unnecessary movement of any plant within those areas of the site, as this may cause soil disturbance and silt mobilisation. Use of tape or barriers as required to restrict unnecessary access to areas of the site not undergoing development.</li> <li>Seeding of any exposed topsoil at the earliest opportunity to minimise surface run-off from completed areas, including stored piles.</li> <li>Reduce the time spoil heaps are left uncontrolled on site.</li> </ol>
<b>Active Treatment Gel Flocculant</b>	<ol style="list-style-type: none"> <li>Gel Flocculant (GF494 / GF360) to be deployed within selected manholes within the newly installed surface water drainage system.</li> <li>Frog Environmental Limited environmental calculations for the use of gel flocculant are included within <b>Appendix D</b>. This confirms that there will be no environmental risk from their proposed application.</li> <li>Gel flocculants are synthetic anionic polyacrylamides that also have a coagulating function. Gel flocculant is non-toxic to the aquatic environment and does not bioaccumulate, remaining bound to the sediment until they degrade.</li> </ol>



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	<p>Copies of the appropriate gel flocculant material safety data sheets (MSDS) are presented within <b>Appendix E</b>.</p> <ol style="list-style-type: none"> <li>4. Gel flocculants encourage the agglomeration of silt particles to form larger 'flocs' of silt and allow for deposition to promote the solid separation from water prior to discharge. The attenuation ponds and swales have been adapted to enhance settlement and capture of the resultant sediment.</li> <li>5. The deployment of gel flocculant and the use of flocculant mats to treat surface water prior to discharge will encourage the amalgamation of silt particles to form larger 'flocs' of silt and allow for deposition to occur more readily prior to discharge. Technical information is provided in <b>Appendix F</b>.</li> </ol>
<b>Attenuation Ponds</b>	<ol style="list-style-type: none"> <li>1. Where possible surface water will be directed into attenuation ponds to allow passive, gravity-driven silt settlement methods to allow natural settlement.</li> <li>2. Rock filled wire gabion baskets (rock filter check dam) lined with silt fence material, to be placed at each inflow and outfall headwall. The wire baskets should be formed to tightly fit between the headwall wingwalls to act as a check-dam, with suitably weighted silt matts placed behind the gabion baskets to capture silt. This will dissipate flow energy and to minimise soil erosion.</li> <li>3. To increase the effective length to width ratio of a basin, the use of internal baffles is required across a section of the pond as indicated on the proposed SWMP drawing.</li> <li>4. Create a sediment forebay around each inlet headwall within the attenuation ponds by staking a coarse porous cloth or geotextile curtain. Sediment build up within the forebay to be excavated post construction and disposed of in accordance with current legislation.</li> <li>5. The banks of the attenuation ponds should be vegetated at the earliest opportunity.</li> </ol>
<b>Road sweeper wastewater</b>	<ol style="list-style-type: none"> <li>1. Redrow Homes have received authorisation from Welsh Water for the temporary disposal of trade effluent from pre-treated road sweeper waste to the public foul sewer at their Great Milton Park development. The maximum volume of trade effluent that may be discharged shall not exceed 20 m<sup>3</sup> per day at a flow rate no greater than 2 litres per second. A copy of the consent is included <b>Appendix G</b>.</li> </ol>

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### 9.0 Contact Details (to be used for support and advice)

Name	Job Role	Organisation	Contact Number
Anthony Smith	Technical Project Manager	Redrow Homes Limited	07979 101156
Nick Powell	Project Site Manager	Redrow Homes Limited	07884 738949
John Harris	Area Construction Manager	Redrow Homes Limited	07824 413130
Simon Mason	Engineering Manager	Redrow Homes Limited	07435 982179
Tim Crowe	Principal GeoEnvironmental Consultant	RSK Environment Limited	07827 072702
Kevin Holmes	Principal Engineer	RSK Environment Limited	07768 753024

### 10.0 Monitoring Procedures and Records

The following monitoring procedures will be carried out on a weekly/routine basis by the site team to enable continuous review of the measures listed above. A record of the effectiveness of the system will be maintained to enable further review by any parties attending site:

1. As part of the Site Managers Weekly HS&E Sample checks of gullies should be completed to ensure maintenance and cleaning has been completed to prevent build-up of excess sediment, mud, and contamination.
2. Maintenance, cleaning and replacement of gully protection and potential silt fencing and silt matting as required.
3. Monitoring the conditions on site and the identified receptors at strategic locations on a weekly basis and daily during periods of particularly heavy rainfall. This will assist in identifying any changes needed to the protection systems as the development progresses.
4. Specific monitoring locations are identified on the Surface Water Management Plan. These will not all need monitoring for the duration of the development but will be monitored when relevant based on development progress and the currently active work areas on site.
5. Monitoring records to be reviewed by site observations and use of the checklist and updated when required to reflect changes to site conditions and operations.
6. Call the Redrow Divisional HS&E Manager in the event of silty run-off breaching protective measures.

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### 12.0 Data Sources

This Plan has been produced with references to available online information (MAGIC Maps, Google Earth) and the following reports:

- Integral Geotechnique; Site Investigation Report; Ref: 12229/GNS/19/SI ; Rev: 0; Dated May 2019.
- Phoenix Design Partnerships Ltd; The Hollies 3 Engineering Plan – Sheet 1; Drawing No: 10275-100-01; Rev: U, Date: 04/04/2024.
- Phoenix Design Partnerships Ltd; The Hollies 3 Engineering Plan – Sheet 2; Drawing No: 10275-100-02; Rev: U; Date: Feb 2021.
- Phoenix Design Partnerships Ltd; Llanwern Village Hollies 4 Engineering Plan – Sheet 1; Drawing No: 10275-300-01; Rev: C; Date: 21/07/2023.
- Phoenix Design Partnerships Ltd; Llanwern Village Engineering Plan – Sheet 2; Drawing No: 10275-300-02; Rev: C; Date: 21/07/2023.
- Wardell Armstrong LLP; Drainage Strategy Technical Report; Dated 19 April 2017; Job Number: WM11064; Report Number: 002 – Version 2.2.
- Wardell Armstrong LLP; Preliminary Ecological Appraisal; Dated October 2016; Job Number: WM11064; Report Number: Eco 001.
- Wardell Armstrong LLP; Site Investigation Interpretative Report; Ref: CA02926 – 002; Dated; April 2008.
- Wardell Armstrong LLP; S104 SOUTH COMBINED GENERAL ARRANGEMENT (SHEET 1 OF 5); Ref: BM11513-140; Rev: R; Dated: 04/08/2023.
- Wardell Armstrong LLP; S104 SOUTH COMBINED GENERAL ARRANGEMENT (SHEET 2 OF 5); Ref: BM11513-141; Rev: P; Dated: 04/08/2023.
- Wardell Armstrong LLP; S104 SOUTH COMBINED GENERAL ARRANGEMENT (SHEET 3 OF 5); Ref: BM11513-142; Rev: R
- Wardell Armstrong LLP; S104 SOUTH COMBINED GENERAL ARRANGEMENT (SHEET 3 OF 5); Ref: BM11513-143; Rev: T
- Wardell Armstrong LLP; S104 SOUTH COMBINED GENERAL ARRANGEMENT (SHEET 3 OF 5); Ref: BM11513-153; Rev: A

### 12.0 Attachments

Figure 1 – Surface Water Management Plan Schematic

Appendix A – Redrow Homes - Water Management Redrow Operating Procedure (ROP012)

Appendix B – Engineering drawings

Appendix C – Frog Environmental Limited – Settlement Test

Appendix D – Frog Environmental Limited – Environmental Calculations

Appendix E – Frog Environmental Limited – Gel Flocculant material safety data sheets (MSDS)

Appendix F – Frog Environmental Limited – Product Technical information

Appendix G – Welsh Water - temporary disposal of wastewater consent

## SURFACE WATER MANAGEMENT PLAN

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### Appendix A – Redrow Homes - Water Management Redrow Operating Procedure (ROP012)

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# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

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### Purpose

This procedure sets out the requirements and procedures for effectively planning, managing, monitoring and co-ordinating Health, Safety and Environmental (HS&E) aspects relating to Water Management to ensure that all activities are **Safe by Design** and that everyone is **Operating Responsibly**.

### Scope

This procedure covers the HS&E requirements for water management to ensure both the efficient utilisation of water resources across Redrow and the effective control of water and wastewater. These HS&E requirements will help to prevent water wastage and ensure that Redrow will meet its compliance obligations, with respect to both water discharges and abstractions, whilst providing a means to effectively manage and control the migration and use of water on Redrow sites.

This procedure provides specific guidance for:

- Offices;
- Sites;
- Sales;
- Customer Services.

It is recognised that controls and Regulatory bodies may vary in England and Wales.

# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

### Definitions

<b>Abstraction</b>	The process of removing water from a surface source (such as a river, stream, or canal) or from an underground source.
<b>Consents, Licences and Permits</b>	A legal requirement to acquire permission to undertake a task or operation in a manner that is environmentally responsible and approved by the Regulator.
<b>Construction Environmental Management Plan (CEMP)</b>	Construction Environmental Management Plan and/or Construction Management Plan is a document that helps to ensure that construction work considers aspects of environmental protection within the context of compliance with local legislation and minimisation of the impacts on humans and the environment. A CEMP allows a proactive approach in controlling potential polluting activities to prevent adverse public health impacts, nuisance, and hazards to the natural and human environment. <b>N.B.</b> This document may be referred to differently depending on the Local Authority. However, within this procedure CEMP will be the generic term used.
<b>Controlled water</b>	Controlled waters describe nearly all surface, estuarial, coastal, and ground waters. The main exceptions are small land locked ponds or reservoirs which are not connected to other watercourses or exist to provide drinking water.
<b>Discharge</b>	The act of allowing water to flow out from site to a watercourse, either directly or via a drainage system.
<b>Drainage Plan</b>	A drainage plan identifies all drainage systems and outlets on site. Detail on the plan will include identification of surface water, foul water, combined drainage systems and interceptors.
<b>Effluent</b>	Liquid waste or sewage discharged from site.
<b>Environmental Management Plan (EMP)</b>	An Environmental Management Plan is a document that helps to ensure that work in Redrow office considers aspects of environmental protection within the context of compliance with local legislation and minimisation of the impacts on humans and the environment. An EMP allows a proactive approach in controlling the environment and is developed in line with the <b>Redrow Operating Procedure – Office (ROP009)</b> .
<b>Environmental Permit</b>	A permit issued by the Regulator which allows discharge of surface water, liquid effluent, sewage, or wastewater.
<b>Flood Zone 1</b>	Low Probability: Land having a less than 1 in 1,000 annual probability of river or sea flooding. Shown as 'clear' on the UK Flood Map – all land outside Zones 2 and 3
<b>Flood Zone 2</b>	Medium Probability: Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the UK Flood Map)
<b>Flood Zone 3a</b>	High Probability: Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding (Land shown in dark blue on the UK Flood Map).
<b>Flood Zone 3b</b>	The Functional Floodplain: This zone comprises land where water must flow or be stored in times of flood (not separately distinguished from Zone 3a on the UK Flood Map).
<b>Foul waters (trade effluent)</b>	Water that has been used in a process, passed through or over the site where work is taking place. This water will usually have picked up contaminants as it passes through the process or site, such as suspended solids, oils and/or chemicals. It may also have had its properties changed, such as an increase or decrease in pH.
<b>Grey water</b>	Grey water is domestically used water usually derived from sinks, baths and / or showers (excluding toilet wastes).
<b>Groundwater</b>	Water found below ground level. Ground water is often extracted via a borehole.
<b>Groundwater Source Protection Zone</b>	These are groundwater sources usually used as a supply for drinking water. There are defined zones dependent on their risk to contamination.
<b>IBC</b>	Intermediate Bulk Containers.
<b>Impoundment</b>	Water impoundment refers to structures within inland waters that can permanently or temporarily change the water level or flow, such as: dams, weirs, sluices, culverts, retaining walls, flumes and/or temporary diversions during construction work.

# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

<b>Impoundment Licence</b>	A licence needed before work starts on an impoundment structure, even in an emergency.
<b>Interceptor</b>	An interceptor (also known as a separator) is a device designed to remove oil and oily liquids from a flow of water. Depending on the design, it may also retain silts.
<b>Internal Drainage Board</b>	A public body that manages water levels in an area, known as an internal drainage district, where there is a special need for drainage.
<b>Lead Local Flood Authorities (LLFAs)</b>	A County Council and/or Unitary Authority. They lead in managing local flood risks (i.e., risks of flooding from surface water, ground water and ordinary (smaller) watercourses). This includes ensuring co-operation between the Risk Management Authorities in their area.
<b>Local Wildlife Sites (LWS)</b>	Sites with substantive nature conservation value. They are defined areas, identified, and selected for their nature conservation value, based on important, distinctive, and threatened habitats and species. There are different terms in use to describe Local Wildlife Sites, including Sites of Importance for Nature Conservation (SINCs), Sites of Nature Conservation Importance (SNICIs) and County Wildlife Sites. Found on both public and private land, LWS's vary in size and shape. They are selected by the relevant Wildlife Trust, along with representatives of the local authority and other local wildlife conservation groups.
<b>Main River</b>	Main rivers are usually larger rivers and streams, designated as such, and shown on the Environment Agency (EA) Main River Map in England and designated by Natural Resource Wales (NRW) in Wales. All other watercourses are known as Ordinary Watercourses. Main Rivers are managed by the EA in England and NRW in Wales.
<b>Ordinary Watercourse</b>	Those streams and rivers not designated as Main Rivers are known as ordinary watercourses. These are managed by the LLFA's, district councils and internal drainage boards.
<b>Potable water</b>	Water which is suitable for human consumption (also known as mains water).
<b>Ramsar Site</b>	A wetland site designated to be of international importance under the Ramsar Convention.
<b>Regulator</b>	An organisation or body with the authority to issue and enforce environmental legislation including the issue and control of licences or permits for water abstraction and discharge to surface and ground.
<b>Regulatory Position Statement (RPS)</b>	Defines conditions required to comply with during various environmental activities e.g., using water, disposing of waste, storing waste, etc. Usually if these conditions cannot be met a Regulatory permit is required.
<b>Risk Assessment Management Authorities (RMAs)</b>	<p>The list below contains the defined as RMA's:</p> <ul style="list-style-type: none"> <li>• Environment Agency/Natural Resources Wales.</li> <li>• Lead Local Flood Authorities.</li> <li>• District and Borough Councils.</li> <li>• Coast protection authorities.</li> <li>• Water and sewerage companies.</li> <li>• Internal Drainage Boards.</li> <li>• Highways authorities.</li> </ul> <p>The Flood and Water Management Act 2010 requires RMAs to:</p> <ul style="list-style-type: none"> <li>• Co-operate with each other.</li> <li>• Act in a manner that is consistent with the National Flood and Coastal Erosion Risk Management Strategy for England and/or Wales and the local flood risk management strategies developed by Lead Local Flood Authorities.</li> <li>• Exchange information.</li> </ul>
<b>Sites of Special Scientific Interest (SSSI)</b>	A formal conservation designation. Usually, it describes an area that's of particular interest to science due to the rare species of fauna or flora it contains - or even important geological or physiological features that may lie in its boundaries.
<b>Special Areas of Conservation (SAC)</b>	A designated area which protects one or more special habitats and/or species – terrestrial or marine listed in legislation.



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<b>Special Protected Areas (SPA)</b>	A designated area which protects areas for birds listed in legislation.
<b>Standpipe</b>	A portable pipe that can be used to connect to the mains water supply, through a metered tap or valve, to provide a temporary supply of water.
<b>Surface water</b>	Water that remains static, or flows, above the ground (such as ditches, ponds, streams, rivers, canals, reservoirs, lakes, estuaries, and coastal waters).
<b>Sustainable Drainage Systems (SuDS)</b>	Drainage that mimics nature and typically manage rainfall close to where it falls. Designed to transport surface water and slow run-off down (attenuate) before it enters watercourses. They provide areas to store water in natural contours and can be used to allow water to soak (infiltrate) into the ground or be evaporated from surface water and lost or transpired from vegetation.
<b>Water Discharge</b>	Discharging of water includes the removal of water from site either through ground, watercourses, or drainage systems. It includes the removal of water from an excavation, drip tray, sump, or other man-made objects such as a wheel wash or boot wash.
<b>Water Treatment</b>	Any process that improves the quality of the water to make it more acceptable for a specific end use. The end use may be drinking water, industrial water supply, irrigation, being safely returned to the environment, or any other use. Common forms of water treatment on site include the use of silt settlement devices e.g., silt buster, interceptor, silt traps and fences.



# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

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### Redrow Operating Procedure

#### OFFICES

##### General Requirements

Managing Directors, Office Managers and/or Facilities Managers must ensure:

- Any work taking place in and around the office where Redrow is responsible is planned to ensure there is minimal risk to the environment.
- Works completed (by both Redrow or an external party) must have suitable and sufficient Risk Assessments and Method Statements (RAMS) which include necessary mitigation and control of potential environmental risks.
- That all personnel understand their responsibilities and the requirements of the **Offices Redrow Operating Procedure (ROP009)** which includes requirements for the use of water and the management of water on site.
- Where an activity may arise in the office that requires a consent, licence, or permit, this is completed as required and in a timely manner. E.g., the need for an **Environmental Permit** to allow vehicles to be washed in the office car park. If unsure, check with the Divisional HS&E Manager.
- The office location is compliant with the requirements of the **Offices Redrow Operating Procedure (ROP009)** and has an **Environmental Management Plan (EMP) (STF093)** detailing water usage in the office.
- Water usage is kept to a minimum and reused wherever possible to reduce the impact on the environment and to achieve cost savings.
- Any actions or remediation identified as part of inspections and audits are implemented.
- Prompt reporting of any environmental incidents regarding water management, for example a delivery vehicle leaking oil in the car park. All incidents must be recorded on RedHSE. For guidance on recording incidents on RedHSE please refer to **RedHSE – Guidance – How to Report an Accident or Incident (HSEMS0492)** which is in the HS&E document library on Engage.
- Timely, effective resolution of any incidents to prevent reoccurrence and that lessons learnt are shared with the Group Environmental Manager.

##### Potable (Mains) Water & Water Meters

Managing Directors, Office Managers and/or Facilities Managers must ensure:

- All mains water is metered, with sub-meters, where necessary.
- Where there is no water meter contact the local Utility company who will install one.
- Safe access is available to the meters to allow for inspections and readings.
- That a responsible Redrow employee facilitates the third-party specialist (currently AJR Management Ltd) in providing meter readings.
- That a visual check is completed annually, and any leaks are dealt with by a competent and approved contractor.

Divisional Commercial Teams must ensure:

- Meters used in office locations can give a reading that is accurate to within 5% of the real amount of water that it is measuring. For example, if measuring 1,000 litres, readings between 950 litres and 1,050 litres are allowable.

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Office Managers and/or Facilities Managers must:

- When requested, provide meter readings to the third-party specialist who capture utility data on behalf of Redrow. This will be necessary where the third-party specialist has been unable to obtain the information themselves either by attending the location or via copies of invoices.

**N.B.** Where offices are not wholly owned or managed by Redrow there is the potential for an unmetered supply. No action is required in non-metered offices. In this situation supply estimates will be utilised by the third-party specialist based on known consumption from metered offices and the number of employees utilising the individual location.

# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

### CONSTRUCTION SITES

#### General Requirements

A flowchart showing the water management process on a construction site is available in **Appendix 1**. It provides a breakdown of the essential steps required to manage water responsibly on site.

Divisional Technical Teams must ensure:

- That relevant details obtained from site surveys, planning consents, pre-construction information and any other relevant sources are included in the **Construction Environmental Management Plan (CEMP)**.
- Details from any third-party Water Management Plans and/or Drainage Plans that impact on the Redrow work, must be included in the Redrow **CEMP**.
- If the site is in a Groundwater Source Protection Zone (which can be identified via Magic Map - <https://magic.defra.gov.uk/magicmap.aspx>), mitigation is developed to prevent potential pollution or harm to the groundwater. This mitigation must be included in the site **CEMP**.
- If site plans to use abstracted water from controlled sources, permission (where required) is obtained from the appropriate Regulator.
- Permission for discharge to controlled water or sewers off site is granted by the appropriate Regulator in a timely manner.
- The construction site has a **CEMP** with a water management section covering the following, where applicable:
  - Water sources (mains, abstraction points).
  - Water inputs to drainage systems.
  - Water storage areas (pits, lagoons, and tanks).
  - Drainage routes below ground.
  - Clear distinction between surface water and sewers (colour coded for ease of recognition – red for Foul drainage and blue for Surface Water drainage).
  - Treatment (interceptors, silt management).
  - Discharge points/outfalls.
  - Abstraction points (including boreholes).
  - Spill kit locations.
  - Monitoring points (shall include both incoming and outgoing water drainage within proximity of the site boundary).
  - Vehicle/plant wash down areas (including treatment installed and discharge location).
- The **CEMP** includes water management controls to prevent pollution and reduce the sites impact on the environment (including reduced water usage where possible. See **Appendix 2** for the **Water Hierarchy**).
- They liaise with the Redrow Site Management Teams to keep the site **CEMP** relevant and update the document through the life cycle of the development.
- Electronic copies of any licences and consents issued to site by the Regulator, Local Authority or Water Company are recorded on the sites **Environmental Permits and Obligations Register (STF097)**.
- Where Redrow are working on a consortium or shared site and not the lead contractor, the lead contractors Water Management Plan and/or Drainage Plan must be reviewed. Consideration must be given to the impact on the Redrow construction site and included in the Redrow **CEMP**. Where Redrow's works impact the existing drainage, mitigation must be implemented and agreed with the drainage owner.

Divisional Construction Directors must ensure:

- All construction sites have a relevant **CEMP** that provides adequate controls for water management to manage the impact on the environment.
- The water management process described in the **CEMP** is understood and adhered to by all Redrow

# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

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employees and contractors.

- The water management processes described in the **CEMP** are undertaken.
- Water usage is kept to a minimum and reused wherever possible to reduce the impact on the environment and to achieve cost savings. Greywater should be considered where possible.
- All actions and/or remediation identified as part of construction site inspections and audits are implemented.
- Principal Contractors are aware of any planning consents that they may need to discharge the requirements detailed in the site **CEMP** for effective water management on site.

Redrow Site Management Teams must ensure:

- This **ROP** is implemented and fully complied with by all those working on the construction site, including all contractors and sub-contractors.
- The water management measures detailed within the **CEMP** are understood and adhered to by all Redrow employees and contractors.
- The Water Management section of the **CEMP** and its contents remain relevant – where changes are necessary, discuss this with the Divisional Technical Teams for them to update the document.
- Relevant mitigation defined by the Divisional Technical Teams is implemented to prevent pollution of any Groundwater Source Protection Zone identified (where applicable).
- Any changes in the water management on site must be briefed to all members of the workforce on site.
- All permits and licences are discharged as required and controls understood and completed by those on the construction site.
- No water is abstracted from a controlled source without permission, where required, from the appropriate Regulator with permission to be requested by the Divisional Technical Teams.
- No water is discharged off site to controlled water or sewers without permission from the appropriate Regulator with permission to be requested by the Divisional Technical Teams.
- A copy of all the corresponding forms, permits, licences and consents detailed in this **ROP** are held in **Section 12** of the **Construction Phase Health, Safety and Environment Plan (CPHSEP)**.
- Prompt reporting of any incident regarding water management e.g., release of contamination into a watercourse. All incidents must be recorded on RedHSE. For guidance on recording incidents on RedHSE please refer to **RedHSE – Guidance – How to Report an Accident or Incident (HSEMS0492)** which is in the HS&E document library on Engage.
- Timely, effective resolution of any incidents to prevent reoccurrence and that lessons learnt are shared with the Group Environmental Manager.

### Flood Management and Uncontrolled Release of Water

Divisional Technical Teams must:

- Identify if any works during construction could increase the flood risk or adversely affect land drainage.
- Contact EA or NRW as soon as possible to discuss plans if it is anticipated that any works could increase the flood risk or adversely affect land drainage. The authorities will want to see full details of the work proposed at least two months before the work is intended to start.
- Confirm with the EA or NRW if an **Environmental Permit** (previously known as Flood Defence Consent) is required. This permit may be required when works will occur:
  - On or near a main river;
  - On or near a flood defence structure;
  - In a flood plain or;
  - On or near a sea defence.

The application can be completed on the relevant authorities' website.

- Confirm (when an Environmental Permit is not required) with the Lead Local Flood Authority if a Land Drainage Consent is needed. This is generally when works involve constructing or altering a culvert or flow control structure (such as a weir) on any 'Ordinary Watercourse', which is a small river, stream, or ditch.

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- Check to see if the site qualifies for an exemption from the Land Drainage Consent. If so, this should be applied for to the relevant Regulator prior to work commencing, this is done via the EA or NRW websites.
- Investigate whether there are any specific Local Authority byelaws to be considered and complied with before taking the appropriate action.
- Complete a flood Risk Assessment for developments in a flood zone: and where the Risk Assessment meets one or more of the following criteria:
  - In flood zones 2 or 3 including minor development and change of use;
  - More than 1 hectare (ha) in flood zone 1;
  - Less than 1 ha in flood zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs);
  - Areas within flood zone 1 which has critical drainage problems as notified by the EA and/or NRW;
  - Within 20 metres of a 'Main River'.
- Design and develop methods (in conjunction with specialists where necessary) of ensuring water flow is controlled on site during construction to reduce the environmental impact of the site (see **Pollution Prevention ROP (ROP014)** for preventing silt). Methods could include, but are not limited to:
  - Limit/plan vegetation clearance to provide natural filtration and limit flow;
  - Construct planned drainage and/or SuDS prior to house building;
  - Limit hardstanding areas without suitable drainage to reduce flow rate of water;
  - Installation of temporary measures to control movement of water on site;
  - Ensure site entrances are positioned appropriately to allow for regular cleaning to prevent build-up of dust and mud;
  - Avoid the installation of deep boreholes, particularly in the more sensitive parts of the site.
- Include all flood Risk Assessments and water management control methods in the site **CEMP** alongside any relevant mitigation.

Redrow Site Management Teams must:

- Implement mitigation methods identified to reduce flood risk and water management control as defined in the **CEMP**.
- Understand the requirements of any consents for the site and the controls needed to comply.
- Monitor any area of the site, watercourses, and outfalls in accordance with the consents for the site. For monitoring water through the worksite or neighbouring the worksite, monitoring should be completed in accordance with the requirements of the consent or where no requirements are specified, as a minimum, should be visually checked daily and the **Inspection of Watercourses Standard Form (STF098)** completed weekly.
- Inform all contractors on site of any consent requirements and ensure RAMS are developed to include adequate mitigation for the work taking place.

### Neighbouring & Onsite Watercourses

Divisional Technical Teams must:

- Identify any onsite watercourses (i.e., ponds, brooks, streams, rivers, etc.) and include location details and any required mitigation in the site **CEMP**:
  - If work is affecting and/or taking place close to a main river (within 10m), a permit may be required from either the EA or NRW. This can be completed via their websites.
  - If work is affecting and/or taking place close to an ordinary watercourse, usually small rivers, streams, and ditches:
    - In Wales contact the local authority (via website or office) responsible and apply for an ordinary watercourse consent.
    - In England contact either the relevant Internal Drainage Board in the area and/or the lead local flood authority through the local council or the EA (via website or office).

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- Identify any neighbouring watercourses especially those watercourses that may be negatively affected by the work site and/or the site work undertaken if not managed correctly. Include required mitigation and location in the site **CEMP**.
- Include any details of watercourses in the water management portion of the site **CEMP**, including any mitigation that is required to prevent pollution.
- Include offsite water flows (direction of flow and how water enters the site) when reviewing water management and its impact on the site works and the manner water leaves site. This detail is to be included in the site **CEMP**.

Redrow Site Management Teams must:

- Implement the requirements defined in any consents, licences, or permits issued by regulators.
- Implement necessary mitigation to reduce the impact of offsite water flow as instructed by the Divisional Technical Teams and detailed in the site **CEMP**.
- Implement necessary mitigation for any neighbouring and/or onsite watercourses to prevent pollution.
- Monitor any onsite/neighbouring watercourses, in accordance with any consents, licences or permits implemented by regulators, using the **Inspection of Watercourses Standard Form (STF098)**. Where no consent, licence or permit is required watercourses, as a minimum, should be visually checked daily and the **Inspection of Watercourses Standard Form (STF098)** completed weekly.
- Brief any mitigation identified in the **CEMP** and requirements defined in consents, licences, or permits issued by regulators and the requirements to any contractors ensuring they are aware of their responsibilities.

### Site Water Habitat Review

Divisional Technical Teams must:

- Identify if there are any protected areas or species that may be affected by the development. This includes reviewing neighbouring areas outside of the Redrow site boundary.
- Consider how the development will affect any nearby Sites of Special Scientific Interest (SSSI), Special Protected Areas (SPA), Special Areas of Conservation (SAC) or Ramsar site.
- Identify if any licences for species disturbance are required. Advice should be taken by an experienced and qualified ecologist who should also complete any surveys required as part of the licence process (licences generally take up to 30 days and can be applied for online via Natural England or NRW website).
- Include details of protected areas and/or species in the site **CEMP** along with necessary mitigation to prevent disturbance, pollution prevention or damage.
- Ensure continued liaison between the Redrow Site Management Teams and a qualified ecologist to reduce the risk of ecological constraints and programming restrictions impeding the works.

Redrow Site Management Teams must:

- Implement necessary mitigation, dependent on local weather conditions, to reduce the impact to protected areas and/or species as instructed by the Divisional Technical Teams and detailed in the site **CEMP**.
- Where necessary, maintain monitoring of protected species via a qualified and competent ecologist – ensuring the site remains compliant with any licences in place.
- Make all contractors on site aware of any requirements regarding water habitats in and around the site and ensure RAMS are developed to include adequate mitigation for the work taking place.

### Sustainable Drainage Systems (SuDS)

Divisional Technical Teams must:



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## WATER MANAGEMENT

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- Design SuDS, in accordance with Construction Industry Research and Information Association (CIRIA) best practice guidance, so that they control the quantity of run-off from the construction site and manage the quality of the run-off to prevent pollution. SuDS must prevent pollution of the water environment and protect the bed and banks of the receiving surface water by retaining maximum vegetation cover and control erosion.
- Ensure when designing SuDS that consideration has been given to where fuel delivery or refuelling areas are located and areas where potentially polluting materials, such as chemicals and oil will be delivered, handled, and stored during construction.
- Ensure any discharge from the developed SuDS is done so in accordance with this **ROP**.

Redrow Site Management Teams must:

- Construct the drainage at the earliest possible convenience. This is to help reduce the impact of water egress across the construction site, remove the sites potential to flood and prevent pollution of local watercourses and ground contamination.
- Maintain SuDS so they are in good order and protect them from materials that will damage or block the system.
- Monitor any SuDS, in accordance with any consents, licences or permits implemented by regulators, using the **Inspection of Watercourses Standard Form (STF098)**. Where no consent, licence or permit is required watercourses, as a minimum, should be visually checked daily and the **Inspection of Watercourses Standard Form (STF098)** completed weekly.
- Make all contractors on site aware of the location of any SuDS in and around the site and ensure RAMS are developed to include adequate mitigation for the work taking place to prevent damage or pollution.

### Surface Water Management Plan

Divisional Technical Teams must:

- Ensure a Surface Water Management Plan using the **Surface Water Management Plan (STF096)** is developed. If completed by an external specialist the Redrow template should be used to ensure consistency.
- Include the **Surface Water Management Plan (STF096)** in the **CEMP** and ensure detail from the plan is included into the relevant sections of the **CEMP**.
- Ensure the details contained in the **Surface Water Management Plan (STF096)** are relevant and the plan is completed in accordance with this **ROP**.
- Review and update the **Surface Water Management Plan (STF096)** in accordance with the site programme of works and major change which may occurred during works.

Redrow Site Management Teams must:

- Ensure the details contained in the **Surface Water Management Plan (STF096)** are implemented on site and coordinated to ensure the environmental risk is kept to a minimum. Works are to be completed in accordance with this **ROP** and the **Pollution Prevention ROP (ROP014)**.
- Ensure the **Surface Water Management Plan (STF096)** is suitable and sufficient. Coordinate with the Divisional Technical Teams when changes are needed to ensure the plan is correct and up to date.
- Ensure all contractors are aware of the details contained in the **Surface Water Management Plan (STF096)** and the contractors RAMS include relevant mitigation to reduce environmental impact on site.

### Water Discharge Activities (Off-site)

Divisional Technical Teams must:

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- Consider whether an **Environmental Permit** is required for discharging liquid or wastewater from the construction site. A permit is not required if the following applies (in accordance with the governments **Regulatory Position Statement (RPS) 261 Temporary dewatering from excavations to surface water**):
  - Discharge from an excavation to surface water (such as pumping out of excavations) is for a short period and is uncontaminated water, which is wholly or mainly rainwater.
  - Clean water, for example clear rainwater or infiltrated groundwater which has collected in the bottom of temporary excavations.
  - If water does not contain fine or coarse suspended solids (silty water) entering surface water.
  - If pumping lasts less than 3 consecutive months (the activity may stop and restart in those 3 months, but the clock does not restart). If the activity is likely to go over 3 consecutive months, then the Divisional Technical Teams need to apply for a permit.
  - Made to surface water, such as a river, stream, or the sea.
  - Detailed mitigation in the RAMS that minimises the risk of pollution.
- Apply for an **Environmental Permit** if the site cannot meet the above requirements. This is completed online via the EA or NRW website.
- Ensure any conditions detailed in the **Environmental Permit** are reviewed to ensure the Redrow Site Management Teams can comply with the requirements of the permit. The permit will specify limits that the water must comply with before discharging e.g., pH, suspended solids, flow rate, etc.
- Undertake further discussions with the Regulator, if required, to enable compliance with the **Environmental Permit** alongside current designs.
- Apply for a permit from the relevant sewerage undertaker, usually the local water utilities company, if the site needs to discharge to a public foul sewer (or a drain that connects to one).
- Request written permission from the lead company or owner of the foul drainage prior to discharging where Redrow are completing construction works with a consortium partner / shared site.
- Record the conditions of any permits in the Water Management section of the **CEMP**.
- Mitigate water removal from excavations ensuring it is managed to prevent risk and uncontrolled water does not leave site. Include details of this in the Water Management section of the **CEMP**.

Redrow Site Management Teams must ensure water discharge:

- Is only made when there is no further use for the water or during times of heavy rainfall.
- Does not pollute surface water.
- Does not contain any chemical dosing agents, flocculants, or coagulants.
- Does not come from a site which is contaminated by oil, metals, hydrocarbons, solvents or pesticides or other polluting substances.
- Does not result in the spread of non-native invasive species, parasites, or disease.
- Does not cause flooding from surface water.
- Does not cause erosion of the banks or bed of the receiving watercourse.
- Does not contain concrete wash water even if it has been treated.
- Does not contain site drainage from surface areas such as haul roads, storage or working areas.
- Does not come from a site with naturally elevated concentrations of substances which exceed environmental quality standards.
- Is not located within, or less than 500 metres upstream of, sensitive environmental areas e.g., SSSI or Local Wildlife Sites (LWS).
- Is checked to ensure it is clean and uncontaminated. If the discharge changes during the process, then the discharge must stop immediately. Rainwater that is 'clean', for example, from a roof, road, pathway, or clean hard-standing area, can be allowed to enter controlled watercourses without the need for permission. If, however it is contaminated with, for example, silt, oil, or concrete, prior to discharging to a stream or river, then an **Environmental Permit** from the corresponding Regulator is required.
- Where the **Environmental Permit** has been issued to site (via the Divisional Technical Teams) the Redrow Site Management Teams will:
  - Ensure any discharge is via an authorised discharge point that has been designed, engineered, and constructed to maintain compliance with the **Environmental Permit** conditions.



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## WATER MANAGEMENT

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- Check any discharge leaving the construction site meets the conditions of the permit. Record checks in accordance with the **Environmental Permit** using the **Inspection of Watercourses Standard Form (STF098)**. Where no timescale is stipulated then, as a minimum, a visual check should be completed daily, and the **Inspection of Watercourses Standard Form (STF098)** completed weekly. These inspection forms should be stored in the **Section 12** of **CPHSEP**.
- Control of all water discharge (both surface and groundwater) that leaves the construction site via either:
  - An **Environmental Permit** issued by the Regulator and applied for by the Divisional Technical Teams.
  - A permit from the relevant sewerage undertaker where the site needs to discharge to a public foul sewer (or a drain that connects to one), applied for by the Divisional Technical Teams.
- If conditions of the permit are breached or there is an unauthorised discharge from site, the breach must be reported:
  - Firstly, internally to the Divisional HS&E Manager.
  - Secondly to the Regulator (as required).
  - In accordance with **RedHSE – Guidance – How to Report an Accident or Incident (HSEMS0492)** reporting procedure.
- Inform all contractors on site of any permit requirements and ensure RAMS are developed to include adequate mitigation for the work taking place.

### Water Discharge Activities (On-site)

Divisional Technical Teams must:

- Ensure how water removal from excavations is to be managed and is detailed in the Water Management section of the **CEMP**.

Divisional Construction Directors must:

- In conjunction with the Divisional Technical Teams, plan how to minimise the level of contaminants such as silt entering any excavation(s).
- Plan how to dispose of water that enters excavation(s).
- Plan not to use machinery in excavations whilst dewatering is taking place.
- Minimise water entering the excavation, for example from rainfall, run-off, groundwater ingress or high water-table.
- Ensure any Principal Contractor working on behalf of Redrow has a suitable and sufficient RAMS that mitigates water discharge from excavations and they are compliant with this **ROP**.

Redrow Site Management Teams must consider:

- The quantity of water to be pumped.
- Where the water is from and going too. Water should only leave site or enter a watercourse if it is compliant with **RPS 261** (*Temporary dewatering from excavations to surface water*) or without prior permission and the relevant **Environmental Permit** (applied via the Divisional Technical Team).
- The requirements of the **RPS 261** state:
  - Only clean water, for example clear rainwater or infiltrated groundwater which has collected in the bottom of temporary excavations can be discharged.
  - No water containing fine or coarse suspended solids (silty water) can enter surface water.
  - Pumping must last no more than 3 consecutive months (the activity may stop and restart in the 3-month period, but the clock does not restart). If the activity is likely to go over 3 consecutive months, then the Divisional Technical Teams will need to apply for a Regulatory Permit.
  - Entering surface water (such as a river, stream, pond, lake, SuDS, etc.).
  - Have a method statement that minimises the risk of pollution.

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- The quality of the water, ensuring no oil, chemicals, or other substance deemed a pollutant enter either surface water, drainage, or SuDS without an **Environmental Permit**.
- Ensure that water removed from excavations is in accordance with this procedure.
- Complete and issue a **Permit to Pump Standard Form (STF100)** for all water discharges from excavations, whether complying with the **RPS 261** requirements (see above) or an **Environmental Permit**.
- Complete and issue a **Permit to Pump Standard Form (STF100)** for water discharge from any excavation, no matter quantity of water or size of excavation.
- Guarantee water leaving any excavations is not entering any surface water, drainage, other excavation or leaving site, with the exception that there is an **Environmental Permit** in place.
- Confirm water leaving the excavation is clean water and not contaminated with oil, chemicals, or excessive suspended solids (refer to the Silt section of the **Pollution Prevention ROP (ROP014)** for guidance).
- Monitor for adherence to the **Permit to Pump** via Site Managers Inspections and Area Construction Managers Inspections.
- Retain a copy of the **Permit to Pump Standard Form (STF100)** for 2 years in **Section 12** of the **CPHSEP**. These records must be made available to the Regulator on request.
- All contractors breaking ground on site are aware that a Permit to Pump is required for removal of water and this is detailed in the contractors RAMS.

### Impoundment Structure

Divisional Technical Teams must:

- Assess the construction site prior to work commencing to identify if an impoundment structure is to be changed (permanently or temporarily). This will only apply where works involve:
  - Culverts;
  - Retaining walls;
  - Temporary diversions during construction work.
- Apply for an Impoundment Licence from the EA or NRW online before work is started on any impoundment structure, even in an emergency.
- Ensure that any changes to impoundment structures are included in the Water Management section of the **CEMP**.

Redrow Site Management Teams must:

- Guarantee that all construction work on any impoundment structures is done so in accordance with the licence requirements.
- Hold a copy of the **Impoundment Licence** on site in **Section 12** of the **CPHSEP**.
- Ensure that all construction work on any impoundment structures is done so in accordance with the licence requirements.
- Ensure contractors completing any impoundment work do so in accordance with the licence requirements and all RAMS are suitable and sufficient, including adequate mitigation to minimise environmental risk.

### Wash Areas and Bays (including wheel washes)

Divisional Technical Teams must:

- Identify if a vehicle wash area or bay is needed as a requirement of planning or to reduce the impact on neighbours and the environment.
- Design the designated wash bay so that run-off from washing vehicles, plant or equipment is:
  - On hard standing (e.g., an area of concrete or tarmac);
  - Contained by three sides (use of channels, gullies, gradient (fall on the surface) and kerbs);

# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

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- Isolated from surface water;
- Containing the wash water and rainfall run-off to prevent its entry to surface water drainage systems, unmade ground, or porous surfaces.
- Consider the following options for segregating wash water:
  - Collected in a sealed system for authorised disposal and tankered off site as wastewater for authorised treatment;
  - A closed loop/recycle system (water collected for re-use), which is Redrow's preferred option;
  - Water directly entering a permitted discharge to foul system. The discharge will require an oil interceptor as a minimum with additional silt traps or settlement tanks(s) possibly needed, prior to the interceptor, to remove larger particles of silt and sediment;
  - Measures such as cut-off trenches will be put in place to prevent any potentially polluted run-off from within the site entering any excavations.
- Details of the requirements regarding vehicle washing, where required are included in the Water Management section of the **CEMP**.

Redrow Site Management Teams must ensure that:

- Any activities that produce run-off from vehicles, plant, or equipment, are carried out in areas that are defined and clearly marked as detailed above.
- Where possible, vehicle/plant washing activities are avoided to minimise water resource requirements and to avoid the associated pollution risks.
- Consideration is given as to whether a fence or barrier is required to prevent spray drift out of the designated area contaminating adjacent ground/drainage.
- Equipment used minimises water use and waste production. Use facilities and equipment that filter and reuse water.
- If trigger-operated spray guns (jet wash) are used, they have an automatic water supply cut-off when not in use and are only used in the designated wash areas.
- Wash facilities are maintained to ensure the impact on the environment is minimal.
- Any wash areas/bays are monitored, as part of the Site Managers HS&E Weekly Sample to ensure they are working as required with no environmental impact.
- Everyone on site, including contractors and delivery drivers, are made aware of the site-specific vehicle washing and cleaning activity requirements and restrictions.

### Water Bowsers (including IBC)

Divisional Technical Teams must:

- Identify when and if a water bower is to be used at any time during the site works.
- Record details of how it will be managed in the Water Management section of the **CEMP**.

Redrow Site Management Teams must ensure:

- Water bowsers used on Redrow sites are:
  - Situated in a position suitable for the safe access and distribution of water;
  - Regularly inspected and maintained to ensure they are fit for purpose;
  - Designed to control and minimise the water usage whilst remaining effective when used for dust suppression (e.g., dampening of roads);
- Mobile bower meets the requirements detailed above.
- Water bowsers (both mobile and stationary) are regularly inspected and maintained to ensure they are fit for purpose and any leaks are repaired.
- All contractors using bowsers and/or IBCs are aware of the requirements detailed in the **CEMP** and have detailed in their RAMS mitigation for the management of water bowsers on site.

# REDROW OPERATING PROCEDURE

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### Water Treatment (including water containing concrete and silt)

Divisional Technical Teams must:

- Identify if water treatment is required prior to construction commencing. If treatment is required a Permit is not needed if the site complies with the **RPS 235** for *Treating and using water that contains concrete and silt at construction sites*. The **RPS 235** states water can only be treated by:
  - Settlement or physical dewatering (or both), for example in a settlement tank or silt press;
  - Correcting the pH before discharging to a foul sewer, subject to the sewerage undertaker's consent;
  - Using agents to solidify water that contains concrete or silt from the site;
  - No other chemicals or flocculants can be used.
- Continue to assess this requirement throughout the lifecycle of a site as this requirement may change.
- Apply for an **Environmental Permit** if compliance with the **RPS 235** cannot be achieved. This can be done through the EA or NRW websites.
- Include Water Treatment requirements in the Water Management section of the **CEMP**. This may be either standard **RPS 235** requirements or details included within the Permit.

Redrow Site Management Teams must:

- Comply with this procedure, which is written in accordance with the **RPS 235**, or any **Environmental Permit** issued to the site for treating contaminated water.
- Follow a method statement which minimises the risk of pollution when treating water.
- Contain all waters before treatment and use, e.g., a settling tank or lined lagoon.
- Ensure that during cleaning and maintenance the risk of pollution is assessed and mitigated. In most cases the discharge will need to be stopped whilst these activities take place.
- Ensure that when cleaning out water treatment facilities, particularly oil interceptors or separators, waste is considered to be possibly hazardous and treated as such.
- Ensure that all water treatment facilities remain compliant with **Environmental Permit** conditions.
- Comply with a **Waste Environmental Permit** or exemption if you want to use dried concrete and silt fines.
- Make sure activities do not endanger human health or the environment.
- Only discharge the treated water if compliant with the Water Discharge section of this procedure.
- Remove from site wastewater that cannot be treated as detailed in this procedure. It must be removed by a licensed waste contractor and disposed of in accordance with waste legislation.
- Hold a copy of the **Environmental Permit** for treating water in **Section 12** of the **CPHSEP**.
- Monitor any water treatment processes and regularly maintain and clean them to ensure maximum efficiency whilst reducing potential risks.
- Only licenced waste contractors are used for cleaning out water treatment facilities. A copy of the contractor's waste licence should be held on site in **Section 12** of the **CPHSEP**.

In addition, the Redrow Site Management Teams must ensure the site does not:

- Cause a risk to water, air, soil, plants, or animals.
- Cause a nuisance through noise or odours.
- Adversely affect the countryside or places of special interest.
- Store more than 30m<sup>3</sup> of water containing concrete or silt at any time in any single location on the construction site.
- Carry out activities associated with treating or using water that contains concrete or silt within 10m of any watercourse.
- Carry out activities associated with treating or using water that contains concrete or silt within less than 50m of:
  - SSSI.

# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

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- SACs.
- SPAs.
- Candidate SACs, possible SACs, potential SPAs, and sites of community importance.
- Ramsar sites.
- Other nature conservation sites, such as ancient woodlands and local and national nature reserves.
- LWS.
- Use any water that contains concrete to suppress dust.
- Use more water than necessary to suppress dust.
- Use treated wastewater to suppress dust within a groundwater source protection 1, or within 50m of a private drinking water supply.
- Use water from excavations at sites contaminated by oil, metals, hydrocarbons, solvents, pesticides, or other polluting substances.
- Cause run-off from the treatment or use of water into any surface water drains, surface waters or groundwater.

Divisional Commercial Teams must ensure:

- Any contractor appointed for cleaning water treatment facilities hold the relevant licences to complete the work.

### Using pesticides or herbicides in or near water

Divisional Technical Teams must:

- Identify if herbicides/pesticides are to be used in water, on the banks or banksides next to a watercourse or water body prior to work commencing.
- If herbicides/pesticides are to be used, obtain approval from the EA or NRW by contacting the local office.
- Specialist advice has been taken to ensure the herbicide will not affect any nature conservation area. e.g., SSSIs, SACs or SPAs. Where there is a potential impact permission will be required from Natural England or NRW.

Redrow Site Management Teams must check:

- Prior to use of a herbicide it is approved by the manufacturer for use in or near water - this will be shown on the product label.
- The contractor used for application of the product is fully competent, with the necessary skills, knowledge, and qualifications (National Proficiency Test Council (NPTC) certificate). No Redrow employee should undertake this task.
- If the activities will affect others using the site, any waterbody or watercourse downstream. If this is possible, notification must be given prior to use e.g., anyone abstracting water downstream and people who own or use land or water downstream.
- That the herbicide is only applied in the correct weather conditions following the advice on the product label and to minimise pollution. E.g., do not use herbicides when rain is expected, when it is windy or when soil is saturated.
- That contractors are working in accordance with their RAMS and in line with this **ROP**.
- If the activities will affect others using the site, any waterbody or watercourse downstream. If this is possible, notification must be given prior to use e.g., anyone abstracting water downstream and people who own or use land or water downstream.

### Site Cabins and Welfare Facilities

Divisional Technical Teams must ensure:

# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

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- Connection to the mains sewerage is planned as soon as possible in the development of the site.
- When not connected to the mains, sewage from toilet facilities and any grey water (sinks and showers) collected are designed to be in sealed tanks with the contents emptied and removed regularly by tanker as waste to avoid causing pollution, where mains are not connected.
- Technology is considered in the design to conserve water usage where possible e.g., PIR activated flush system, waterless urinals, etc.
- The relevant discharge consents are applied for and in place prior to any discharge leaving site.

Redrow Site Management Teams will ensure that:

- Services to temporary welfare facilities are installed and connected by a Redrow approved and competent contractor.
- No effluent from welfare facilities shall be discharged to surface water drains, except uncontaminated surface water e.g., roof drainage only.
- The relevant discharge consents are in place prior to any discharge leaving site.
- They undertake checks of facilities on a regular basis as part of the routine maintenance checks.
- They undertake regular visual inspections to ensure that any leaking pipes or taps are repaired without delay. Push taps and waterless urinals need to be maintained in full working condition.
- Water consumption is monitored monthly, in line with business environmental reporting requirements, see Monitor and Review Water Management below for further information.
- The collection of water consumption data is coordinated to ensure the relevant Redrow contractor has access to all monitoring points when they are on site. This is in line with business environmental reporting requirements, see Monitor and Review Water Management below for further information.

### Water Usage

Divisional Technical Teams must ensure:

- The Water Hierarchy (See **Appendix 2**) when planning water usage on a site.
- Rainwater and Rainwater run-off should be considered and opportunities for collecting and using rainwater on site to reduce water usage prior to site activities commencing. This can be collected from roofs, roadways, and yards. The use of this form of non-potable water should be encouraged, wherever possible.
- The use of water abstraction is reviewed prior to site activities commencing and its potential usage. Abstractions of 20 cubic metres (m<sup>3</sup>) (20,000litres) or less per day are exempt from requiring a licence, provided the abstraction is part of a single operation.
- If more than 20m<sup>3</sup> of water a day is to be abstracted:
  - Apply for a licence (via EA or NRW website) prior to starting work on site. Abstracting without a licence where required or breaching of the terms of a licence, is an offence.
  - Ensure that when a licence is obtained conditions of the licence are included in the Water Management section of the **CEMP**.
- Detail areas where rainwater is to be used in the Water Management section of the **CEMP**.
- Where water abstraction is seen as viable then details of managing and monitoring the water are to be detailed in the Water Management section of the **CEMP**.
- All mains water is metered (with sub-meters, where necessary).
- Where there is no water meter, contact the local Utility company who will install one.
- Identify any provision for use of local standpipes prior to site work commencing.
- Apply for a licence (the process differs dependent on the individual utility company) from the mains water supplier for the area prior to site work commencing if standpipes are to be used.
- Detail the conditions of any licence and use of standpipes in the Water Management section of the **CEMP**.
- Water abstraction's return information on completion of the site work and/or in conjunction with the



# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

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limits of the licence. This is in place to ensure that Redrow are compliant with the Site Abstraction Licence, even if nothing has been abstracted a 'nil' return must be completed.

Redrow Site Management Teams must:

- Use non-potable water where available. It can be used for many processes including dust suppression, flushing toilets, wheel washes or vehicle washing.
- Where abstraction of water is to be used this must be done in accordance with the **Water Abstraction Licence**, unless less than 20m<sup>3</sup> of water a day. Management of this will be detailed in the **CEMP**.
- In all cases of water abstraction:
  - Take and record daily volumes of the abstracted water using **Daily Abstraction Volume Record Standard Form (STF099)** to ensure compliance with limits.
  - Maintain records for 2 years to demonstrate compliance with the **Water Abstraction Licence**.
  - Ensure permitted consumption limits are not exceeded.
  - Ensure that if a **Water Abstraction Licence** is issued by the Regulator, a copy is retained on file at site in in **Section 12** of the **CPHSEP** and all conditions of the licence are always adhered to as this may be requested at any time.
  - Ensure where licence conditions are breached, any breach is reported firstly internally to the Divisional HS&E Manager and then secondly to the Regulator in accordance with **RedHSE – Guidance – How to Report an Accident or Incident (HSEMS0492)**.
- Safe access is available to all main water (potable) meters to allow for inspections and readings.
- If a standpipe is to be used on site, be aware of which standpipes can be used and only use approved standpipes.
- Ensure where any licence conditions are breached, any breach is reported firstly internally to the Divisional HS&E Manager and then secondly to the Regulator in accordance with **RedHSE – Guidance – How to Report an Accident or Incident (HSEMS0492)**.
- Undertake regular visual checks and an annual inspection of all mains water by a competent contractor to confirm there are no leaks.
- Any water abstraction volumes are provided to the Sustainability Department to be included in Redrow's water usage records.

### Monitoring Water Usage

Divisional Commercial Teams must ensure:

- That meters used on site can give a reading that is accurate to within 5% of the real amount of water that it's measuring. For example, if you're measuring 1,000 litres, you're allowed readings between 950 litres and 1,050 litres.

Divisional Technical Teams must check:

- All conditions in applicable licences regarding accuracy of meter readings and calibration. Water meters (potable, abstraction, and discharge) must be calibrated between once a year and seven years depending on a combination of the following:
  - Type of meter;
  - How it is used (continuously, intermittently, or seasonally);
  - Whether the water source is clean or contains sand, grit, or weeds.
- Receipt of the meter manufacturers', and any laboratory that adjusts the meter, certification stating the accuracy of the meter.

Redrow Site Management Teams must:

- Ensure safe access is available to the meters to allow for inspections and readings.
- Facilitate the third-party specialist (currently AJR Management Ltd) in providing meter readings.

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## WATER MANAGEMENT

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- Retain any water meter calibration certificates for site (not plots) in in **Section 12** of the **CPHSEP**.
- Record, in line with permits covering water usage, environmental data for abstracted water as detailed in the Water Usage section of this **ROP**.
- Record waste effluent tankered off-site for disposal as non-hazardous waste. Quantities will be contained on the duty of care note and recorded in accordance with waste records.
- Collect data from plot meters at the point of handover with initial readings being gathered either from tags left with the meter or from the initial invoice. Where this is not possible contact the supplier for the reading.
- In the exceptional circumstance that readings are not taken at plot meters, contact the utility reading contractor, who will ensure meter readings are taken at the earliest opportunity. As a last resort, readings are taken on the next quarterly cycle.

**N.B.** Where a plot, site or office is using an unmetered water supply or where the water supply type being used on site is not known, supply estimations are to be used, this is to be done by the third-party contractor collection samples.

Group Sustainability Department must:

- Collate the information received from the designated third-party specialist who capture utility data, to ascertain total water usage across Redrow.

### Water Pollution Prevention Plan

Redrow Site Management Teams must:

- Order a **Water Pollution Prevention Plan (HSE0025)** noticeboard via the Brand Portal prior to the site commencing. An example of both the board and content is available in **Appendix 3** of this **ROP**.
- Develop the **Water Pollution Prevention Plan** in accordance with the information contained in the Water Management section of the site **CEMP**.
- Complete the **Water Pollution Prevention Plan (HSE0025)** noticeboard in accordance with the key displayed on the board (example shown below of key). The plan should include all facilities on site, both Redrow and all contractor's information in accordance with the key e.g., Contractors' fuel tank
- Display the noticeboard in a prominent position on site where members of the workforce can review and reference when needed.
- Review and update the noticeboard in accordance with any changes onsite e.g., moving mortar silos, diesel tanks, spill kits, etc.
- Make sure all contractors are aware of the detail contained on the **Water Management Plan** noticeboard and the water management requirements within the **CEMP**.
- Liaise with the Divisional Technical Teams to ensure the **Water Management Plan** is suitable and sufficient. Where there are site changes, the plan may need updating to include the current site layout.
- Use the noticeboard as a focal point for briefings regarding water management onsite.



# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

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### SALES

#### General Requirements

Divisional Sales Director must ensure:

- They understand the requirements of this **ROP**, briefing all personnel to ensure they work in accordance with it.
- The water management procedures described in the site **CEMP** are adhered to.
- Water usage is kept to a minimum and reused wherever possible to reduce the impact on the environment and to achieve cost savings.
- Any actions or remediation identified as part of inspections and audits are implemented.
- Prompt reporting of any incident regarding water management e.g., vehicle leaking in the sale office car park. All incidents must be recorded on RedHSE. For guidance on recording incidents on RedHSE please refer to **RedHSE – Guidance – How to Report an Accident or Incident (HSEMS0492)** which is in the HS&E document library on Engage.
- Timely, effective resolution of any incidents to prevent reoccurrence and that lessons learnt are shared with the Group Environmental Manager.
- That all Sales personnel understand their responsibilities and the requirements of the **Construction Environmental Management Plan (CEMP)** which includes requirements for use of water and the management of water on the development they are working on.

#### Potable (Mains) Water

Divisional Sales Directors must ensure:

- All mains water is metered, with sub-meters, where necessary.
- Where there is no water meter contact the local Utility company who will install one.
- Safe access is available to the meters to allow for inspections and readings.
- That a competent contractor undertakes routine checks and an annual inspection to confirm there are no leaks.
- When requested, they provide meter readings to the third-party specialist who capture utility data on behalf of Redrow. This will be necessary where the third-party specialist has been unable to obtain the information themselves either by attending the location or via copies of invoices.

# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

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### CUSTOMER SERVICES

#### General Requirements

Head of Customer Services must ensure:

- They understand the requirements of this **ROP**, briefing all personnel to ensure they work in accordance with it.
- That site works are undertaken in accordance with the **CEMP**.
- The water management requirements described in the **CEMP** are adhered to.
- Water usage is kept to a minimum and reused wherever possible to reduce the impact on the environment and to achieve cost savings.
- Prompt reporting of any incident regarding water management e.g., release of contamination into a drain. All incidents must be recorded on RedHSE. For guidance on recording incidents on RedHSE please refer to **RedHSE – Guidance – How to Report an Accident or Incident (HSEMS0492)** which is in the HS&E document library on Engage.
- Timely, effective resolution of any incidents to prevent reoccurrence and that lessons learnt are shared with the Group Environmental Manager.
- All Customer Services personnel understand their responsibilities and the requirements of the **CEMP** which includes requirements for use of water and the management of water at the development they are working on.

# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

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### References

- Environmental Management Plan (EMP).
- RedHSE – Guidance – How to Report an Accident or Incident (HSEMS0492).
- Construction Environmental Management Plan (CEMP) (STF104).
- Environmental Permits and Obligations Register (STF097).
- Permit to Pump Standard Form (STF100).
- Inspection of Watercourses Standard Form (STF098).
- Daily Abstraction Volume Record Standard Form (STF099).
- Surface Water Management Plan (STF096).
- Water Pollution Prevention Plan (HSE0025).
- Construction Industry Research and Information Association (CIRIA) SuDS Guidance via [www.susdrain.org](http://www.susdrain.org).
- RPS 235: Treating and using water that contains concrete and silt at construction sites - (<https://www.gov.uk/government/publications/treating-and-using-water-that-contains-concrete-and-silt-at-construction-sites-rps-235/treating-and-using-water-that-contains-concrete-and-silt-at-construction-sites-rps-235>).
- RPS 261: Temporary dewatering from excavation to surface water - (<https://www.gov.uk/government/publications/temporary-dewatering-from-excavations-to-surface-water>).

### Appendices

**Appendix 1 – Water Management on Construction Sites Flow Chart**

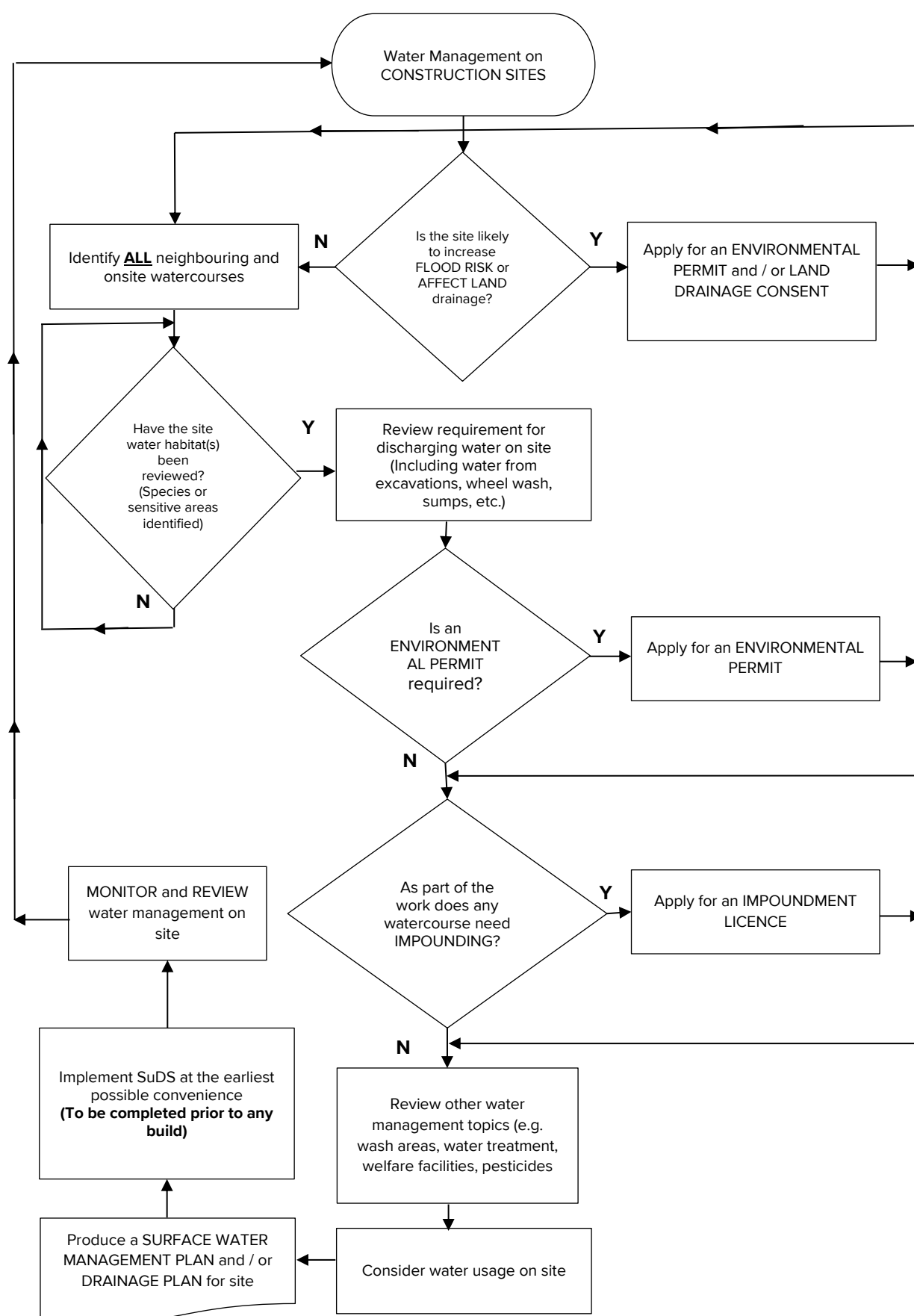
**Appendix 2 – Water Use Hierarchy**

**Appendix 3 – Water Pollution Prevention Plan Example**

# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

### Appendix 1 - Water Management on Construction Sites

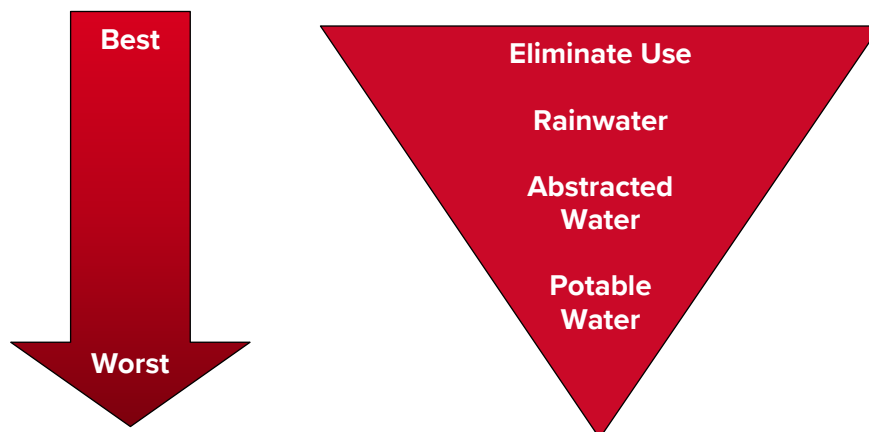


# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

### Appendix 2 – Water Usage Hierarchy

The diagram below highlights the preferred order for any use of water. This order promotes using the most sustainable sources of water and should be followed, wherever possible.



Rainwater (collected from site run-off) – where water is required this is the best option environmentally and offers cost savings too.

Use abstracted water (from either river or ground water, in conjunction with permit, as required) as an alternative or to support the use of rainwater use.


Potable (mains) water is the least sustainable option and should be regarded as a last resort for operational water use. Mains water should only be used when other water sources are either inappropriate, insufficient, or unavailable (e.g., at times of low flow we are prevented from abstracting) or for welfare facilities.

It is worth noting, however, that the most sustainable method for reducing water consumption is to try to design out its use from our processes. Water use should therefore be limited to a 'needs must' basis; however other procedures and processes should not be compromised to deliver this.

# REDROW OPERATING PROCEDURE


## WATER MANAGEMENT

### Appendix 3 – Water Pollution Prevention Plan Example



## WATER POLLUTION PREVENTION PLAN

### 500 CHISWICK HIGH ROAD, LONDON



SITE/PHASE LAYOUT DISPLAYED HERE

**PLANNING TO PREVENT POLLUTION:**

Please mark **areas to protect** in blue:

- WATER Watercourses  
(incl. rivers, streams, brooks, sea, estuary, lakes and ponds)
- SOAK Soakaways
- O/F Outfalls
- I/L Inlets
- SW Surface water drains near to all potential sources of pollution

Please mark **potential sources of pollution** in red:

- DIESEL Diesel Tanks
- MORTAR Mortar Silos
- CONC. Concrete wash out area
- WASH Wheel / jet / plant wash area
- CHEM Other fuel/chemical storage
- WASTE Waste compound
- /// Potential for silt to occur  
(stripped areas, stockpiles, excavations)

Please mark **spill materials** in green:


- S/K Spill kit locations

Please mark in black:

- Direction of fall of site
- SM Silt management  
(fences, bales, settlement etc.)


UPDATED ON: \_\_\_\_/\_\_\_\_/\_\_\_\_

UPDATED BY: \_\_\_\_\_



**BUILDING RESPONSIBLY**

BECAUSE IT MATTERS



**REDROW**

# REDROW OPERATING PROCEDURE

## WATER MANAGEMENT

### PLANNING TO PREVENT POLLUTION:

Please mark **areas to protect** in blue:

- WATER** Watercourses  
(incl. rivers, streams, brooks, sea, estuary, lakes and ponds)
- SOAK** Soakaways
- O/F** Outfalls
- I/L** Inlets
- SW** Surface water drains near to all potential sources of pollution

Please mark **potential sources of pollution** in red:

- DIESEL** Diesel Tanks
- MORTAR** Mortar Silos
- CONC.** Concrete wash out area
- WASH** Wheel / jet / plant wash area
- CHEM** Other fuel/chemical storage
- WASTE** Waste compound
- Potential for silt to occur**  
(stripped areas, stockpiles, excavations)

Please mark **spill materials** in green:

- S/K** Spill kit locations

Please mark in black:

- Direction of fall of site**
- SM** Silt management  
(fences, bales, settlement etc.)

UPDATED ON: \_\_\_\_/\_\_\_\_/\_\_\_\_

UPDATED BY: \_\_\_\_\_

## SURFACE WATER MANAGEMENT PLAN

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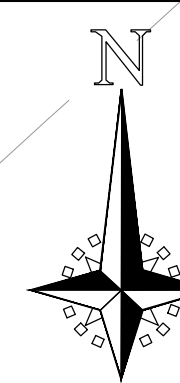
### Appendix B – Engineering Drawings

DRAFT









- GENERAL NOTES**
1. Do Not Scale.
  2. The contractor is to check and verify all buildings and site dimensions and levels, including sewer invert levels, before works start on site. The contractor is to comply in all aspects with the current building legislation, British Standards, building regulations etc.
  3. Positions of existing services/statutory undertakers apparatus adjacent to or crossing proposed excavations are to be checked by the contractor prior to starting work.
  4. This drawing is to be read in conjunction with and checked against all other drawings, Engineering Details, Specification and any structural, geotechnical or other specialist document provided.
  5. Any anomaly or contradiction between any of the above is to be reported to Redrow Homes.
  6. This drawing is schematic for clarity only, positions of pipe runs and manholes may vary on site due to site conditions.
  7. All works for adoption under a Section 104 agreement shall be carried out to the National Water Council guide "Sewers for Adoption" 7th edition and Dwr Cymru Welsh Water requirements.

- GENERAL DRAINAGE NOTES**
1. All private drainage shall be in accordance with BS8301 and relevant sections of Approved Document H of the Building Regulations.
  2. The contractor is to check the level of existing sewers being used as outfalls or crossing proposed drainage runs PRIOR to laying any pipes. Any discrepancies are to be reported to the Engineer.
  3. Private house drainage will be flexible jointed plastic or clay pipework (Diameter 100mm unless shown otherwise).
  4. All connections for House Drainage shall be 100mm unless noted otherwise and must extend 500mm behind the back of footway/homezone road. All connections when laid shall be plugged, protected as necessary and marked with a stake for future use. All drainage laterals from the adoptable drainage system to be 150mm dia. unless connecting to the head of a 100mm dia. FWS.
  5. For private drains where cover to pipes is less than 900mm in vehicular areas or 600mm in other areas protection in the form of a 100mm thick concrete pad shall be provided over the pipe granular surround.
  6. Where pipes pass through screen walls, footings or retaining walls it is to be provided over. Under buildings pipes shall be surrounded with 150mm thickness of granular material. Where drains pass within 1m of buildings the wall foundation shall be taken down below the invert of the pipe.
  7. Where drains do not exist or are damaged, plastic or clay access fittings minimum diameter 225mm shall be used. Elsewhere proprietary plastic or precast concrete inspection chambers shall be used. Unless shown otherwise FWS inspection chambers are to be 600mm below dpc level and SW chambers and rodding eyes to be 420mm below dpc.
  8. All gullies and rainwater downpipes connected directly to drains are to be roddable.
  9. Levels of drainage access points are inverts.
  10. Where possible, drainage runs should be laid at a minimum of 3.0m from the rear of properties where practical to allow for future extensions.
  11. All drainage shall be laid upstream and each run between manholes shall be laid complete prior to backfilling. Where this is not practical trial holes or other means of identifying the line and level of services shall be carried out prior to works commencing.
  12. All branch drains, or connections, are to discharge to the collectors obliquely, and in the direction of the main flow.
  13. All low spots on hardstanding areas to have yard gullies/ACO.
  14. All manholes/inspection chambers located within trafficked areas to have minimum of B125 covers. (M40) in all highway areas.
  15. Backdrop to be used where pipe gradient exceeds 1:5 or lateral clothes with main sewer.
  16. Where gully is located with no level, ground worker to create low spot for water to run off to, typically 25mm lower.
  17. Steps to be maximum of 150mm rise for Part M Access: up to 200mm elsewhere.
  18. Where groundwater is encountered within S&B features, the feature itself is to be wrapped in impermeable membrane.
  19. First chamber to borewater verge to be 1.35m deep, refer to borewater standard details.

- KEY**
- FOUL SEWER & MANHOLE (S104)
  - SURFACE WATER SEWER & MANHOLE (SAB)
  - BACK DROP (MAX 1:5) - SEE NOTE 15
  - SAB ADAPTABLE STORM DRAIN
  - PRIVATE STORM DRAIN (100mm UNLESS SHOWN OTHERWISE)
  - PRIVATE FOUL DRAIN (100mm UNLESS SHOWN OTHERWISE)
  - 450mm FOUL INSPECTION CHAMBER
  - 600mm DEEP UNLESS NOTED OTHERWISE
  - 600mm PRIVATE FOUL INSPECTION CHAMBER
  - 600mm DEEP UNLESS NOTED OTHERWISE
  - 450mm STORM INSPECTION CHAMBER
  - 600mm DEEP UNLESS NOTED OTHERWISE
  - 600mm STORM INSPECTION CHAMBER
  - 600mm DEEP UNLESS NOTED OTHERWISE
  - PROPOSED HEADWALL

- PROPOSED SPOT LEVEL**
- FFL LEVEL**
- PROPOSED RETAINING WALL**
- PROPOSED GRAVEL BOARD**
- PROPOSED UNDERBUILD**
- TANKING**
- PROPOSED WATER BREAK INLET**
- PROPOSED OVERFLOW GULLY**
- STONE GRP - 100mm TO REAR GARDENS AROUND PATIOS**
- STONE GRP - 150mm TO HIGH SIDE OF RETAINING WALL**
- FIN DRAIN**
- SEL DISTRIBUTION UNIT**
- LINEAR DRAINAGE CHANNEL**
- DELINEATION KERB**
- PERFORATED DELINEATION KERB**
- SEL 'RANTANNA' DOWN PIPE**
- SEL 'RANTANNA' DOWN PIPE**
- RAIN WATER BUTT**
- BIORETENTION VERGE**
- BIORETENTION VERGE - OUTSIDE OF THIS PHASE**
- SAB ADAPTABLE PERMEABLE PAVING**
- PRIVATE PERMEABLE MACADAM**
- PERMEABLE MACADAM**

- SURVEYED ROUTE OF 11KV SERVICE**
- PROPOSED STREET LIGHTING**
- U 04.04.24 STREET LIGHT COLUMN RELOCATED TO FRONT OF PLOT 356.
- T 29.02.24 RANTANNA PIPE FIXED UP TO REAR OF PLOT 344.
- E 08.11.24 ENGINEERING MINDED TO PLOTS 345 - 417.
- R 13.12.23 STREET LIGHTING COLUMNS UPDATED AS PER REVISED DESIGN.
- L 13.11.23 LANE DRAINAGE ADDED TO REAR GARDENS.
- Revisions
- Project: Llanwrn Village Hollies 3
- Client:

Drawing: The Hollies 3 Engineering Plan - Sheet 2

Scale: 1:250 @ A0 Date: Feb 2021 Drawn by: NL

Drawing No: 10275 - 100 - 02 Rev: U

**PHOENIX DESIGN**  
Partnership Ltd.

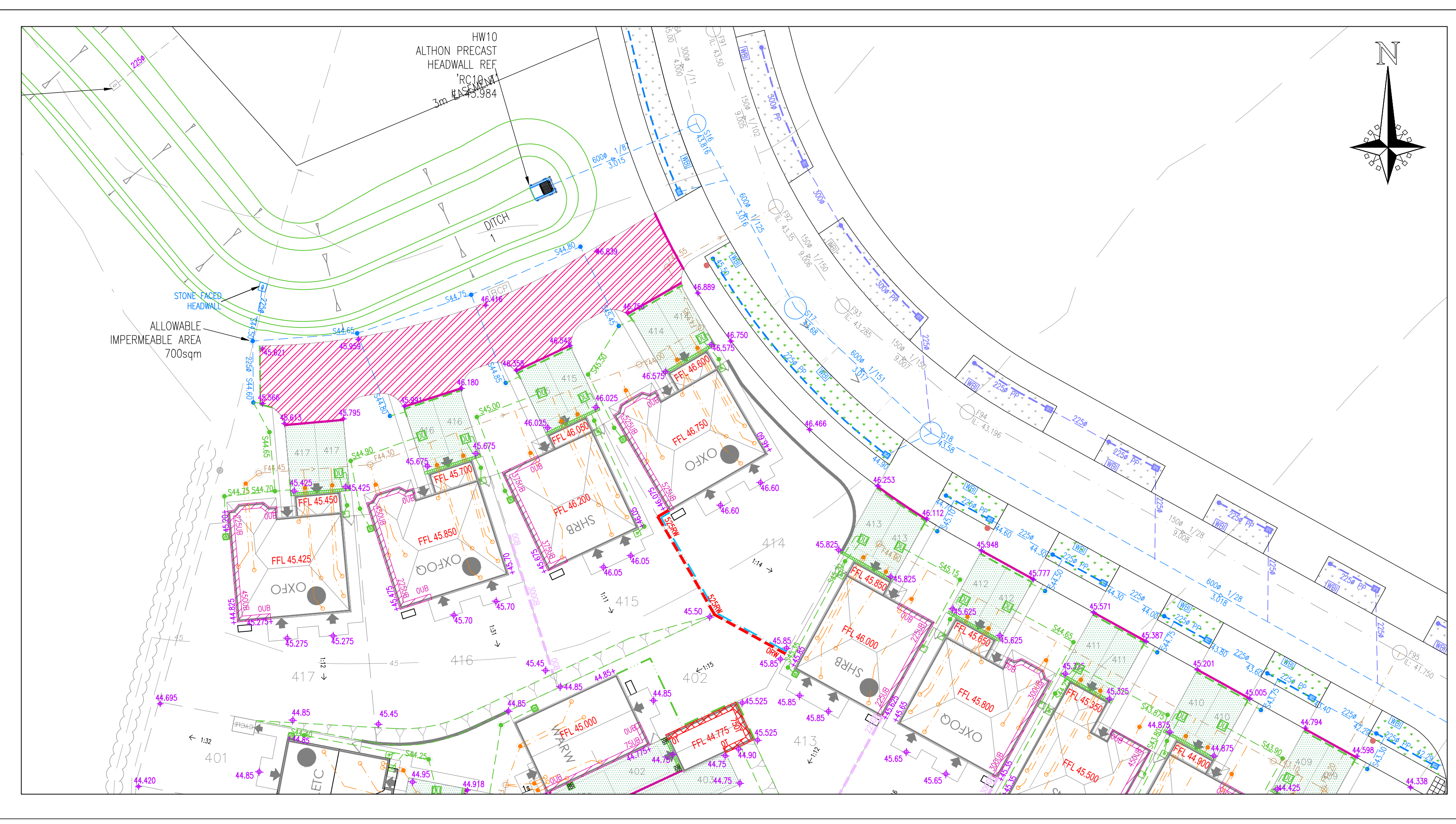
Unit 2, Windermere Garage, Manxway, Bury, Greater Manchester, M9 1JH  
Unit 2, Main Concreting Business, Parton, Upper Road, Bury, Greater Manchester, M9 1JH

0161 629 0000 0161 629 0001  
0161 629 0002 0161 629 0003

This drawing is the copyright of Phoenix Design Partnership Ltd. No liability will be accepted for amendments by others to either the printed or digital format.

Orig Status: **FOR CONSTRUCTION**

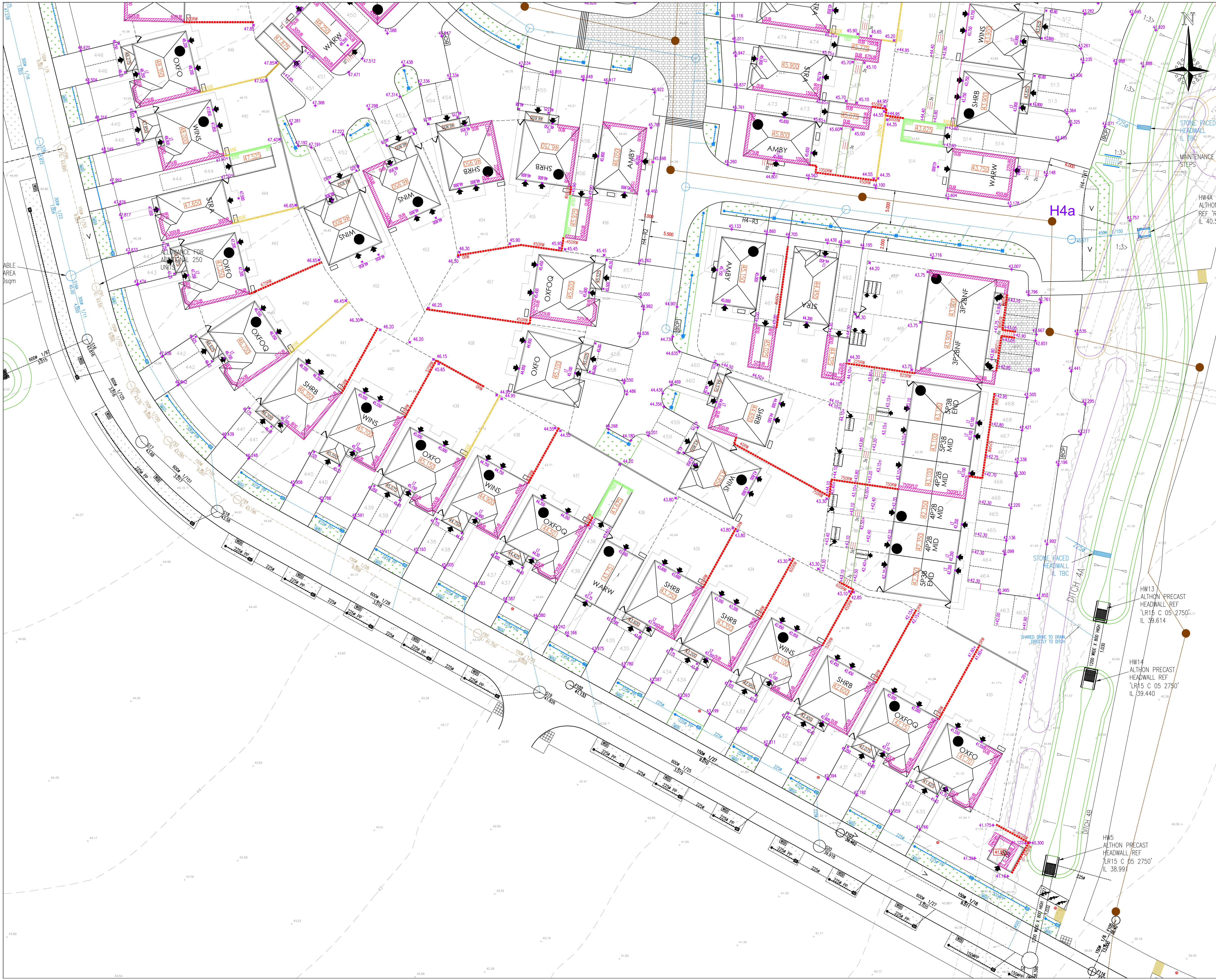
- DESIGN NOTES**
1. Bus stops locations to be agreed with NCC.
  2. Section 278 by others including diverting of existing ditch.
  3. Plot drainage for ALL Windermere & HA units need updating following receipt of drainage points and rain water pipes.
  4. RWP to discharge directly to aco/gully when located in same space.











- GENERAL NOTES**
1. Do Not Scale
  2. The contractor is to check and verify all buildings and site dimensions and levels, including sewer invert levels, before works start on site. The contractor is to comply in all aspects with the current building legislation, British Standards, building regulations etc.
  3. Positions of existing services/utility underground apparatus adjacent to or crossing proposed excavations are to be checked by the contractor prior to starting work
  4. This drawing is to be read in conjunction with and checked against all other drawings, Engineering Details, Specification and any structural, geotechnical or other specialist document provided.
  5. Any anomaly or contradiction between any of the above is to be reported to Redrow Homes
  6. This drawing is schematic for clarity only, positions of pipe runs and manholes may vary on site due to site conditions.
  7. All works for adoption under a Section 104 agreement shall be carried out to the National Water Council guide 'Sewers for Adoption' 7th edition and Dwr Cymru Welsh Water requirements.

- GENERAL DRAINAGE NOTES**
1. All private drainage shall be in accordance with BS8301 and relevant sections of Approved Document H of the Building Regulations.
  2. The contractor is to check the level of existing sewers being used as outfalls or crossing proposed drainage runs PRIOR to laying any pipes. Any discrepancies are to be reported to the Engineer
  3. Private house drainage will be flexibly jointed plastic or clay pipework. Diameter 100mm unless shown otherwise.
  4. All connections for House Drainage shall be 100mm unless noted otherwise and must extend 500mm behind the back of footway/homezone road. All connections when laid shall be plugged, protected as necessary and marked with a stake for future use. All drainage laterals from the adoptable drainage system to be 150mm dia. unless connecting to the head of a 100mm dia. FWS.
  5. For private drains where cover to pipes is less than 900mm in vehicular areas or 600mm in other areas protection in the form of a 100mm thick concrete pad shall be provided over the pipe granular surround.
  6. Where pipes pass through screen walls, footings or retaining walls lintels are to be provided over. Under buildings pipes shall be surrounded with 150mm thickness of granular material. Where drains pass within 1m of buildings the wall foundation shall be taken down behind the invert of the pipe.
  7. Where drains do not exceed 600mm deep, plastic or clay access fittings minimum diameter 225mm shall be used. Elsewhere proprietary plastic or precast concrete inspection chambers shall be used. Unless shown otherwise FW inspection chambers are to be 600mm below dpc level and SW chambers and rodding eyes to be 450mm below dpc.
  8. All gullies and rainwater downpipes connected directly to drains are to be roddable.
  9. Levels of drainage access points are inverts.
  10. Where possible, drainage runs should be laid at a minimum of 3.0m from the rear of properties where practical to allow for future extensions.
  11. All drainage shall be laid upstream and each run between manholes shall be laid complete prior to backfilling. Where this is not practical trial holes or other means of identifying the line and level of services shall be carried out prior to works commencing.
  12. All branch drains, or connections, are to discharge to the collectors obliquely, and in the direction of the main flow.
  13. All low spots on hardstanding areas to have yard gullies/ACO.
  14. All manholes/ inspection chambers located within trafficked areas to have minimum of B125 covers, D400 in all highway areas.
  15. Backdrop to be used where pipe gradient exceeds 1:5 or lateral clashes with main sewer.
  16. Where gully is located with no level, ground worker to create low spot for water to run off to, typically 25mm lower.
  17. Steps to be maximum of 150mm riser for Part M Access. up to 200mm elsewhere
  18. Where groundwater is encountered within SAB features, the feature itself is to be wrapped in impermeable membrane

- DESIGN NOTES**
1. Drainage & ditches shown are indicative and subject to detailed design
  2. Sreet lighting shown is indicative and is subject to detailed design by others
  3. Bus stops locations to be agreed with NCC
  4. Section 278 by others including culverting of existing ditch

**KEY**

- FOUL SEWER & MANHOLE (S104)
- SURFACE WATER SEWER & MANHOLE (SAB)
- BACK DROP (MAX 1.5) - SEE NOTE 15
- PROPOSED SPOT LEVEL
- FFL 00.000
- FFL LEVEL
- PROPOSED RETAINING WALL
- PROPOSED SLAB ON EDGE
- PROPOSED UNDERBUILD
- TANKING
- PROPOSED OVERFLOW GULLY
- BIORETENTION VERGE
- BIORETENTION VERGE - OUTSIDE OF THIS PHASE

C 21.07.23 Latest tree plan added  
B 17.07.23 Engineering updated following layout review  
A 09.11.22 Engineering updated to suit planning comments and architectural layout

Revisions:  
Project: Llanwrn Village  
Client:



Drawing: Engineering Plan Sheet 2  
Scale: 1:250 @ A1 Date: December 2021 Drawn by: NL

Drawing No: 10275 - 300 - 02 Rev: C

**PHOENIX DESIGN**  
Partnership Ltd.  
Unit 9, Westway Garage, Marksbury, Bath, BA2 9HN  
Unit Three, Meini Corrog Business Parc, Upper Boat, Portypridd, CF37 5BE  
tel: 01781 479850 tel: 029 2049 0771  
email: enquiries@phoenixdp.co.uk www.phoenixdp.co.uk

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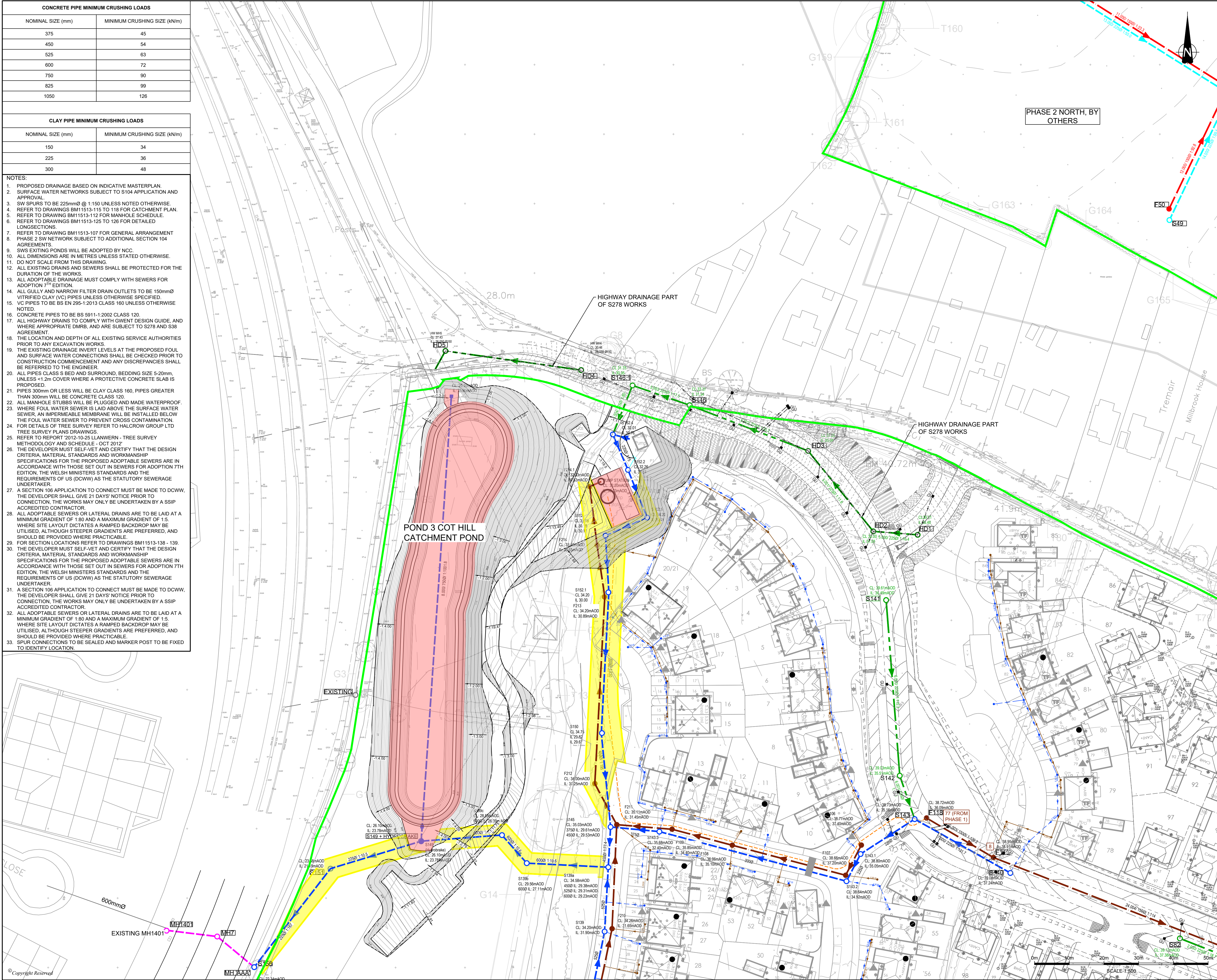
Org Status: PLANNING



CONCRETE PIPE MINIMUM CRUSHING LOADS	
NOMINAL SIZE (mm)	MINIMUM CRUSHING SIZE (kN/m)
375	45
450	54
525	63
600	72
750	90
825	99
1050	126

CLAY PIPE MINIMUM CRUSHING LOADS	
NOMINAL SIZE (mm)	MINIMUM CRUSHING SIZE (kN/m)
150	34
225	36
300	48

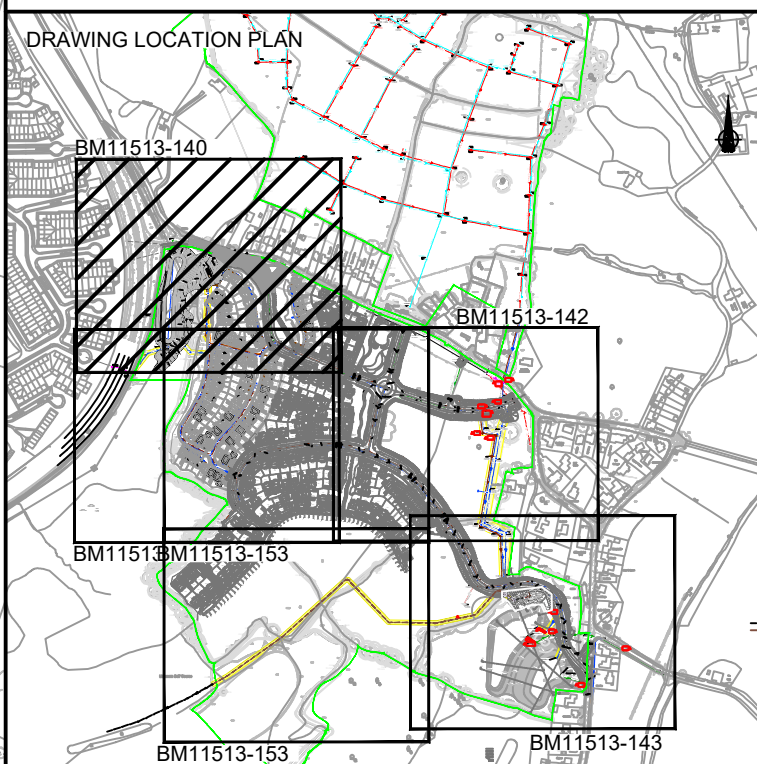
- NOTES:
- PROPOSED DRAINAGE BASED ON INDICATIVE MASTERPLAN.
  - SURFACE WATER NETWORKS SUBJECT TO S104 APPLICATION AND APPROVAL.
  - SW SPURS TO BE 225mmØ @ 1:150 UNLESS NOTED OTHERWISE. REFER TO DRAWINGS BM11513-115 TO 118 FOR CATCHMENT PLAN.
  - REFER TO DRAWING BM11513-112 FOR MANHOLE SCHEDULE.
  - REFER TO DRAWINGS BM11513-125 TO 126 FOR DETAILED LONGSECTIONS.
  - REFER TO DRAWING BM11513-107 FOR GENERAL ARRANGEMENT.
  - PHASE 2 SW NETWORK SUBJECT TO ADDITIONAL SECTION 104 AGREEMENTS.
  - SWS EXITING PONDS WILL BE ADOPTED BY NCC.
  - ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
  - DO NOT SCALE FROM THIS DRAWING.
  - ALL EXISTING DRAINS AND SEWERS SHALL BE PROTECTED FOR THE DURATION OF THE WORKS.
  - ALL ADOPTABLE DRAINAGE MUST COMPLY WITH SEWERS FOR ADOPTION 7<sup>TH</sup> EDITION.
  - ALL GULLY AND NARROW FILTER DRAIN OUTLETS TO BE 150mmØ VITRIFIED CLAY (VC) PIPES UNLESS OTHERWISE SPECIFIED.
  - VC PIPES TO BE BS EN 295-1:2013 CLASS 160 UNLESS OTHERWISE NOTED.
  - CONCRETE PIPES TO BE BS 5911-1:2002 CLASS 120.
  - ALL HIGHWAY DRAINS TO COMPLY WITH GWENT DESIGN GUIDE, AND WHERE APPROPRIATE DMRB, AND ARE SUBJECT TO S278 AND S38 AGREEMENT.
  - THE LOCATION AND DEPTH OF ALL EXISTING SERVICE AUTHORITIES PRIOR TO ANY EXCAVATION WORKS.
  - THE EXISTING DRAINAGE INVERT LEVELS AT THE PROPOSED FOUL AND SURFACE WATER CONNECTIONS SHALL BE CHECKED PRIOR TO CONSTRUCTION COMMENCEMENT AND ANY DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER.
  - ALL PIPES CLASS 5 BED AND SURROUND, BEDDING SIZE 5-20mm, UNLESS <1.2m COVER WHERE A PROTECTIVE CONCRETE SLAB IS PROPOSED.
  - PIPES 300mm OR LESS WILL BE CLAY CLASS 160, PIPES GREATER THAN 300mm WILL BE CONCRETE CLASS 120.
  - ALL MANHOLE STUBBS WILL BE PLUGGED AND MADE WATERPROOF.
  - WHERE FOUL WATER SEWER IS LAID ABOVE THE SURFACE WATER SEWER, AN IMPERMEABLE MEMBRANE WILL BE INSTALLED ABOVE THE FOUL WATER SEWER TO PREVENT CROSS CONTAMINATION.
  - FOR DETAILS OF TREE SURVEY REFER TO HALCROW GROUP LTD TREE SURVEY PLANS DRAWINGS.
  - REFER TO REPORT '2012-10-25 LLANWERN - TREE SURVEY METHODOLOGY AND SCHEDULE - OCT 2012'.
  - THE DEVELOPER MUST SELF-VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED ADOPTABLE SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN SEWERS FOR ADOPTION 7TH EDITION, THE WELSH MINISTERS STANDARDS AND THE REQUIREMENTS OF US (DCWW) AS THE STATUTORY SEWERAGE UNDERTAKER.
  - A SECTION 106 APPLICATION TO CONNECT MUST BE MADE TO DCWW, THE DEVELOPER SHALL GIVE 21 DAYS' NOTICE PRIOR TO CONNECTION, THE WORKS MAY ONLY BE UNDERTAKEN BY A SSIP ACCREDITED CONTRACTOR.
  - ALL ADOPTABLE SEWERS OR LATERAL DRAINS ARE TO BE LAID AT A MINIMUM GRADIENT OF 1:80 AND A MAXIMUM GRADIENT OF 1:5. WHERE SITE LAYOUT DICTATES A RAMPED BACKDROP MAY BE UTILISED, ALTHOUGH STEEPER GRADIENTS ARE PREFERRED, AND SHOULD BE PROVIDED WHERE PRACTICABLE.
  - FOR SECTION LOCATIONS REFER TO DRAWINGS BM11513-138 - 139.
  - THE DEVELOPER MUST SELF-VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED ADOPTABLE SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN SEWERS FOR ADOPTION 7TH EDITION, THE WELSH MINISTERS STANDARDS AND THE REQUIREMENTS OF US (DCWW) AS THE STATUTORY SEWERAGE UNDERTAKER.
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  - SPUR CONNECTIONS TO BE SEALED AND MARKER POST TO BE FIXED TO IDENTIFY LOCATION.



DO NOT SCALE FROM THIS DRAWING

KEY:

- RED LINE BOUNDARY
- PROPOSED ADOPTABLE SURFACE WATER SEWER
- PROPOSED ADOPTABLE PHASE 2 SURFACE WATER SEWER
- NON-ADOPTABLE SURFACE WATER SEWER
- HYDROBRAKE
- PROPOSED NON-S104 HYDROBRAKE
- PROPOSED EASEMENT
- PROPOSED HIGHWAY DRAIN
- EXISTING PUBLIC SURFACE WATER SEWER
- EXISTING FILTER DRAIN
- FLOW DATA (l/s), BASED ON SOUTHERN NETWORK 100YR +30%Q. NOTE THE FLOWS ARE AFFECTED BY SURCHARGING AND THEREFORE SHOULD BE USED AS A GUIDE ONLY.
- PROPOSED ADOPTABLE FOUL WATER SEWER
- PROPOSED ADOPTABLE PHASE 2 FOUL WATER SEWER
- NON-ADOPTABLE FOUL WATER SEWER
- PROPOSED RISING MAIN
- EXISTING PUBLIC FOUL WATER SEWER
- PROPOSED NON-S104 DIVERSION OF EXISTING FOUL WATER SEWER
- EXISTING PUBLIC FOUL WATER SEWER TO BE ABANDONED
- NO. OF PROPERTIES CONNECTING INTO MANHOLE (NOT CUMULATIVE)
- ADOPTABLE SURFACE WATER LATERAL & INSPECTION CHAMBER (SUPPLIED BY THINKURBAN)
- ADOPTABLE FOUL WATER LATERAL & INSPECTION CHAMBER (SUPPLIED BY THINKURBAN)
- LAND TO BE TRANSFERRED TO WELSH WATER



R	Sheet 5 added	14/03/23	PK	JS	JS
Q	Drainage around Phase 2 updated to suit latest drainage information	27/09/19	LH	LH	KW
P	New Foul manhole added at compound. Cover levels amended at compound to suit new design levels.	26/07/16	LH	LH	KW
O	Manhole S143.3 invert level amended from 32.43 to 32.40 to suit as built information.	06/05/19	LH	LH	KW
N	Manhole S143.3 invert level amended to suit changes to required pipe gradients	30/06/19	LH	LH	KW
M	Additional Manholes added downstream of S145 to avoid RPO.	26/05/16	LH	LH	KW
L	Foul manhole F213 set back to revision J. Manhole F214 Amended to allow for connection for ThinkUrban Development.	22/05/16	LH	LH	KW
K	Foul Drainage Amended	22/05/19	CD	KW	KW
REVISION	DETAILS	DATE	DESIGNED	CHECKED	APPROVED
CLIENT					

REDROW HOMES

PROJECT

LLANWERN VILLAGE

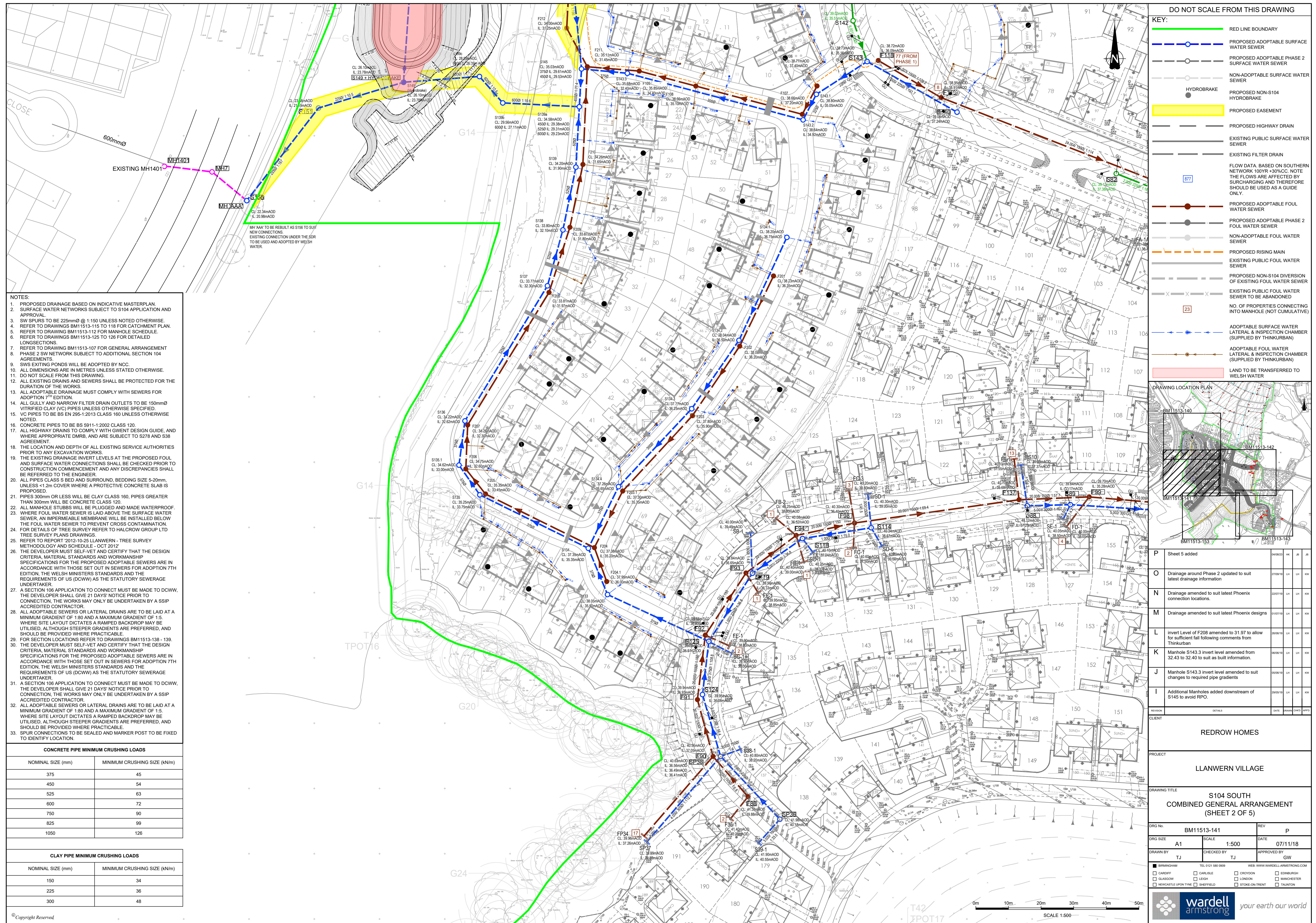
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S104 SOUTH COMBINED GENERAL ARRANGEMENT (SHEET 1 OF 5)

DRG No.	BM11513-140	REV	R
DRG SIZE	A1	SCALE	1:500
		DATE	07/11/18
DRAWN BY	TJ	CHECKED BY	TJ
		APPROVED BY	GW

WARDLE ARMSTRONG your earth our world









- CONSTRUCTION PACK**  
STATUS – ISSUED PENDING SECTION 278, 38, AND  
SECTION 106 APPROVALS.
- DRAINAGE DESIGN AMENDED SINCE S104 APPROVAL
- THIS DRAWING WILL BE SUBJECT TO CHANGE UPON  
FINAL NEWPORT CC, DCWW, NRW AND FRAP  
APPROVALS AND HAS BEEN ISSUED UNDER CLIENT  
INSTRUCTION.

DRAWING LOCATION PLAN

BM11513-140

BM11513-142

BM11513-141

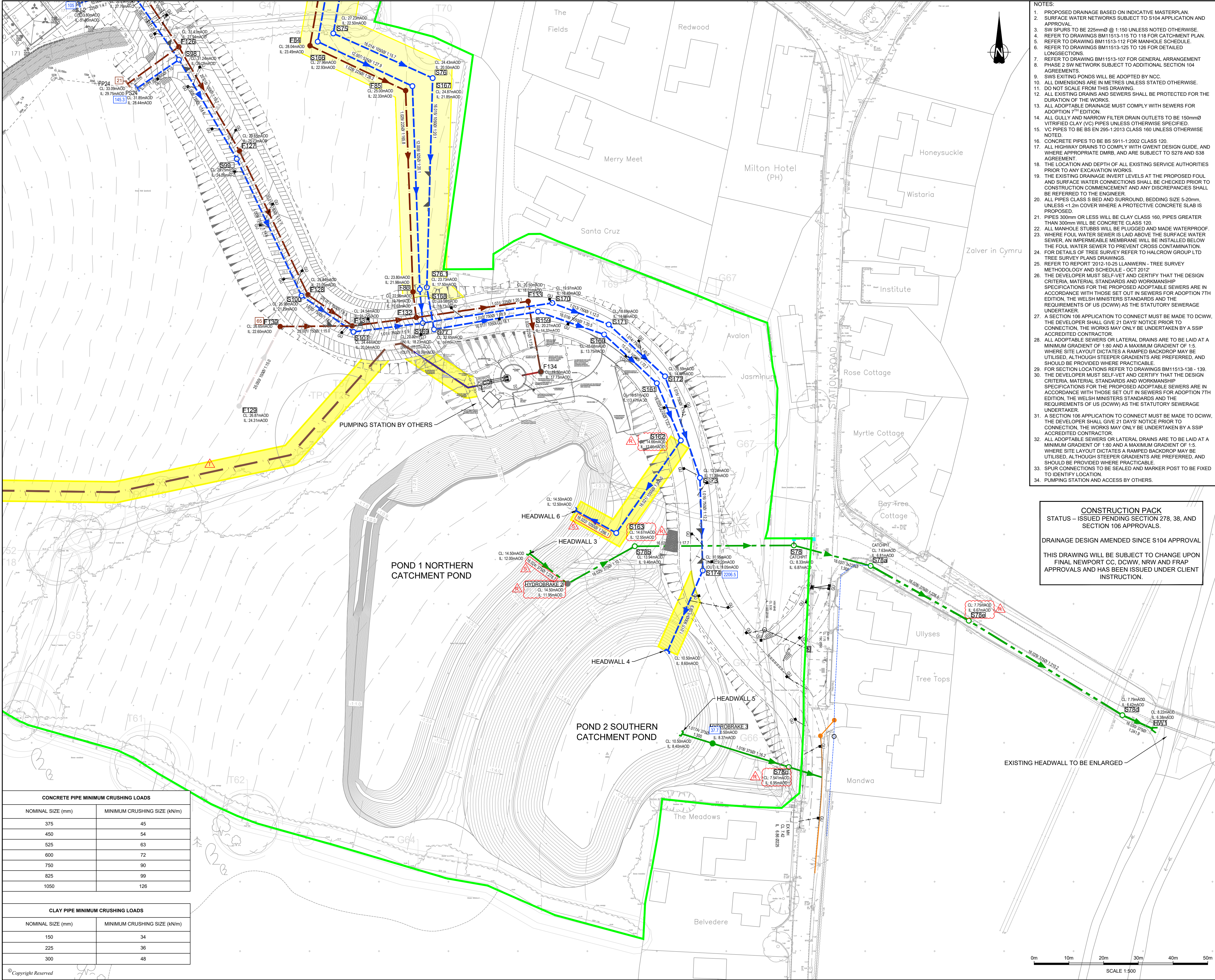
BM11513-153

BM11513-143

PROJECT			
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DRAWING TITLE			
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ORIG SIZE	SCALE	DATE	07/11/18
DRAWN BY	CHECKED BY	APPROVED BY	
TJ	TJ	GW	
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CLAY PIPE MINIMUM CRUSHING LOADS	
NOMINAL SIZE (mm)	MINIMUM CRUSHING SIZE (kN/m)
150	34
225	36
300	48





- NOTES:
1. PROPOSED DRAINAGE BASED ON INDICATIVE MASTERPLAN.
  2. SURFACE WATER NETWORKS SUBJECT TO S104 APPLICATION AND APPROVAL.
  3. SW SPURS TO BE 225mmØ @ 1:150 UNLESS NOTED OTHERWISE.
  4. REFER TO DRAWINGS BM11513-115 TO 118 FOR CATCHMENT PLAN.
  5. REFER TO DRAWING BM11513-112 FOR MANHOLE SCHEDULE.
  6. REFER TO DRAWINGS BM11513-125 TO 126 FOR DETAILED LONGSECTIONS.
  7. REFER TO DRAWING BM11513-107 FOR GENERAL ARRANGEMENT.
  8. PHASE 2 SW NETWORK SUBJECT TO ADDITIONAL SECTION 104 AGREEMENTS.
  9. SWS EXISTING PONDS WILL BE ADOPTED BY NCC.
  10. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
  11. DO NOT SCALE FROM THIS DRAWING.
  12. ALL EXISTING DRAINS AND SEWERS SHALL BE PROTECTED FOR THE DURATION OF THE WORKS.
  13. ALL ADOPTABLE DRAINAGE MUST COMPLY WITH SEWERS FOR ADOPTION 7TH EDITION.
  14. ALL GULLY AND NARROW FILTER DRAIN OUTLETS TO BE 150mmØ VITRIFIED CLAY (VC) PIPES UNLESS OTHERWISE SPECIFIED.
  15. VC PIPES TO BE BS EN 295-1:2013 CLASS 160 UNLESS OTHERWISE NOTED.
  16. CONCRETE PIPES TO BE BS 5911-1:2002 CLASS 120.
  17. ALL HIGHWAY DRAINS TO COMPLY WITH GWENT DESIGN GUIDE, AND WHERE APPROPRIATE DMRB, AND ARE SUBJECT TO S278 AND S38 AGREEMENT.
  18. THE LOCATION AND DEPTH OF ALL EXISTING SERVICE AUTHORITIES PRIOR TO ANY EXCAVATION WORKS.
  19. THE EXISTING DRAINAGE INVERT LEVELS AT THE PROPOSED FOUL AND SURFACE WATER CONNECTIONS SHALL BE CHECKED PRIOR TO CONSTRUCTION COMMENCEMENT AND ANY DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER.
  20. ALL PIPES CLASS S BED AND SURROUND, BEDDING SIZE 5-20mm, UNLESS <1.2m COVER WHERE A PROTECTIVE CONCRETE SLAB IS PROPOSED.
  21. PIPES 300mm OR LESS WILL BE CLAY CLASS 160. PIPES GREATER THAN 300mm WILL BE CONCRETE CLASS 120.
  22. ALL MANHOLE STUBBS WILL BE PLUGGED AND MADE WATERPROOF.
  23. WHERE FOUL WATER SEWER IS LAID ABOVE THE SURFACE WATER SEWER, AN IMPERMEABLE MEMBRANE WILL BE INSTALLED BELOW THE FOUL WATER SEWER TO PREVENT CROSS CONTAMINATION.
  24. FOR DETAILS OF TREE SURVEY REFER TO HALCROW GROUP LTD TREE SURVEY PLANS DRAWINGS.
  25. REFER TO REPORT 2012-10-25 LLANWERN - TREE SURVEY METHODOLOGY AND SCHEDULE - OCT 2012.
  26. THE DEVELOPER MUST SELF-VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED ADOPTABLE SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN SEWERS FOR ADOPTION 7TH EDITION, THE WELSH MINISTERS STANDARDS AND THE REQUIREMENTS OF US (DCWW) AS THE STATUTORY SEWERAGE UNDERTAKER.
  27. A SECTION 106 APPLICATION TO CONNECT MUST BE MADE TO DCWW. THE DEVELOPER SHALL GIVE 21 DAYS' NOTICE PRIOR TO CONNECTION. THE WORKS MAY ONLY BE UNDERTAKEN BY A SSIP ACCREDITED CONTRACTOR.
  28. ALL ADOPTABLE SEWERS OR LATERAL DRAINS ARE TO BE LAID AT A MINIMUM GRADIENT OF 1:80 AND A MAXIMUM GRADIENT OF 1:5. WHERE SITE LAYOUT DICTATES A RAMPED BACKDROP MAY BE UTILISED, ALTHOUGH STEEPER GRADIENTS ARE PREFERRED, AND SHOULD BE PROVIDED WHERE PRACTICABLE.
  29. FOR SECTION LOCATIONS REFER TO DRAWINGS BM11513-136 - 139.
  30. THE DEVELOPER MUST SELF-VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED ADOPTABLE SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN SEWERS FOR ADOPTION 7TH EDITION, THE WELSH MINISTERS STANDARDS AND THE REQUIREMENTS OF US (DCWW) AS THE STATUTORY SEWERAGE UNDERTAKER.
  31. A SECTION 106 APPLICATION TO CONNECT MUST BE MADE TO DCWW. THE DEVELOPER SHALL GIVE 21 DAYS' NOTICE PRIOR TO CONNECTION. THE WORKS MAY ONLY BE UNDERTAKEN BY A SSIP ACCREDITED CONTRACTOR.
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  33. SPUR CONNECTIONS TO BE SEALED AND MARKER POST TO BE FIXED TO IDENTIFY LOCATION.
  34. PUMPING STATION AND ACCESS BY OTHERS.

CONSTRUCTION PACK  
STATUS – ISSUED PENDING SECTION 278, 38, AND  
SECTION 106 APPROVALS.

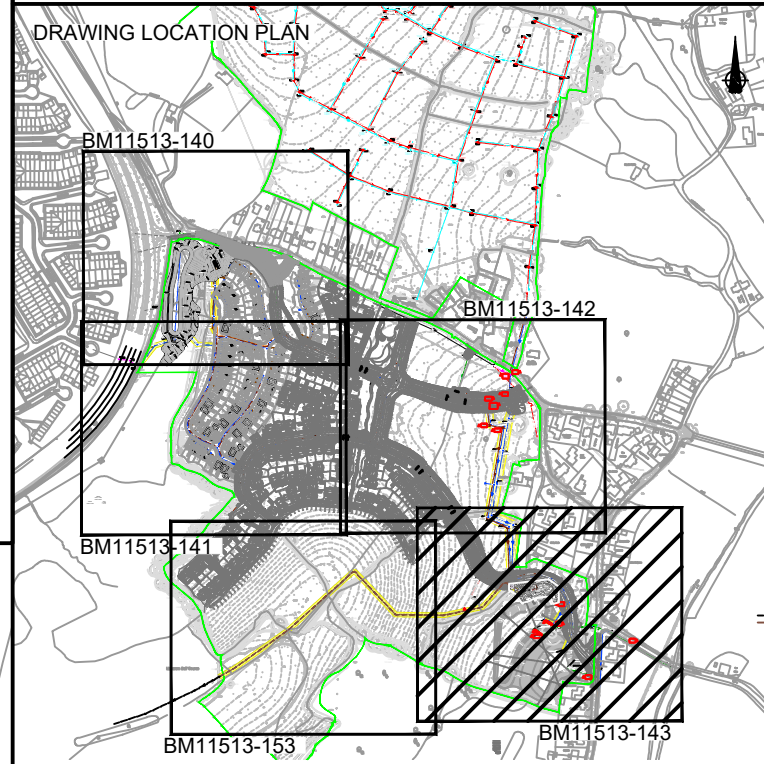
DRAINAGE DESIGN AMENDED SINCE S104 APPROVAL

THIS DRAWING WILL BE SUBJECT TO CHANGE UPON  
FINAL NEWPORT CC, DCWW, NRW AND FRAP  
APPROVALS AND HAS BEEN ISSUED UNDER CLIENT  
INSTRUCTION.

DO NOT SCALE FROM THIS DRAWING

KEY:

- RED LINE BOUNDARY
- PROPOSED ADOPTABLE SURFACE WATER SEWER
- PROPOSED ADOPTABLE PHASE 2 SURFACE WATER SEWER
- NON-ADOPTABLE SURFACE WATER SEWER
- PROPOSED NON-S104 HYDROBRAKE
- PROPOSED EASEMENT
- PROPOSED HIGHWAY DRAIN
- EXISTING PUBLIC SURFACE WATER SEWER
- EXISTING FILTER DRAIN
- FLOW DATA, BASED ON SOUTHERN NETWORK 100YR +30%CC. NOTE THE FLOWS ARE AFFECTED BY SURCHARGING AND THEREFORE SHOULD BE USED AS A GUIDE ONLY.
- PROPOSED ADOPTABLE FOUL WATER SEWER
- PROPOSED ADOPTABLE PHASE 2 FOUL WATER SEWER
- NON-ADOPTABLE FOUL WATER SEWER
- PROPOSED RISING MAIN
- EXISTING PUBLIC FOUL WATER SEWER
- PROPOSED NON-S104 DIVERSION OF EXISTING FOUL WATER SEWER
- EXISTING PUBLIC FOUL WATER SEWER TO BE ABANDONED
- PROPOSED RISING MAIN
- NO. OF PROPERTIES CONNECTING INTO MANHOLE (NOT CUMULATIVE)
- HIGH CAPACITY DRAINAGE CHANNEL



T	Rising main route added, sheet 5 added	06/09/23	JK	JK	JK
S	Pond layout updated Headwall 3 and 6 locations updated	08/03/22	CD	JK	JK
R	New route to northern pond per clients comments Southern pond discharges to high capacity drainage channel as per clients comments	16/11/21	CD	KW	KW
Q	F84 IL Raised	17/09/21	CD	KW	KW
P	S172 IL raised	08/09/21	CD	KW	KW
O	F84, F85 and F132 Cover Levels Updated S166, S167 and S169 Cover Levels Updated	08/09/21	CD	KW	KW
N	Levels at S100 and S101 reverted to levels from REV 1	08/09/21	CD	KW	KW
M	Drainage layout has been updated	20/09/21	CD	KW	KW
L	Construction issue status update	22/05/21	HRK	KW	KW
K	SWECO Pump Station design amended. Cover Levels to S77, S100, S101, S169, S170 and F133 amended.	20/03/21	LH	LH	KW
REVISION	DETAILS	DATE	DRAWN	CHECK	APPROV

REDROW HOMES

PROJECT

LLANWERN VILLAGE

DRAWING TITLE

S104 SOUTH  
COMBINED GENERAL ARRANGEMENT  
(SHEET 4 OF 5)

DRG No. BM11513-143

REV T

DRG SIZE A1

SCALE 1:500

DATE 07/11/18

DRAWN BY TJ

CHECKED BY TJ

APPROVED BY GW

BRIDGEMAN TEL 0121 580 0909 WEB WWW.WARDELL-ARMSTRONG.COM

CARDIFF CARLISLE CROYDON EDINBURGH  
GLASGOW LEIGH LONDON MANCHESTER  
NEWCASTLE UPON TYNE SHEFFIELD STOKES-ON-TRENT TAUNTON

wardell armstrong your earth our world

CONCRETE PIPE MINIMUM CRUSHING LOADS	
NOMINAL SIZE (mm)	MINIMUM CRUSHING SIZE (kN/m)
375	45
450	54
525	63
600	72
750	90
825	99
1050	126

CLAY PIPE MINIMUM CRUSHING LOADS	
NOMINAL SIZE (mm)	MINIMUM CRUSHING SIZE (kN/m)
150	34
225	36
300	48



- NOTES:
1. PROPOSED DRAINAGE BASED ON INDICATIVE MASTERPLAN.
  2. SURFACE WATER NETWORKS SUBJECT TO S104 APPLICATION AND APPROVAL.
  3. SW SPURS TO BE 225mmØ @ 1:150 UNLESS NOTED OTHERWISE.
  4. REFER TO DRAWINGS BM11513-115 TO 118 FOR CATCHMENT PLAN.
  5. REFER TO DRAWING BM11513-112 FOR MANHOLE SCHEDULE.
  6. LONG SECTIONS
  7. REFER TO DRAWING BM11513-107 FOR GENERAL ARRANGEMENT
  8. PHASE 2 SW NETWORK SUBJECT TO ADDITIONAL SECTION 104 AGREEMENTS.
  9. SWS EXISTING PONDS WILL BE ADOPTED BY NCC.
  10. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
  11. DO NOT SCALE FROM THIS DRAWING.
  12. ALL EXISTING DRAINS AND SEWERS SHALL BE PROTECTED FOR THE DURATION OF THE WORKS.
  13. ALL ADAPTABLE DRAINAGE MUST COMPLY WITH SEWERS FOR ADOPTION 7<sup>TH</sup> EDITION.
  14. ALL GULLY AND NARROW FILTER DRAIN OUTLETS TO BE 150mmØ VITRIFIED CLAY (VC) PIPES UNLESS OTHERWISE SPECIFIED.
  15. VC PIPES TO BE BS EN 205-1:2013 CLASS 160 UNLESS OTHERWISE NOTED.
  16. CONCRETE PIPES TO BE BS 5911-1:2002 CLASS 120.
  17. ALL HIGHWAY DRAINS TO COMPLY WITH GWENT DESIGN GUIDE, AND WHERE APPROPRIATE DMRS, AND ARE SUBJECT TO S278 AND S38 AGREEMENT.
  18. THE LOCATION AND DEPTH OF ALL EXISTING SERVICE AUTHORITIES PRIOR TO ANY EXCAVATION WORKS.
  19. THE EXISTING DRAINAGE INVERT LEVELS AT THE PROPOSED FOUL AND SURFACE WATER CONNECTIONS SHALL BE CHECKED PRIOR TO CONSTRUCTION COMMENCEMENT AND ANY DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER.
  20. ALL PIPES CLASS S BED AND SURROUND, BEDDING SIZE 5-20mm, UNLESS <1.2m COVER WHERE A PROTECTIVE CONCRETE SLAB IS PROPOSED.
  21. PIPES 300mm OR LESS WILL BE CLAY CLASS 160, PIPES GREATER THAN 300mm WILL BE CONCRETE CLASS 120.
  22. ALL MANHOLE STUBBS WILL BE PLUGGED AND MADE WATERPROOF.
  23. WHERE FOUL WATER SEWER IS LAID ABOVE THE SURFACE WATER SEWER, AN IMPERMEABLE MEMBRANE WILL BE INSTALLED BELOW THE FOUL WATER SEWER TO PREVENT CROSS CONTAMINATION.
  24. FOR DETAILS OF TREE SURVEY REFER TO HALCROW GROUP LTD TREE SURVEY PLANS DRAWINGS.
  25. REFER TO REPORT '2012-10-25 LLANWERN - TREE SURVEY METHODOLOGY AND SCHEDULE - OCT 2012'
  26. THE DEVELOPER MUST SELF-VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED ADAPTABLE SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN SEWERS FOR ADOPTION 7TH EDITION, THE WELSH MINISTERS STANDARDS AND THE REQUIREMENTS OF US (DCWW) AS THE STATUTORY SEWERAGE UNDERTAKER.
  27. A SECTION 106 APPLICATION TO CONNECT MUST BE MADE TO DCWW, THE DEVELOPER SHALL GIVE 21 DAYS' NOTICE PRIOR TO CONNECTION, THE WORKS MAY ONLY BE UNDERTAKEN BY A SSIP ACCREDITED CONTRACTOR.
  28. ALL ADAPTABLE SEWERS OR LATERAL DRAINS ARE TO BE LAID AT A MINIMUM GRADIENT OF 1:80 AND A MAXIMUM GRADIENT OF 1:5, WHERE SITE LAYOUT DICTATES A RAMPED BACKDROP MAY BE UTILISED, ALTHOUGH STEEPER GRADIENTS ARE PREFERRED, AND SHOULD BE PROVIDED WHERE PRACTICABLE.
  29. FOR SECTION LOCATIONS REFER TO DRAWINGS BM11513-138 - 139.
  30. THE DEVELOPER MUST SELF-VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED ADAPTABLE SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN SEWERS FOR ADOPTION 7TH EDITION, THE WELSH MINISTERS STANDARDS AND THE REQUIREMENTS OF US (DCWW) AS THE STATUTORY SEWERAGE UNDERTAKER.
  31. A SECTION 106 APPLICATION TO CONNECT MUST BE MADE TO DCWW, THE DEVELOPER SHALL GIVE 21 DAYS' NOTICE PRIOR TO CONNECTION, THE WORKS MAY ONLY BE UNDERTAKEN BY A SSIP ACCREDITED CONTRACTOR.
  32. ALL ADAPTABLE SEWERS OR LATERAL DRAINS ARE TO BE LAID AT A MINIMUM GRADIENT OF 1:80 AND A MAXIMUM GRADIENT OF 1:5, WHERE SITE LAYOUT DICTATES A RAMPED BACKDROP MAY BE UTILISED, ALTHOUGH STEEPER GRADIENTS ARE PREFERRED, AND SHOULD BE PROVIDED WHERE PRACTICABLE.
  33. SPUR CONNECTIONS TO BE SEALED AND MARKER POST TO BE FIXED TO IDENTIFY LOCATION.
  34. PUMPING STATION AND ACCESS BY OTHERS.

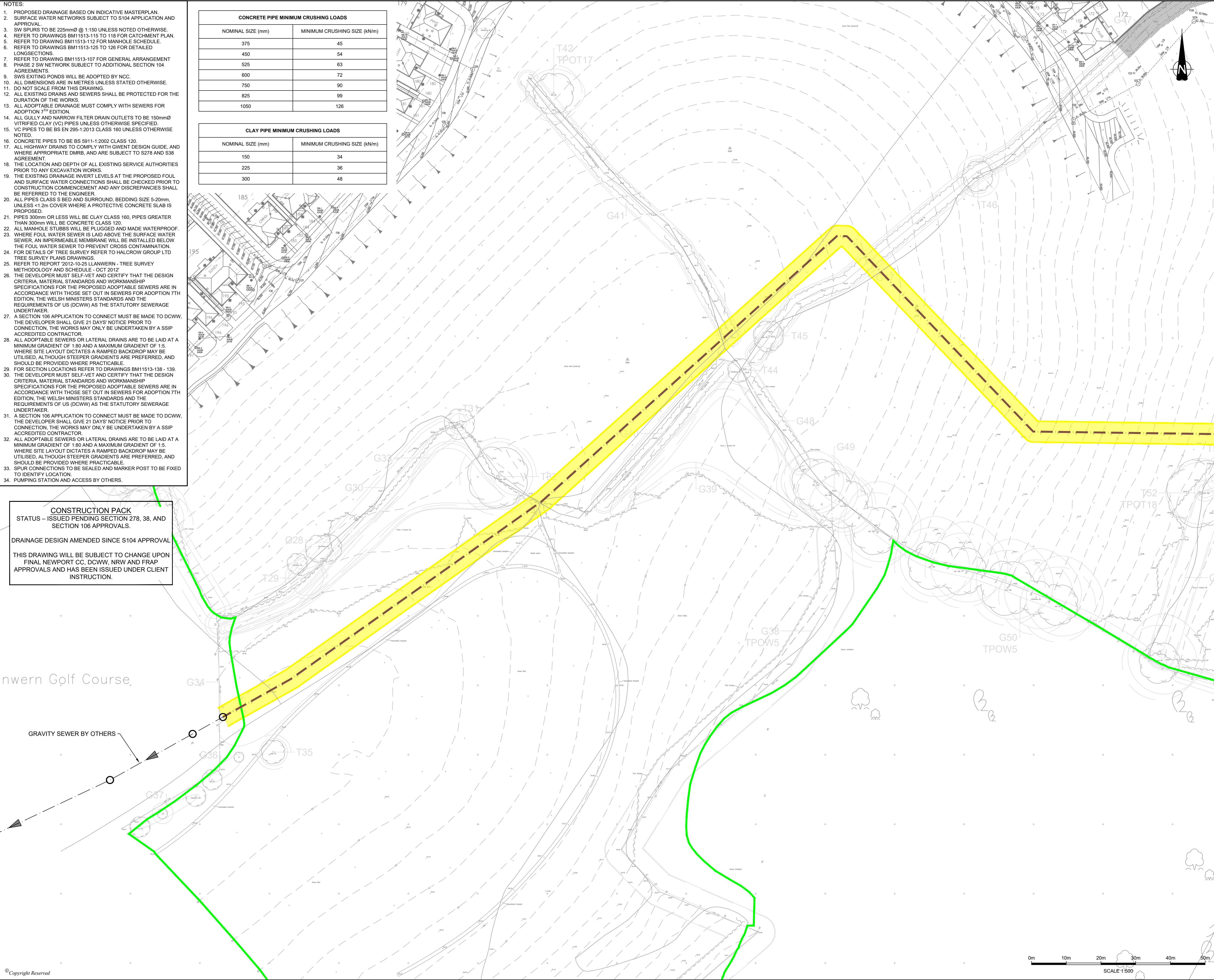
CONSTRUCTION PACK  
STATUS – ISSUED PENDING SECTION 278, 38, AND  
SECTION 106 APPROVALS.

DRAINAGE DESIGN AMENDED SINCE S104 APPROVAL

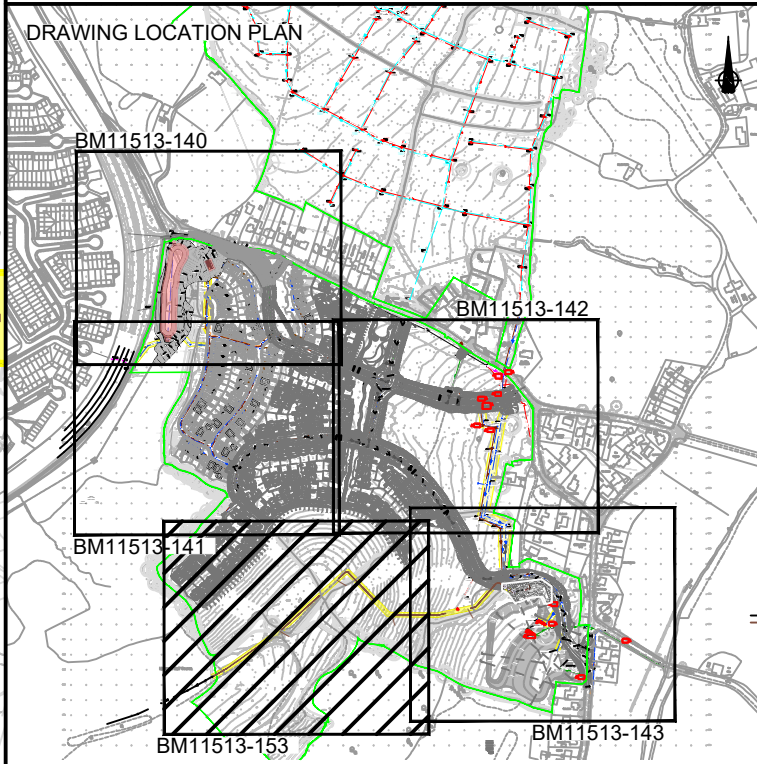
THIS DRAWING WILL BE SUBJECT TO CHANGE UPON  
FINAL NEWPORT CC, DCWW, NRW AND FRAP  
APPROVALS AND HAS BEEN ISSUED UNDER CLIENT  
INSTRUCTION.


CONCRETE PIPE MINIMUM CRUSHING LOADS	
NOMINAL SIZE (mm)	MINIMUM CRUSHING SIZE (kN/m)
375	45
450	54
525	63
600	72
750	90
825	99
1050	126

CLAY PIPE MINIMUM CRUSHING LOADS	
NOMINAL SIZE (mm)	MINIMUM CRUSHING SIZE (kN/m)
150	34
225	36
300	48



- DO NOT SCALE FROM THIS DRAWING
- KEY:
- RED LINE BOUNDARY
  - PROPOSED ADAPTABLE SURFACE WATER SEWER
  - PROPOSED ADAPTABLE PHASE 2 SURFACE WATER SEWER
  - NON-ADAPTABLE SURFACE WATER SEWER
  - HYDROBRAKE
  - PROPOSED NON-S104 HYDROBRAKE
  - PROPOSED EASEMENT
  - PROPOSED HIGHWAY DRAIN
  - EXISTING PUBLIC SURFACE WATER SEWER
  - EXISTING FILTER DRAIN
  - FLOW DATA, BASED ON SOUTHERN NETWORK 100YR +30%CC. NOTE THE FLOWS ARE AFFECTED BY SURCHARGING AND THEREFORE SHOULD BE USED AS A GUIDE ONLY.
  - PROPOSED ADAPTABLE FOUL WATER SEWER
  - PROPOSED ADAPTABLE PHASE 2 FOUL WATER SEWER
  - NON-ADAPTABLE FOUL WATER SEWER
  - PROPOSED RISING MAIN
  - EXISTING PUBLIC FOUL WATER SEWER
  - PROPOSED NON-S104 DIVERSION OF EXISTING FOUL WATER SEWER
  - EXISTING PUBLIC FOUL WATER SEWER TO BE ABANDONED
  - PROPOSED RISING MAIN
  - NO. OF PROPERTIES CONNECTING INTO MANHOLE (NOT CUMULATIVE)
  - HIGH CAPACITY DRAINAGE CHANNEL



A	First Issue DWG added to dwg series 140 - 143 Addition of RM and easement	04/08/23	HK	JB	JB
	REVISION	DETAILS	DATE	DRAWN	CHECK
CLIENT					
REDROW HOMES					
PROJECT					
LLANWERN VILLAGE					
DRAWING TITLE					
S104 SOUTH COMBINED GENERAL ARRANGEMENT (SHEET 5 OF 5)					
DRG No. BM11513-153			REV		
DRG SIZE A1		SCALE 1:500		DATE 20/07/23	
DRAWN BY HRK		CHECKED BY		APPROVED BY	
■ BIRMINGHAM TEL 0121 580 0909 WEB: WWW.WARDELL-ARMSTRONG.COM					
<input type="checkbox"/> CARDIFF		<input type="checkbox"/> CARLISLE		<input type="checkbox"/> CROYDON	
<input type="checkbox"/> GLASGOW		<input type="checkbox"/> LEIGH		<input type="checkbox"/> EDINBURGH	
<input type="checkbox"/> NEWCASTLE UPON TYNE		<input type="checkbox"/> SHEFFIELD		<input type="checkbox"/> MANCHESTER	
		<input type="checkbox"/> STOKES-ON-TRENT		<input type="checkbox"/> TAUNTON	
<div> wardell armstrong</div> <div>your earth our world</div>					



## SURFACE WATER MANAGEMENT PLAN

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### Appendix C - Frog Environmental Limited – Settlement Test

DRAFT

Frog reference	FR3099
Customer	Anthony Smith _ Redrow Homes
Site	Llanwern Village Development, Hen Chwarel Drive, Llanwern, Newport, NP18 2DG
Sample	Collected by LOD on Friday 13 <sup>th</sup> January 2023 – attenuation pond and standing water
Date	16 <sup>th</sup> January 2012
Lead Author	Leela O'Dea <a href="mailto:Leela@frogeenvironmental.co.uk">Leela@frogeenvironmental.co.uk</a>

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<b><i>Introduction</i></b>	<b>2</b>
<b><i>About Gel Flocculant</i></b>	<b>2</b>
<b><i>Test Process</i></b>	<b>3</b>
<b><i>Disclaimer</i></b>	<b>4</b>
<b><i>Results</i></b>	<b>4</b>
<b><i>Sample 2: Peat Hill</i></b>	<b>5</b>
<b><i>Summary of Results</i></b>	<b>6</b>
<b><i>Conclusions and next Steps</i></b>	<b>6</b>

## Introduction

Testing has been undertaken on a soil & water sample from the above-mentioned site. The testing process examines the rate of natural separation of solid fraction from water and helps inform the type of silt pollution control measures that may be required during Temporary Works.

frog environmental has a protocol in place that we will first examine the possibilities for treating water without the deployment of flocculants. Only when this avenue has been exhausted through testing and site investigation will frog suggest the use of a flocculant. For more information about the use of flocculants on construction sites, please follow the link: <https://www.frogenvironmental.co.uk/pollution-avoidance-and-mitigation/flocculant-use-on-a-construction-site/>

If test result show that a flocculant is required, there is a preference for working with the customer to develop gravity fed treatment systems. Gravity fed systems have several distinct advantages over pumped system:

- Reduced energy and carbon footprint
- Reduced fuel costs
- Reduced pump hire costs
- Reduced risk associated with refueling

A limitation of gravity fed treatment systems can be the effective mixing of flocculant with effluent. In these circumstances, forced mixing using a pumped flow of water can improve reaction times and settlement rates. Gravity fed systems are therefore not appropriate for every site.

## About Gel Flocculant

Gel Flocculant is an active silt control product applied in slow-release solid gel blocks. It is designed to separate liquid from solid. Gel Flocculant is stored in dehydrated state and only activates on contact with water. There are several different blends of Gel Flocculant frequently used in the UK and settlement testing establishes the most effective blend for the site in question. In some circumstances a combination of 2 different blends of Gel Flocculant may provide the most effective solid separation.

Gel Flocculant products applied in the UK are synthetic anionic polyacrylamides that also have a coagulating function.

For peer reviewed information regarding the safety of Gel Flocculant and its fate in the environment, a literature review is available from frog environmental upon request.

Management calculations to demonstrate the carry-over concentrations of three key substances; Acrylamide, Polyacrylamide Polyelectrolyte (PP) and Aluminium contained in Gel Flocculant are completed for every project to ensure compliance with relevant Environmental Quality Standards (EQS) for drinking water. These calculations are intentionally conservative and do not account for the factor of the dilution within the receiving waterbody nor any binding to the sediments. It is anticipated that any residual concentrations are present in very small concentrations.

Should there be specific environmental sensitivities, testing for acrylamide and aluminum concentrations in effluent can be undertaken as part of a management system to ensure thresholds are not breached. However, there are no UK laboratory tests available for polyelectrolytes.

## Test Process

The aim of testing is to record the natural separation of the solid fraction from water in controlled conditions. The control is tested against different Gel Flocculant blends with reaction times and type of floc produced noted. Where a control shows promise for effective natural settlement this will be recorded in the report and the customer advised of passive silt management interventions.

Once all Gel Flocculant blends have been tested, the most effective blend is photographed and included in the report, with the results of testing from other less effective blends omitted. The control is also photographed for comparison purposes.

Repeated agitation of the same sample gives a good indication for the reaction time required to settle solids from suspension. In each case an NTU reading is taken and shown in the key alongside a photographic record of the test. The level of agitation required for reaction helps to inform a deployment plan.

In some cases, Gel Flocculant will not be effective. Whilst cationic flocculants and liquid products are available, frog environmental do not supply these products for use in 'open' applications, such as surface water drainage from construction sites due to the associated environmental risks.

Where products tested by frog environmental are not effective this will be openly discussed with the client and support provided in objectively reviewing alternative pollution control interventions.

### Disclaimer

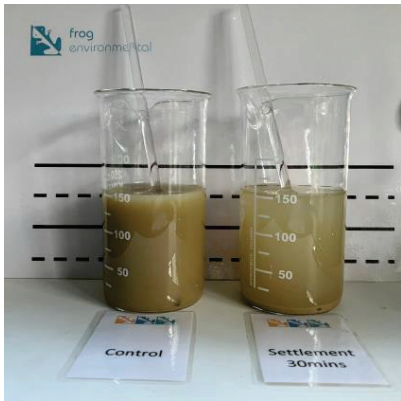
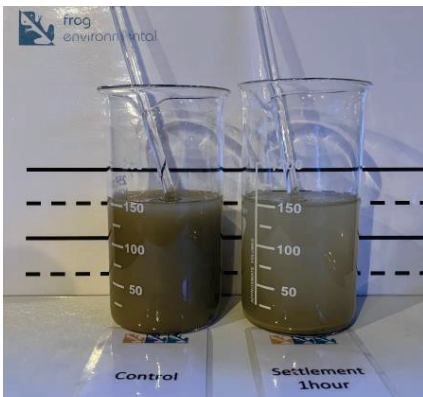
The use of flocculants on site requires permission from the local regulatory authority. Proceeding with deployment of gel flocculant without regulatory permission is not advised.

Whilst frog environmental provide advice on product specification and deployment, frog environmental is not in control of the construction site or any portion of the construction site at any time. frog environmental do not take responsibility for the quality of water discharging from site at any time and do not accept design liability for the efficacy of any water treatment systems that are developed as part of this report. Please refer to our full terms and conditions prior to procurement, as these will form part of any contract for supply of silt control products and services.

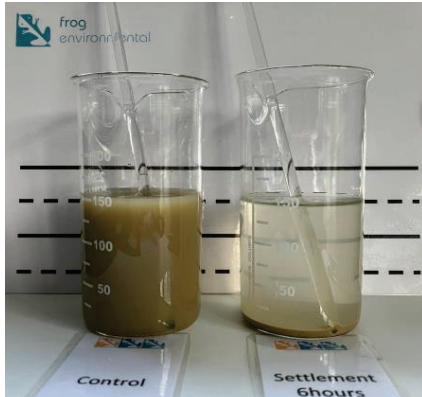
Any product specifications, technical drawings, sketches and site plans provided by frog environmental ltd in relation to this report are proposals and should be reviewed and approved by the Permanent Works Designer. All proposals are based on the best available data at the time of quotation.

Testing results are indicative and are reliant on the representative nature of samples. Most silt control systems require an element of fine tuning once installed to operate at optimal levels.

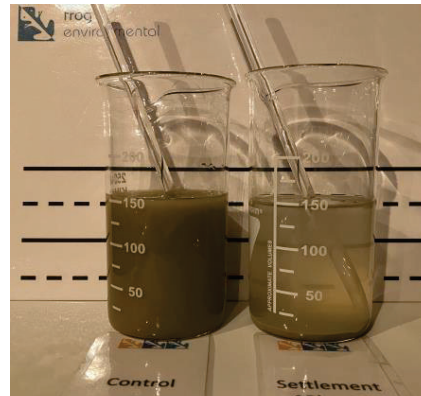
### Results

 <p>A. Control vs 30 min Settlement</p>	 <p>B. Control vs 1h Settlement</p>
<p>Turbidity &gt;1000 NTU to 922 NTU</p>	<p>Turbidity &gt;1000 NTU to 587 NTU</p>





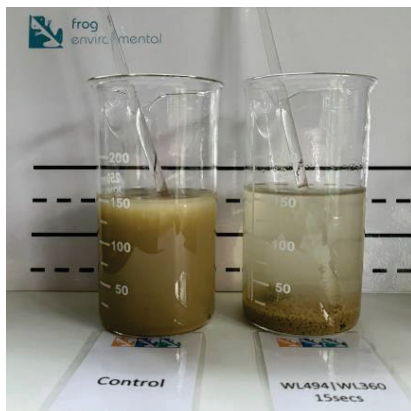
C. Control vs 6h Settlement



D. Control vs 12h Settlement

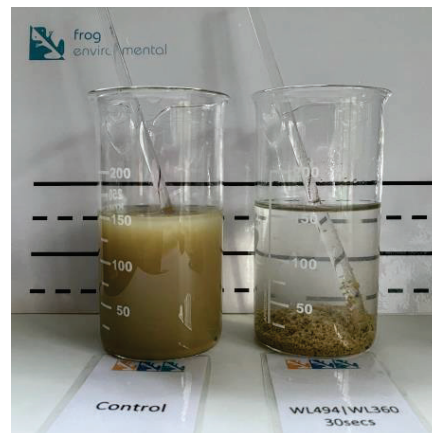
Turbidity  
>1000 NTU to 142 NTU

Turbidity  
>1000 NTU to 73 NTU



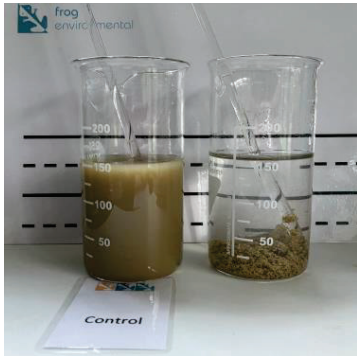
A. **Test 1** Control vs WL 494 / 360  
(15 seconds agitation plus 30 seconds  
settlement)

Turbidity  
>1000 NTU to 186 NTU



B. **Test 2** Control vs WL 494 / 360  
(further 15 second agitation from Test 1 plus 60  
seconds settlement)

Turbidity  
>1000 NTU to 60 NTU

 <p>C. <b>Test 3</b> Control vs WL 494 / 360        (further 15 second agitation from Test 2 plus        60 second settlement)</p>	
<p>Turbidity          &gt;1000 NTU to 47 NTU</p>	

## Summary of Results

Natural settlement at Llanwern village only had a marginal reduction in 30mins reducing from over 1000 NTU to 922 NTU. Whilst settlement for 1 hour and 6 hours respectively reduced the NTU to 587 and 142, both exceed the permitted requirement from Natural Resources Wales. However, if settlement for 12 to 24 hours can be achieved then the resulting turbidity is low at 73 and 23 NTU respectively.

Testing showed the most effective Gel Flocculant to be WL494 in combination with WL360. Therefore, the application of Gel Flocculant would be able to speed up the rate of settlement reducing the required attenuation time on site.

## Conclusions and next Steps

Physical settlement is extremely unlikely to achieve clear water at both Chang Hill and Peat Hill. Settlement Testing is a key factor when it comes to assessing the risk of a construction site causing a silt pollution event. However, there are other important factors to consider:

Factor	Why is it important?
Settlement characteristics of particle (defined by Settlement Test)	Defines how the silt particles behaves when in suspension with and without the application of Gel Flocculant

Water Attenuation areas and attenuation design	Attenuation areas slow the flow of water and allow time for silt or floc particles to settle out of suspension. If this can be done without use of flocculant, it should be.
Permitted Total Suspended Solids (TSS) value expressed in mg/l	Notes the quality of water acceptable for discharge.
The flow rate of effluent that requires treatment	Treatment solutions have differing effective treatment rates. Knowing the flow rate helps to come up with the most cost-effective approach.
Proximity and connectivity to watercourse(s)	Where does surface water from your site drain to? It is illegal to cause silt pollution or erosion at the point of discharge.
Knowledge and Experience on site	Skills and knowledge on site can help prevent a silt pollution incident or react quickly to mitigate one
Management Systems	Named roles and responsibilities on site helps a company to respond effectively to an incident.

There are 5 key components to a treatment system using Gel Flocculant:

1. **Mixing:** the mixing of effluent with Gel Flocculant, through passive or forced measures.
2. **Capturing:** trapping flocculated particles, either in attenuation features, Silt Capture Channels, or a combination of measures.
3. **Maintenance:** removing accreted silt from attenuation features or Silt Capture Channels
4. **Monitoring:** testing effluent quality to ensure compliance
5. **Optimise:** refine the system, scaling treatment up or down depending on the season, or the risk associated with a specific construction phase

More information on the deployment of Gel Flocculant is available from frog environmental.

To discuss next steps, contact: Leela O'Dea ([Leela@frogenvironmental.co.uk](mailto:Leela@frogenvironmental.co.uk))

## SURFACE WATER MANAGEMENT PLAN

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### Appendix D - Frog Environmental Limited – Environmental Calculations

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## Gel Flocculant Treatment System: Environmental Calculations

**Project:** Great Milton Park, Llanwern - Redrow Homes

### Overview

This sheet provides site specific assurance data for the "carry-over" of key elements to the environment from water treatment using gel flocculant blocks  
Calculations are derived from an estimated flow / treatment rate, forecast or known volumes of gel flocculant and compared against a worst case scenario release rate  
Worst case degradation rates are known from years of site trials, experience and technical review  
Carry over rates are compared to the most relevant Environmental Quality Standards (EQS)  
The approach is highly conservative, with worst case scenarios being adopted  
Carry Over Rates are prior to dilution within the receiving waterbody, nor do they take account of binding / capture within the subsequent methods of silt capture

### Site Data

Number of Gel Flocculant Blocks / Mats in system		Flow Rate	
Type	No.	Total Discharge Rate (L / min)	1,800
360	8	Hours run per day	24
494	8	Discharge per day (Litres)	2,592,000
394	0	Days until replacement of Blocks	90
398	0	Discharge in litres per set of blocks	233,280,000
Total	16		
Number of Floc Mats in system			20

### Aluminium

No. of Gel Flocculant (494)	Forced Mixing Degradation of Blocks in days (Pipe Reactor, typically >80 days)								Passive mixing degradation of blocks in days (drainage ditch/ drain/ culvert)					
	10	20	30	40	50	60	70	80	90	100	110	120	130	140
1	0.003	0.002	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.006	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000
3	0.009	0.005	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
4	0.012	0.006	0.004	0.003	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
5	0.015	0.008	0.005	0.004	0.003	0.003	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001
6	0.018	0.009	0.006	0.005	0.004	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.001	0.001
7	0.021	0.011	0.007	0.005	0.004	0.004	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002
8	0.024	0.012	0.008	0.006	0.005	0.004	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002
9	0.027	0.014	0.009	0.007	0.005	0.005	0.004	0.003	0.003	0.003	0.002	0.002	0.002	0.002

### Acrylamide

No. of Gel Flocculant blocks in	Forced Mixing Degradation of Blocks in days (Pipe Reactor, typically >80 days)								Passive mixing degradation of blocks in days (drainage ditch/ drain/ culvert)					
	10	20	30	40	50	60	70	80	90	100	110	120	130	140
16	0.161	0.080	0.054	0.040	0.032	0.027	0.023	0.020	0.018	0.016	0.015	0.013	0.012	0.011

### Polyelectrolyte

No. of Gel Flocculant blocks in	Forced Mixing Degradation of Blocks in days (Pipe Reactor, typically >80 days)								Passive mixing degradation of blocks in days (drainage ditch/ drain/ culvert)					
	10	20	30	40	50	60	70	80	90	100	110	120	130	140
16	0.640	0.320	0.213	0.160	0.128	0.107	0.091	0.080	0.071	0.064	0.058	0.053	0.049	0.046

### Project Specific Comparison: Carry Over Levels v Environmental Quality Standards

Discharge carry over aspect	EQS Value		Standard	Project Discharge Value	% below EQS
Aluminium	0.2	mg/l	Drinking Water Standard	0.003	7282.28%
Acrylamide	0.1	ug/l	Drinking Water Standard	0.018	82.14%
Polyelectrolyte	7.5	mg/l	Waste Water Treatment Standa	0.071	10439.76%





SUMMARY / NOTES:

Terms

The use of flocculants on construction sites requires permission from the environmental regulator.  
Proceeding with deployment of a flocculant without regulatory permission is not advised.  
Every construction site is different and whilst frog environmental provide site-specific proposals, frog environmental is not 'in control' of the construction site or any portion thereof at any time.  
frog environmental do not accept design liability for the efficacy of water treatment systems that are developed in conjunction with the customer.  
The quality and quantity of water discharged from site remains the sole responsibility of the customer at all times. Please refer to our full terms and conditions

## SURFACE WATER MANAGEMENT PLAN

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### Appendix E - Frog Environmental Limited – Gel Flocculant material safety data sheets (MSDS)

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## SAFETY DATA SHEET

Gel Flocculant 360

### SECTION 1: IDENTIFICATION OF MIXTURE AND COMPANY

#### 1.1 Product identifier

Gel Flocculant 360

CHEMICAL FAMILY: Polyacrylamide/polyacrylate polymer

CAS NUMBER: none identified

CHEMICAL NAME: none identified

#### 1.2 Relevant Identified Uses

Water treatment

### SECTION 2: HAZARDS IDENTIFICATION

#### 2.1. Classification

Not classified according to EU regulation 1272/2008 as implemented in The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use) (Amendment etc.) (EU Exit) Regulations 2019.

#### 2.2 Label elements

No labeling required

#### 2.3. Other hazards

No component meets the criteria of a PBT or vPvB substance according to EU regulation 1907/2006 as implemented in The REACH etc. (Amendment etc.) (EU Exit) Regulations 2019 (as amended)

### SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

There are no components present, within the current knowledge of the supplier that are classified as hazardous to health or the environment and present at concentrations that require reporting in this section.

### SECTION 4: FIRST AID MEASURES

#### 4.1. Description of first aid measures

##### General

Take proper precautions to ensure your own health and safety before attempting rescue and providing first aid.

##### Skin

Wash skin with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse. If irritation occurs get medical attention.

##### Inhalation

Remove exposed person to fresh air. Seek medical attention if the patient feels unwell.

##### Eye

Flush eyes with large amounts of water for at least 15 minutes, lifting eyelids to insure complete flushing of surface. Seek medical attention if irritation persists.

##### Ingestion

Keep at rest. Never give anything by mouth to an unconscious person. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Keep airway clear. Seek

#### 1.3 Supplier

*Frog Environmental Ltd*

*Business Contact*

*The Byre*

*0345 057 4040*

*Blackenhall Park*

#### Emergency Contact

Bar Lane

Staffordshire DE13 8AJ

0345 057 4040 (not 24 hours)

#### 24 Hour Emergency Contact

UK National Poisons Information Service: 0344 892 0111

medical attention.

#### 4.2. Most important symptoms and effects, both acute and delayed.

Signs and Symptoms of Acute Exposure

**Inhalation:** vapours, mists or dusts of the product may be irritating to the respiratory system. May irritate mouth, nose, and throat.

**Ingestion:** May cause irritation of the lining of the stomach.

**Skin:** Mild to moderate irritation can occur.

**Eyes:** Can cause mild to moderate irritation.

#### Chronic Health Effects

Prolonged or repeated contact may cause defatting and drying of the skin. Prolonged or repeated contact may cause discomfort and local redness. No known other chronic effects.

#### 4.3 Indication of any immediate medical attention and special treatment needed.

Treat symptomatically.

## SECTION 5: FIRE FIGHTING MEASURES

### 5.1. Extinguishing Media

Suitable: Use extinguishing media suitable for the surrounding fire.

Unsuitable: None.

### 5.2. Special hazards arising from the mixture

Hazardous Combustion Products: Carbon and Nitrogen Oxides (CO, CO<sub>2</sub>, NO<sub>x</sub>)

### 5.3. Advice for Firefighters

Protective Equipment/Clothing: Wear full protective clothing including positive pressure self-contained breathing apparatus.

Fire Fighting Guidance: Fight large fires from maximum distance or use unmanned hose handlers or monitor nozzles. Move containers from fire area if you can do it without risk. Cool containers with flooding quantities of water until after fire is out.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

Wear appropriate protective equipment (see section 8). Wet product and aqueous solutions of product are very slippery. Trace amounts of product on smooth surfaces can become extremely slippery when wet.

### 6.2 Environmental precautions

Prevent entry of concentrated solutions into waterways or sewers.

### 6.3. Methods and materials for containment and clear up

Sweep or scoop dry material and place in appropriate container. Absorb aqueous solutions with a dry inert material, such as clay, and place in an appropriate waste disposal container. After most of the material has been recovered, clean the area with warm, soapy water.

## SECTION 7: HANDLING AND STORAGE

### 7.1. Precautions for Safe Handling

Normal precautions common to good manufacturing practice should be followed in handling and storage. Open and handle container with care. Keep the containers closed when not in use. Avoid physical damage to blocks. Use appropriate personnel protective equipment (See section 8).. Avoid contact with eyes, skin, and clothing. Do not ingest. After handling, wash hands thoroughly with soap and water.

### 7.2. Conditions for safe storage, including any incompatibilities.

Store in a cool, dry area. Store in accordance with good industrial practices. Keep away from direct sunlight. Protect against physical damage.

## SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

### 8.1. Control parameters

None identified.

### 8.2. Exposure controls

#### 8.2.1. Engineering Controls

No specific measures required.

#### 8.2.2. Individual Personal Protection

**Eye Safety** glasses are required as a minimum. Use splash goggles or a face shield when eye contact due to splashing is possible.

**Skin:** Wear nitrile, butyl or Viton® gloves. The specification of glove depends on the work being undertaken; consult manufacturer's recommendations. Breakthrough times >480 mins (thickness ≥0.1 mm). When skin contact is possible for other than the hands, protective clothing including gloves, apron, sleeves, boots, head and face protection should be worn. Protective clothing must be cleaned thoroughly after each use.

**Respiratory:** No specific measures required.

**Thermal:** No hazard

**Additional Remarks:** Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing and wash thoroughly before reuse. Use care in walking on spilled material. Material spilled on hard surfaces can be a serious slipping/falling hazard.

### 8.2.3. Environmental exposure controls

No specific measures identified for normal handling and use.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

**Physical state:** Solid.

**Colour:** Green to white or off-white

**Odor:** Slight vinegar odour.

**Melting Point:** > 100 °C

**Boiling Point:** > 100 °C

**Flammability:** not flammable

**Lower/Upper Flammable Limit:** Not applicable

**Flash Point:** No Data Available

**Auto-Ignition temperature:** No data available

**Decomposition temperature:** No data available.

**pH:** 7 (concentration dependent)

**Viscosity:** Not applicable.

**Solubility (Water):** Soluble in water but dissolves very slowly.

**Partition Coefficient (KOW):** No Data Available.

**Vapor Pressure:** No data available

**Relative density:** ~1.1

**Vapour density:** No data available

**Particle characteristics:** Not applicable, bulk form

**Other information :** No relevant data identified

## SECTION 10: STABILITY AND REACTIVITY

### 10.1: Reactivity

No hazardous reactions identified. Does not react with air, water or other common materials.

### 10.2. Chemical Stability

This product is stable.

### 10.3. Possibility of hazardous reactions

None identified. Hazardous polymerization will not occur.

### 10.4. Conditions to Avoid

High temperatures.

### 10.5. Incompatible materials

Oxidising agents. Strong bases may cause the release of ammonia.

### 10.6. Hazardous Decomposition Products

Carbon and nitrogen oxides ( CO, CO<sub>2</sub> NO<sub>x</sub>)

## SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1. Information on hazard classes

**Acute Toxicity:** This product is of a low order of acute toxicity. Oral LD50 (Rat) >5000 mg/kg

**Skin Irritation:** Mild to moderate irritation can occur. Prolonged or repeated contact may cause defatting and drying of the skin

**Eye irritation:** Transient mild to moderate irritation can occur.

**Respiratory of skin sensitization:** No known effects.

**Germ cell mutagenicity:** No known effects

**Carcinogenicity:** No known effects

**Reproductive toxicity:** No known effects

**Specific target organ toxicity – single exposure:** No known effects

**Specific target organ toxicity – repeated exposure:** No known effects

**Aspiration hazard:** not applicable for solids

### 11.2. Other information

The substance is not expected to have endocrine disrupting properties. No other relevant information identified.

## SECTION 12: ECOLOGICAL INFORMATION

### 12.1. Ecotoxicity

Fish (*Oncorhynchus mykiss*): 96 hr  $LC_{50}$ : 140- 150 mg/L.

Invertebrates (*Daphnia magna*): 48 hr  $EC_{50}$ :  $\geq$  125 mg/L.

### 12.2. Persistence and Degradability

Not readily biodegradable but complete mineralization is expected under environmental exposure.

Degradation initialization and rate are dependent on UV levels.

### 12.3. Bioaccumulation potential

The product is not expected to bioaccumulate.

### 12.4. Mobility in soil

The product is designed to bind to sediment and soil, so it is not expected to suffer from leaching or mobility.

### 12.5. Results of the PBT assessment

This product does not meet the criteria of a PBT or vPvB substance.

### 12.6 Endocrine disrupting properties

The substance is not expected to have endocrine disrupting properties

### 12.7 Other adverse effects

None identified

## SECTION 13: DISPOSAL CONSIDERATIONS

**13.1 Waste treatment methods:** Dispose of all waste must be in accordance with all applicable national and local health and environmental regulations. Empty containers should be recycled or disposed of through an approved waste management facility.

## SECTION 14: TRANSPORT INFORMATION

**14.1: UN number:** Not applicable. The products is not classified as dangerous for transport.

**14.2: UN proper shipping name:** The products is not classified as dangerous for transport.

**14.3: Transport hazard classes:** Not applicable. The products is not classified as dangerous for transport

**14.4: Packing group:** Not applicable. The products is not classified as dangerous for transport

**14.5: Environmental hazards:** None identified.

**14.6: Special precautions for users:** None identified.

**14.7. Maritime transport in bulk:** Not applicable. The products is not classified as dangerous for transport

## SECTION 15: REGULATORY INFORMATION

### 15.1. Safety, health and environmental regulations/ legislation specific for the product

**EU REACH:** All components of this product have been registered with the European Chemicals Agency or are exempt from registration.

**U.S. TSCA Inventory Status:** All components of this product are either on the Toxic Substances Control Act (TSCA) Inventory List or exempt.

**Canadian DSL Inventory Status:** All components of this product are either on the Domestic Substances List (DSL), the Non-Domestic Substances List (NDSL) or exempt.

### 15.2. Chemical Safety Assessment

A chemical safety assessment has not been carried out for this product.

## **SECTION 16: OTHER INFORMATION**

DATE: December 2022: First issue:

### **DISCLAIMER OF RESPONSIBILITY**

Information contained in this publication, while accurate to the best knowledge and belief of Frog Environmental Ltd (FEL) is not intended and should not be construed as a warranty or representation for which FEL assumes any legal responsibility.

Any information or advice obtained from FEL otherwise than by means of this publication is also given in good faith. However, it remains at all times the responsibility of the customer to ensure that the product is suitable for the particular purpose intended. Conditions of use are beyond our control, and therefore users are responsible for verifying the data under their own operating conditions to determine whether the product is suitable for their particular purposes and they assume all risks of their use, handling, and disposal of the product.

FEL accepts no liability whatsoever (except as otherwise expressly provided by law) arising out of the use of information supplied, the application, adaptation or processing of the products described herein, the use of other materials in lieu of FEL materials or the use of FEL materials in conjunction with such other materials. The information in this safety data sheet relates only to the product designated herein, and does not relate to its use in combination with any other material.

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## SAFETY DATA SHEET

Gel Flocculant 494

### SECTION 1: IDENTIFICATION OF MIXTURE AND COMPANY

#### 1.1 Product identifier

Gel Flocculant 494

CHEMICAL FAMILY: Polyacrylamide polymer

CAS NUMBER: none identified

CHEMICAL NAME: none identified

#### 1.2 Relevant Identified Uses

Water treatment

#### 1.3 Supplier

*Frog Environmental Ltd*

*Business Contact*

*The Byre*

*0345 057 4040*

*Blackenhall Park*

#### Emergency Contact

Bar Lane

Staffordshire DE13 8AJ

0345 057 4040 (not 24 hours)

#### 24 Hour Emergency Contact

UK National Poisons Information Service: 0344 892 0111

### SECTION 2: HAZARDS IDENTIFICATION

#### 2.1. Classification

Not classified according to EU regulation 1272/2008 as implemented in The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use) (Amendment etc.) (EU Exit) Regulations 2019.

#### 2.2 Label elements

No labeling required

#### 2.3. Other hazards

No component meets the criteria of a PBT or vPvB substance according to EU regulation 1907/2006 as implemented in The REACH etc. (Amendment etc.) (EU Exit) Regulations 2019 (as amended)

### SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

There are no components present, within the current knowledge of the supplier that are classified as hazardous to health or the environment and present at concentrations that require reporting in this section.

### SECTION 4: FIRST AID MEASURES

#### 4.1. Description of first aid measures

##### General

Take proper precautions to ensure your own health and safety before attempting rescue and providing first aid.

##### Skin

Wash skin with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse. If irritation occurs get medical attention.

##### Inhalation

Remove exposed person to fresh air. Seek medical attention if the patient feels unwell.

##### Eye

Flush eyes with large amounts of water for at least 15 minutes, lifting eyelids to insure complete flushing of surface. Seek medical attention if irritation persists.

##### Ingestion

Keep at rest. Never give anything by mouth to an unconscious person. Do not induce vomiting. If

vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Keep airway clear. Seek medical attention.

#### 4.2. Most important symptoms and effects, both acute and delayed.

Signs and Symptoms of Acute Exposure

**Inhalation:** vapours, mists or dusts of the product may be irritating to the respiratory system. May irritate mouth, nose, and throat.

**Ingestion:** May cause irritation of the lining of the stomach.

**Skin:** Mild to moderate irritation can occur.

**Eyes:** Can cause mild to moderate irritation.

#### Chronic Health Effects

Prolonged or repeated contact may cause defatting and drying of the skin. Prolonged or repeated contact may cause discomfort and local redness. No known other chronic effects.

#### 4.3 Indication of any immediate medical attention and special treatment needed.

Treat symptomatically.



## SECTION 5: FIRE FIGHTING MEASURES

### 5.1. Extinguishing Media

Suitable: Use extinguishing media suitable for the surrounding fire..

Unsuitable: None.

### 5.2. Special hazards arising from the mixture

Hazardous Combustion Products: Carbon and Nitrogen Oxides (CO, CO<sub>2</sub>, NO<sub>x</sub>)

### 5.3. Advice for Firefighters

Protective Equipment/Clothing: Wear full protective clothing including positive pressure self-contained breathing apparatus.

Fire Fighting Guidance: Fight large fires from maximum distance or use unmanned hose handlers or monitor nozzles. Move containers from fire area if you can do it without risk. Cool containers with flooding quantities of water until after fire is out.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

Wear appropriate protective equipment (see section 8). Wet product and aqueous solutions of product are very slippery. Trace amounts of product on smooth surfaces can become extremely slippery when wet.

### 6.2 Environmental precautions

Prevent entry of concentrated solutions into waterways or sewers.

### 6.3. Methods and materials for containment and clear up

Sweep or scoop dry material and place in appropriate container. Absorb aqueous solutions with a dry inert material, such as clay, and place in an appropriate waste disposal container. After most of the material has been recovered, clean the area with warm, soapy water.

## SECTION 7: HANDLING AND STORAGE

### 7.1. Precautions for Safe Handling

Normal precautions common to good manufacturing practice should be followed in handling and storage. Open and handle container with care. Keep the containers closed when not in use. Avoid physical damage to blocks. Use appropriate personnel protective equipment (See section 8).. Avoid contact with eyes, skin, and clothing. Do not ingest. After handling, wash hands thoroughly with soap and water.

### 7.2. Conditions for safe storage, including any incompatibilities.

Store in a cool, dry area. Store in accordance with good industrial practices. Keep away from direct sunlight. Protect against physical damage.

## SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

### 8.1. Control parameters

None identified.

### 8.2. Exposure controls

#### 8.2.1. Engineering Controls

No specific measures required

#### 8.2.2. Individual Personal Protection

**Eye Safety:** glasses are required as a minimum. Use splash goggles or a face shield when eye contact due to splashing is possible.

**Skin:** Wear nitrile, butyl or Viton® gloves. The specification of glove depends on the work being undertaken; consult manufacturer's recommendations. Breakthrough times >480 mins (thickness ≥0.1 mm). When skin contact is possible for other than the hands, protective clothing including gloves, apron, sleeves, boots, head and face protection should be worn. Protective clothing must be cleaned thoroughly after each use.

**Respiratory:** No specific measures required.

**Thermal:** No hazard

**Additional Remarks:** Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing and wash thoroughly before reuse. Use care in walking on spilled material. Material spilled on hard surfaces can be a serious slipping/falling hazard.

### 8.2.3. Environmental exposure controls

No specific measures identified for normal handling and use.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

**Physical state:** Solid

**Colour:** Yellow to white or off-white

**Odor:** Slight vinegar odour

**Melting Point:** > 100 °C

**Boiling Point:** > 100 °C

**Flammability:** not flammable

**Lower/Upper Flammable Limit:** Not applicable

**Flash Point:** No data available

**Auto-Ignition temperature:** No data available

**Decomposition temperature:** No data available

**pH:** 5-7.5 (concentration dependent)

**Viscosity:** Not applicable

**Solubility (Water):** Soluble in water but dissolves very slowly

**Partition Coefficient (KOW):** No data available

**Vapor Pressure:** No data available

**Relative density:** ~1.1

**Vapour density:** No data available

**Particle characteristics:** Not applicable, bulk form

**Other information :** No relevant data identified

## SECTION 10: STABILITY AND REACTIVITY

### 10.1: Reactivity

No hazardous reactions identified. Does not react with air, water or other common materials

### 10.2. Chemical Stability

This product is stable

### 10.3. Possibility of hazardous reactions

None identified. Hazardous polymerization will not occur

### 10.4. Conditions to Avoid

High temperatures

### 10.5. Incompatible materials

Oxidising agents. Strong bases may cause the release of ammonia

### 10.6. Hazardous Decomposition Products

Carbon and nitrogen oxides ( CO, CO<sub>2</sub> NO<sub>x</sub>)

## SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1. Information on hazard classes

**Acute Toxicity:** This product is of a low order of acute toxicity. Oral LD50 (Rat) >5000 mg/kg

**Skin Irritation:** Mild to moderate irritation can occur. Prolonged or repeated contact may cause defatting and drying of the skin

**Eye irritation:** Transient mild to moderate irritation can occur

**Respiratory of skin sensitization:** No known effects

**Germ cell mutagenicity:** No known effects

**Carcinogenicity:** No known effects

**Reproductive toxicity:** No known effects

**Specific target organ toxicity – single exposure:** No known effects

**Specific target organ toxicity – repeated exposure:** No known effects

**Aspiration hazard:** not applicable for solids

### 11.2. Other information

The substance is not expected to have endocrine disrupting properties. No other relevant information identified



## SECTION 12: ECOLOGICAL INFORMATION

### 12.1. Ecotoxicity

Fish (*Oncorhynchus mykiss*): 96 hr  $LC_{50}$ : > 2500 mg/L.

Invertebrates (*Daphnia magna*): 48 hr  $EC_{50}$ : immobility 705 mg/L.

### 12.2. Persistence and Degradability

Not readily biodegradable but complete mineralization is expected under environmental exposure.

Degradation initialization and rate are dependent on UV levels.

### 12.3. Bioaccumulation potential

The product is not expected to bioaccumulate.

### 12.4. Mobility in soil

The product is designed to bind to sediment and soil, so it is not expected to suffer from leaching or mobility.

### 12.5. Results of the PBT assessment

This product does not meet the criteria of a PBT or vPvB substance.

### 12.6 Endocrine disrupting properties

The substance is not expected to have endocrine disrupting properties

### 12.7 Other adverse effects

None identified

## SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods: Dispose of all waste must be in accordance with all applicable national and local health and environmental regulations. Empty containers should be recycled or disposed of through an approved waste management facility.

## SECTION 14: TRANSPORT INFORMATION

**14.1: UN number:** Not applicable. The products is not classified as dangerous for transport.

**14.2: UN proper shipping name:** The products is not classified as dangerous for transport.

**14.3: Transport hazard classes:** Not applicable. The products is not classified as dangerous for transport

**14.4: Packing group:** Not applicable. The products is not classified as dangerous for transport

**14.5: Environmental hazards:** None identified.

**14.6: Special precautions for users:** None identified.

**14.7. Maritime transport in bulk:** Not applicable. The products is not classified as dangerous for transport

## SECTION 15: REGULATORY INFORMATION

### 15.1. Safety, health and environmental regulations/legislation specific for the product

**EU REACH:** All components of this product have been registered with the European Chemicals Agency or are exempt from registration.

**U.S. TSCA Inventory Status:** All components of this product are either on the Toxic Substances Control Act (TSCA) Inventory List or exempt.

**Canadian DSL Inventory Status:** All components of this product are either on the Domestic Substances List (DSL), the Non-Domestic Substances List (NDSL) or exempt.

### 15.2. Chemical Safety Assessment

A chemical safety assessment has not been carried out for this product.

## **SECTION 16: OTHER INFORMATION**

DATE: December 2022: First issue:

### **DISCLAIMER OF RESPONSIBILITY**

Information contained in this publication, while accurate to the best knowledge and belief of Frog Environmental Ltd (FEL) is not intended and should not be construed as a warranty or representation for which FEL assumes any legal responsibility.

Any information or advice obtained from FEL otherwise than by means of this publication is also given in good faith. However, it remains at all times the responsibility of the customer to ensure that the product is suitable for the particular purpose intended. Conditions of use are beyond our control, and therefore users are responsible for verifying the data under their own operating conditions to determine whether the product is suitable for their particular purposes and they assume all risks of their use, handling, and disposal of the product.

FEL accepts no liability whatsoever (except as otherwise expressly provided by law) arising out of the use of information supplied, the application, adaptation or processing of the products described herein, the use of other materials in lieu of FEL materials or the use of FEL materials in conjunction with such other materials. The information in this safety data sheet relates only to the product designated herein, and does not relate to its use in combination with any other material.

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## SURFACE WATER MANAGEMENT PLAN

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### Appendix F - Frog Environmental Limited – Product Technical information

DRAFT



**frog**  
environmental

product information sheet

**Floc Mat™**  
water treatment mat



### **Floc Mat™ is a versatile silt control device**

A mat created to treat and capture fine silts and suspended particles in construction site run off.

The main function of the mat is to flocculate very fine particles, making them easier to separate from water.

Floc Mats can be laid flat out in dispersion fields, used with Silt Wattles or silt fence and deployed in the frog environmental Silt Capture Channel as part of a versatile water treatment process to remove silt from construction site run off.

### **Applications**

- In a Silt Capture Channel
- With Silt Wattles and SiltMats
- In site ditches and low flow channels
- In combination with silt fence
- On natural dispersion fields
- In combination with dewatering bags and silt socks

- **Floc Mat™ is a fully biodegradable water treatment and silt capture mat that treats muddy water and helps prevent silt pollution**
- **They are a cost effective way of treating water in ditches and channels, without the need for pumps – saving energy and CO<sub>2</sub>**



**Dimensions:** 2x1 x 0.10m

**Variants:** FM1 (30g/m<sup>2</sup>), FM2 (100g/m<sup>2</sup>)  
FM0(untreated)

**Active ingredient:** Water Lynx™

**Dry Weight:** 12 kg per mat

**Material used:** coir fibres, coir netting, coir rope, anionic flocculant, water

**Function:** Water treatment – aids solid water separation. Can be used to segregate low flow channel to in bankside works.

**Performance:** Single mat captures up to 50kg of silt in live test

**Disposal:** Fully biodegradable, suitable for re-use on site (with correct permit).

Waste classification and disposal legislation must be followed at all times. Always liaise with the regulator before deploying a product containing flocculant. If in doubt contact frog environmental on 0345 0574040 for further information and advice.



*Close up FlocMat showing accretion of silt*



*Deployed in Silt Capture Channels with Silt Wattles*

100% sustainably sourced natural fibres are used to create Floc Mat, this ensures the mats are biodegradable and suitable for use as backfill material once used, reducing waste disposal costs. Floc Mat is available in treated and untreated forms. The fibres of the treated version of Floc Mat are coated with Water Lynx™, a non-hazardous, non-toxic, synthetic anionic polymer which contains no coagulants, cations or metals such as Al and Fe that are ecotoxic.

When deployed in a Silt Capture Channel the Floc Mat provides a safe, low carbon and easy solution to support the removal of suspended solids and associated pollutants from construction site run off.



*Deployed to treat muddy excavation water*

for technical support and sales of  
**Silt Wattle** contact frog environmental

0345 057 4040

[info@frogenvironmental.co.uk](mailto:info@frogenvironmental.co.uk)

[www.frogenvironmental.co.uk](http://www.frogenvironmental.co.uk)

@frogenv

Wales: Llanwrda, Dyfed SA19 8NA

Midlands: The Byre, Blakenhall Park, Barton Under  
Needwood, Staffordshire, DE13 8AJ



## SURFACE WATER MANAGEMENT PLAN

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### Appendix G - Welsh Water - temporary disposal of wastewater consent

DRAFT

Charlie Hulme  
Redrow Homes Limited  
Redrow House  
Copse Walk  
Cardiff Gate Business Park  
Pontprennau  
CARDIFF  
CF23 8RH

**Date 11<sup>th</sup> July 2024**

Dear Mr Hulme,

***Ref:- Authorisation for the Temporary Disposal of wastewater from pretreated roadsweeper waste at Redrow Homes Limited, Great Milton Park, Newport to the Public Foul Sewer***

Thank you for your recent enquiry regarding an authorisation to discharge trade effluent to the public foul sewer from the above address.

Based on the information provided, I can confirm that authorisation is given to discharge the trade effluent into the public foul sewer, subject to the following conditions and not otherwise:

1. The premises from which the trade effluent may be discharged is: Redrow Homes Limited, Great Milton Park, Hen Chwarel Drive, Llanwern, Newport NP18 2DP.
2. The maximum volume of trade effluent that may be discharged shall not exceed 20 cubic metres per day at a flow rate no greater than 2 litres per second.
3. The trade effluent to be discharged is derived from pre-treated road sweeper waste during construction. Pretreatment is to be undertaken by settlement tank and interceptor (Naylor Box) prior to sewer discharge. Both treatment tanks must be cleaned regularly to remove gross solids and maintain the required level of treatment as per condition 4.
4. The trade effluent is expected to contain traces of suspended solids (must not exceed 500 milligrams per litre). No gross solids or sludges may be discharged.
5. Please ensure that the discharge is made to foul sewer only and that there is no risk of the contamination of any surface water drainage.

6. Flows must be introduced into the public sewer in such a way that will not affect the free flow of its contents, for example, settlement of suspended solids or surcharging upstream.
7. **The discharge of the trade effluent must be suspended during periods of heavy rainfall, to help minimise hydraulic overloading of the sewerage system. Should this cause difficulties in managing the volumes of wastewater on site, please contact us for advice.**
8. A 3 metre gravity section must be incorporated into the design before connection to the public sewer should the discharge be pumped.
9. This permission is given on the understanding that:
  - a) it may be reviewed from time to time in accordance with the frequency applying in respect of a trade effluent consent issued under the Water Industry Act 1991, section 124.
  - b) Dwr Cymru-Welsh Water may review its Trade Effluent Policy and require a review of this permission subject to the restrictions in a) above.
  - c) If the nature of the discharge is changed then Dwr Cymru-Welsh Water must be informed of this and shall be entitled to review the permission.
10. This permission is valid until 13<sup>th</sup> July 2025. If an extension is required, please contact the local Trade Effluent Officer on the e-mail address given below.

The standard trade effluent consent application fee, currently £422.63 (zero rated for VAT), is payable for the processing of the authorisation application as per the Dwr Cymru Welsh Water Scheme of Charges. You will be invoiced for this amount in due course.

In the meantime, if you have any queries or should the operation change in any way so as to affect the nature and volume of wastewater for disposal, please contact Heather Pepper, Trade Effluent Officer at [heather.pepper@dwrcymru.com](mailto:heather.pepper@dwrcymru.com).

Yours sincerely

*R. Ingles*

**Richard M Ingles**  
**Wastewater Science Manager**