

Persimmon Homes East Wales

Construction Surface Water Management Plan

Virginia Park, Pen y Castell

316254 R01 (02)

RSK GEOSCIENCES

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RSK GENERAL NOTES

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Author	Kieran Wilson	**Technical reviewer**	Tim Crowe
Signature		Signature	
Date:	October 2026	Date:	October 2026
Project manager	Tim Crowe	**Quality reviewer**	Stacey Brown
Signature		Signature	
Date:	October 2026	Date:	October 2026

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd.

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1 INTRODUCTION

1.1 Scope and objectives

RSK Environment Limited (RSK) was commissioned by Persimmon Homes East Wales (the client), Llantrisant Business Park, Llantrisant, CF72 8YP, to produce a construction phase surface water and silt management plan (CSWMP) for the construction phase of works at their site located on land east of Hoel Bro Wen Road, Caerphilly.

The discharge of surface water during the construction phase, is considered a trade effluent by Natural Resources Wales (NRW), and regulated through the Environmental Permitting Regulations, 2016. Discharge of surface water during the construction phase therefore requires an environmental permit to be approved prior to discharge. RSK understands that the client has applied to discharge surface water via Basin E (application reference: PAN-032446), located at National Grid Reference (NGR) ST 16005 88153, with a discharge rate of 10.66 litres per second.

The approach and measures recommended within this site-specific CSWMP have been developed to provide a plan to address how surface water may be managed onsite during construction phase. The purpose of the measures recommended in this report are to prevent uncontrolled run-off to neighbouring surface watercourses, properties and prevent pollution resulting from discharge of silt-laden surface water into the on-site surface water drainage system and then into the surrounding surface water system.

The objectives of this CSWMP are as follows:

- Employ appropriate mitigation, including monitoring and implementation of contingencies to control and minimise surface water pollution associated with site activities.

The following aspects have been considered during the development of this CSWMP:

- The development activities that produce potential sources of surface water pollution and their point of release to surface water; and
- the mitigation measures that are to be implemented to prevent, as far as is practicably feasible, the potential effect of the surface water pollution release, and details of the persons responsible for the actions at the site.

Sensitive receptors to surface water runoff from the site have been identified as the existing, unnamed, boundary ditches and the downgradient Nant Y Aber and Rhymney River.

It is recommended that a current digital and/or hardcopy of this report is retained within the site compound for reference by site staff. The document has not been prepared for specific discharge of planning conditions.

This document should be considered by the Principal Contractor (PC) or Contractors as a ‘living’ document, should be regularly reviewed and amended to reflect any site-specific changes or conditions encountered during the site work.

This report is subject to the RSK service constraints given in **Appendix A**.

2 SITE SETTING

2.1 Site Details

2.1.1 Site boundaries and surroundings

The site is situated approximately 1 km northeast of Caerphilly town centre. The centre of the site is located approximately at National Grid Reference (NGR) ST 16122 88020. A site location plan is presented as **Figure 1**.

The client's site forms the northern half of a wider development area, which is irregular in shape and occupies approximately 18 hectares. The Virginia Park development (the site) is formed of Phase 1A (Areas 1 and 2) and Phase 1B, centred at National Grid reference (NGR) ST 16076 88051 and encompasses an area of approximately 5 hectares. Prior to redevelopment, the site was occupied by a golf course and prior to that a landfill. Phases 1A and 1B of the development, has undergone a phased remediation.

The site is bounded to the north and east by an existing unnamed watercourse, beyond which are established residential properties. To the west, the site adjoins Caerphilly Tennis Club, with Heol Bro Wen and further residential properties located beyond. The southern boundary is defined by the wider development area, which has been allocated for future phases of development.

2.1.2 Summary of previous reports

RSK have been provided with copies of the following reports for review;

- EcoVigour, Surface Water Management Plan – Virginia Park Phase 1a and 1b, Reference: J002453.02 Revision 1, dated: 17/10/2025;
- Integral Geotechnique, Scoping Site Investigation Report – Virginia Park Golf Course, Caerphilly, Reference: 11637/RB/16/SI/RevB, dated: September 2017;
- Integral Geotechnique, Site Investigation and the Proposed Remediation Strategy Report – Virginia Park Golf Course, Caerphilly, for Withey Developments Limited, Reference: 12476/RAH/20/SI/COND30 Rev B, dated: March 2020;
- Integral Geotechnique, Reclamation Validation Report – Virginia Park Phase 1A Areas 1 and 2, Caerphilly, for GHR Developments Limited, Reference: 12476/GNS/24/RVR Rev 0, dated: September 2024; and
- Integral Geotechnique, Reclamation Validation Report – Virginia Park Phase 1B, Caerphilly, for GHR Developments Limited, Reference: 12476/DPD/24/RVR-1B Rev A, dated: April 2026.

Historical investigations identified a capping layer overlying heterogeneous landfill deposits containing ash, clinker, construction debris and domestic refuse, with peat and natural soils beneath.

Soil testing identified contamination within the landfill materials, including metals, PAHs, hydrocarbons and asbestos, with contamination largely confined to the Phase 1A area. Subsequent leachate, groundwater and surface water monitoring identified only limited exceedances of selected parameters. Further assessment concluded that contaminant

concentrations did not pose an unacceptable risk to controlled waters, with calculated un-ionised ammonia concentrations remaining below relevant assessment criteria.

Remediation works, incorporating hotspot removal, excavation of unsuitable material and engineered fill, have since been completed and validated across Phases 1A and 1B. it has been confirmed that no significant pollutant linkages remain between residual contamination and surrounding surface water receptors. Consequently, contamination associated with the historic landfill is not considered likely to adversely affect the proposed drainage infrastructure or receiving water environment. RSK have prepared a sperate Environmental Risk Assessment for surface waters (reference 316254 R02 (00), dated June 2026), which should be read in conjunction with this report.

2.1.3 Environmental Designations

Based on publicly available information of the DEFRA website (Magic Map Application), the site and the hydraulically down-gradient environment do not fall within an environmentally sensitive designated area.

The Nant Yr Aber, Porset Brook and Rhymney River have all been classified as a Main Rivers, designated by Natural Resource Wales (NRW). Based on the available flood zone mapping, all three main rivers located outside the site boundary have associated Flood Zones 2 and 3 extents. Within the site boundary, several smaller surface watercourses are also identified as being associated with Flood Zones 2 and 3. Across the northern site boundary the Flood Zone 3 extent associated with the northern watercourse extends up to and adjacent to the site boundary.

The site does not lie within a groundwater source protection zone and there are no groundwater abstractions within 500 m of the site. However, as part of the bespoke permit application process, NRW have highlighted concerns with the discharge of site-derived groundwater, due to elevated concentrations of Ammoniacal Nitrogen and Iron, associated with legacy contamination of the site.

2.2 Geology, Hydrogeology and Hydrology

Bedrock geology beneath the works area is expected to comprise the Grovesend Formation-Mudstone, siltstone and sandstone with superficial coverings of Till, Devensian-Diamicton. The bedrock geology is classified a Secondary A aquifer, while the superficial deposits are Secondary (undifferentiated). Ground investigation findings support the published geological maps for the site.

Given that the site was excavated and historically used as a landfill, actual ground conditions are likely to be different to published geological maps. It is noted that the site has already seen significant cut and fill works as part of site reclamation and remediation works to form a suitable formation level for residential development. Ground levels are understood to be 600 -800 mm below finished floor levels. The formation level is formed of reworked, engineered fill comprising suitable for use made ground soils and imported aggregate and soils.

The Porset Brook is located upgradient approximately 350 m southeast of the development boundary. An unnamed ditch / stream, a tributary of the Rhymney River, flows from south to north, approximately 180 m east of the site boundary. The Brook

discharges into the Rhymney River, approximately 320 m north and northeast (at its closest point), flowing from west to east. A second tributary of the Rhymney River, the Nant Yr Aber, flows from southwest to northeast, approximately 280 m northwest (at its closest point), discharging into the Rhymney River. A number of smaller drains are also located within the surrounding residential area, discharging into the Rhymney River and its tributaries.

In addition, minor, unnamed drainage channels are present along the northern and eastern boundaries of site. Based on observations and the surrounding topographical setting, the drainage features have interpreted to drain towards the Nant Y Aber, and soon after discharging to the Rhymney River downstream of the site. Site observations indicate that the onsite watercourses are ephemeral in nature, remaining dry for much of the year and conveying flow primarily during inclement weather. During the initial site inspection conducted on 26 May 2026, flow was observed within the drainage ditch along the northern boundary, whereas the ditch along the eastern boundary was dry.

Groundwater was monitored post remediation via two boreholes and was recorded between 3 m and 4 m below ground level (bgl). The monitoring identified elevated ammoniacal nitrogen concentrations (up to 5,000 µg/L) and a marginal exceedance of the freshwater EQS for iron within the groundwater. No other determinants exceeded the relevant EQS.

Assessment of groundwater quality on a limited number of samples, undertaken post remediation, determined that under worst-case conditions, recorded pH and temperature, the predicted un-ionised ammonia concentration was 0.153 mg/L. This is below the Water Framework Directive groundwater threshold value of 0.162 mg/L for un-ionised ammonia. Accordingly, the assessment concluded that the risk to surface water receptors is low.

Given the limited groundwater analytical data obtained and absence of analytical data of the receiving watercourses, NRW have requested that groundwater should not be discharged to surface water, without further assessment to confirm its suitability to discharge.

2.3 Proposed works

The development is to comprise 174 residential properties along with associated infrastructure and private gardens. Surface water drainage at the completed development will comprise runoff collected via highway gullies, rain gardens and property gutters before draining via newly constructed below ground surface water infrastructure to a number of attenuation basins and swales prior to discharge via five newly constructed headwalls into the surrounding watercourses.

2.3.1 Site discharge location and discharge rate

Prior to the commencement of construction activities at the site, rainwater falling across the development site would discharge via overland flow, downgradient to the northern and eastern boundary, where it will be intercepted by temporary cut off ditches and basins prior to discharge.

During the construction phase, surface water at the site will be managed via constructed attenuation and retention basins located across the site, which will convey surface water

runoff to the designated point of discharge at Pond E (NGR ST 16005 88153) into the unnamed ditch / stream and downgradient Nant Y Aber. Site waters that accumulate within the other basins across the site will need to be over pumped back to Pond E to enable controlled discharge, as site waters will be discharged solely from the outfall headwall of Pond E. The maximum discharge rate from this outfall will be restricted via a hydrobreak to 10.66 litres per second.

In the completed drainage phase, surface water will be collected via roof gutters and highway gullies and conveyed through newly constructed below-ground drainage infrastructure to the attenuation and retention basins. Upon completion, there will be five permanent discharge points into the unnamed watercourse / Nant Y Aber.

Groundwater encountered during the construction works will be contained and separated from surface water features, to prevent discharge from the site boundary. Groundwater will therefore either be removed from site as waste or isolated, tested in a UKAS/MCERTS accredited laboratory and discharged to surface water, only if it meets the required criteria for discharge, as set out in **Section 6** and **Table 4**.

3 SENSITIVE RECEPTORS

3.1 Sediment contaminant linkage

The process of sediment contamination of surface waters and receptors can be broken down into a pollutant linkage comprising of a source, pathway and receptor. This model forms the basis of land and groundwater contamination assessment and can also be used to assess the pollution of surface waters by construction-related suspended solids. The source, pathway and receptors relating to the site and general construction activities is discussed below.

3.1.1 Sources of sediment mobilisation

Mobilised sediment is generated from disturbance and/or disintegration of soils across the site. Generally, the most significant volume of mobilised sediment is generated during the phase of works including earth excavation and stockpiling, infrastructure construction and soil stripping activities. Mobilisation of soils are also subject to prevailing weather conditions, with adverse weather (heavy and/or prolonged precipitation) potentially causing significant sediment to be mobilised.

3.1.2 Pathways of sediment migration

Sediment can migrate via several pathways including direct surface run-off (overground flow) determined by topographic relief or preferential migration pathways, via existing infrastructure (e.g., roads, land drains and gullies) and pumping (e.g. from dewatering of excavations). Site-specific conditions normally determine the preferential pathways for sediment migration.

3.1.3 Sensitive receptors to sediment

Potential sensitive receptors to mobilised sediment form the end part of the linkage, with a source and pathway preceding. Generally, mobilised sediment migrates along a pathway down a hydraulic gradient towards topographically lower-lying areas. Potential sensitive receptors generally include surface watercourses, infrastructure, vegetation and designated environmentally sensitive sites.

In addition to surrounding watercourses, residential properties and designated environmentally sensitive sites down-gradient of the development site have been identified as potential receptors to surface water run-off and sediment associated with the pre-construction site works.

Sensitive receptors to surface water and silt are identified as follows:

Onsite

- All onsite attenuation and detention basins;
- Gullies and surface water sewers of the drainage systems (upon installation);
- Northern watercourse;
- Eastern watercourse;

Offsite

- The receiving downstream Main watercourse, the unnamed ditch / Nant Y Aber;
- The wider catchment area, namely the Rhymney River;
- Wider public highway realm offsite beyond the Site entrance and boundary;

4 SURFACE WATER POLLUTION SOURCE INVENTORY

4.1 Sources of surface water pollution during construction activities

Due to the nature of the geology underlying the site and site activities, there is the potential for suspended solids to be generated and mobilised in surface water run-off.

Sources of potential pollution include those present at the site prior to the commencement of construction related activities, and those present as a result of construction activities.

Table 1 provides a summary of the surface water pollution source inventory as well as associated hazards, receptors, and consequences.

Table 1: Surface water pollution sources associated with construction activities at Virginia Park

Hazard / Source	Receptor	Pathway	Consequence at Receptor
General Construction Related Activities			
Leak/spillage of hazardous material on-site (e.g., oils and fuels).	Constructed initial drainage ditches, onsite basins and the wider surface water catchment	Via infiltration, overland flow or via the surface water drainage system (storm system).	Discharge of hazardous substances into drainage ditches or below ground infrastructure and ultimately into the Unnamed ditch / Nant Y Aber.
Leak of oil/fuel from pumps used as part of pumping activity.			
Discharge of water containing suspended solids (silt).		Overland flow from site boundary or discharged from the outfall.	Discharge of suspended solids (silt) into drainage ditches or below ground infrastructure and ultimately into the Unnamed ditch / Nant Y Aber
Discharge of water containing chemicals (Flocculant) from a treatment process where utilised.		Overland flow from site boundary or discharged from the outfalls.	Contamination of drainage ditches, below ground infrastructure and ultimately the Unnamed ditch / Nant Y Aber with flocculant.
Spillage of collected solids from settlement system.		Overland flow from site boundary or discharged from the outfall.	Discharge of suspended solids (silt) into existing drainage ditches, below ground infrastructure and ultimately into the Unnamed ditch / Nant Y Aber.
Failure of pumping equipment – overflow of water from drainage etc.		Via surface flow or surface water drainage system.	
Groundwater potentially containing elevated levels of ammoniacal nitrogen and Iron.		Via dewatering of excavation impacting site surface water drainage system.	Discharge of potentially elevated concentrations of Iron and ammoniacal nitrogen to the adjacent watercourses and ultimately the Unnamed ditch / Nant Y Aber.
Vandalism – resulting in release of contaminants from containers.		Via surface flow.	Discharge of contaminants into existing drainage ditches, below ground infrastructure

Hazard / Source	Receptor	Pathway	Consequence at Receptor
			and ultimately into the Unnamed ditch / Nant Y Aber.

5 SETTLEMENT TEST AND DOSING TRIAL

5.1 Introduction

To help inform appropriate mitigation and management measures for the site the settlement rate for suspended solids needs to be understood. Therefore, a sample of surface water and subsoil from the site were obtained during a site walkover.

The samples were submitted to laboratory for testing of the rate of natural separation of the solid fraction (suspended solid) from the water. Where settlement rates are slow, a dosing trial is undertaken, which involves applying gel flocculant as an active silt control method, to bind the negatively charged silt particles, forcing them to drop out of suspension (formation of a floc).

The use of chemical treatment is controlled by the local environmental regulatory authority (NRW). Application and approval of a bespoke Environmental Permit under the Environmental Permitting Regulation (2016) would be required prior to deploying chemical treatment (gel flocculant) at the site.

Results of the settlement test and dosing trial are set out in **Appendix B** with associated material safety data sheets (MSDS) provided in **Appendix C.**

5.2 Settlement Test

The turbidity of each sample is measured in Nephelometric Turbidity Unit (NTU).

Natural settlement rate of the sample obtained from the site, are initially measured over a 24hr period. Results of the settlement test are set out in **Table 2**.

Table 2: Natural Settlement Rates

Sample Location	Initial Turbidity (NTU)	NTU after 10 min settlement	NTU after 30 min settlement	NTU after 2-hr settlement	NTU after 12-hr settlement	NTU after 24-hr settlement
Site Subsoil	1,000	1,000	996	276	82	32

Testing shows physical settlement can be achieved within 24 hours under laboratory conditions, meaning achieving natural settlement on-site may be possible given sufficient attenuation and external factors such as weather and flow are managed. Sediment settlement time can be enhanced through treatment provided this is part of a structured deployment plan.

5.3 Dosing Trial

The testing of chemical treatment, via a dosing trial, is undertaken alongside a control sample. Samples are tested against different gel flocculant blends with reaction times and flocculant type recorded.

Samples are agitated repeatedly to gain a good indication of the reaction time required to settle the suspended solid. The laboratory testing reported the most effective blend of gel flocculant chemical treatment.

The use of gel flocculant is recommended in this case as natural settlement times are up to 24 hours in laboratory conditions and are unlikely to be achieved on site, particularly during the wetter winter months. The use and implementation of it on-site will be dependent on location of use and flow rates and will likely alter throughout the construction process with 'fine tuning' to the deployment required.

Settlement rate of the sample obtained from the site, are measured over the three-stage application of gel flocculant. Results of the settlement test are set out in **Table 3**.

Table 3: Settlement rates following Gel Flocculant validation

Sample Location	Test 1* (15 seconds agitation plus 30 seconds settlement)	Test 2* (further 15 seconds agitation from Test 1 plus 60 seconds settlement)	Test 3* (further 15 seconds agitation from Test 2 plus 60 seconds settlement)
Site Subsoil	1,000 NTU To 199 NTU	199 NTU To 93 NTU	93 NTU To 85 NTU
* Using Gel Flocculant 494+394			

Testing of samples indicated that a gel flocculant blend of product Gel 494 and 394 would be the most effective. Testing indicated that a three-stage application will reduce the turbidity to 85 NTU, which following the further attenuation processes, would likely achieve clear water and suitably reduce the level of suspended solids to an acceptable rate for discharge.

Results indicate that the application of the gel flocculant should be designed so that, where required, surface water can be dosed a minimum of twice but ideally three times (recommended number of stage application) and a suitable settlement distance (~<10 m) is allowed for, prior to surface water discharge. This is to ensure that all gel flocculant and bound sediment remain within the site boundary. The designed use of gel flocculant based chemical treatment will be such that only surface water is discharged from the site and that the gel and sediment remain within the site boundary.

The deployment locations and quantity of gel flocculant blocks should be reviewed at key build milestones to ensure that treatment locations are appropriate to works being undertaken and the associated level of risk.

6 PROTECTION MEASURES WITHIN ACTIVE WORKS AREAS

The ‘active works area’ refers to each of the areas set out in this report that is undergoing intrusive ground works, that has the potential to impact controlled waters.

The primary source of sediment and sediment-contaminated surface water will be generated during the excavation and stockpiling of soils associated with large scale excavation of basins, reprofiling of existing ditches and general groundworks.

Without adequate sediment mitigation and segregation of the works area from active watercourses (inclusive of basins, swales and existing drainage infrastructure), there is the potential for controlled waters to be adversely affected by sediment contamination. The following section sets out proposed prevention and mitigation measures to address potential risks. The prevention and mitigation measures are illustrated on **Figure 2.**

Please note that if conditions change that result in the potential for surface waters leaving the site boundary, or changes in works to those proposed at the site, reduces the efficacy of installed measures, then the silt mitigation must be reviewed, and additional measures implemented as necessary.

6.1 Boundary Protection Measures

- Silt fencing should be installed as per the site wide mitigation plan contained within **Figure 2**. Silt fencing should be installed along all site boundaries, where applicable, between development and non-development zones to minimise sediment wash-off into adjacent areas. Additionally silt fencing should be installed surrounding and between development zones and all basins on site (attenuation and retention) to protect the basin as shown in **Figure 2.**
- Silt fencing is to comprise a semi-permeable membrane staked at regular intervals with typical installation details presented on **Figure 2**. Importantly, the base of the membrane on silt fencing should be buried to prevent surface water from passing beneath it. For longer term protection and to reduce maintenance requirements, the fence installation would benefit from stockproof wire mesh to reduce wind damage to the membrane.
- Vegetated buffer zones should be maintained as shown on **Figure 2.** A vegetated buffer retains the existing vegetation that acts as a natural filter to any potential construction run off. Vegetation buffer zones should be demarked with physical barriers such as marker tape or light Heras fencing.

6.2 Headwall check dams, sediment forebays and swale protection measures

- A Rock filter check dam should be installed at all larger inlet headwalls within attenuation basins. Rock check dams should consist of coarse angular stone placed in a wire gabion style basket. Baskets should be tight fitting between the headwall wingwalls and lined with silt fence material. Rock check dams act as a sediment trap

at the headwalls while also dissipating energy of the water flowing into the attenuation feature.

- Within the attenuation basins, the smaller proposed SuDS swale inlet headwall features are expected to operate under low-flow conditions. Erosion control matting should therefore be provided at the outfalls to reduce the risk of localised erosion and capture any deposited sediment.
- Appropriately sized forebays should be installed around all inlets headwalls in the attenuation basins. Where appropriate, inlet headwalls may be grouped, with a single forebay serving multiple proposed SuDS swale inlets, as illustrated in **Figure 2**. However, larger inlet headwalls should be provided with individual forebays to ensure adequate sediment capture and protection.
- Silt fence check dams should be installed at all outfall headwalls of the attenuation basins as per **Figure 2**. Silt fence check dams should be constructed across a headwall formed of a timber frame holding silt fence material. Silt fence check dams act to increase the attenuation period, and the timber frame should be tight fitting against the faces of the headwalls vertical wingwalls.

6.3 Surface water attenuation

- All attenuation / detention basins and swales should be excavated in a temporary state, at the earliest opportunity ahead of installing the adjacent below ground drainage infrastructure and construction of each group of plots. All surface water features should be lined with topsoil and seeded as soon as possible to reduce the volume of exposed subsoils and potential for silt to be remobilised in the basin.
- All attenuation basins should be compartmentalised to separate bodies of surface water, increase attenuation and promote settlement of sediment as shown on **Figure 2**. During the construction phase, all non-permitted outfalls should be bunged, and any water that accumulates within these basins shall be pumped back to Pond E for controlled discharge. All waters being pumped should be discharged through a silt bag placed on an area of vegetation at the banks of Pond E. Alternatively, the silt bag should be placed on a bed of aggregate to prevent erosion and mobilisation of sediment.
- All attenuation features will be installed in a temporary state to manage surface water during the construction phase and be remediated, to remove deposited sediment, and completed as per the final design, upon completion of the development.

6.4 Managing dewatered groundwater

Elevated concentrations of ammoniacal nitrogen and Iron, which may have the potential to impact surrounding surface watercourses, have been identified within the groundwater beneath the Phase 1A and 1B development area. Accordingly, any groundwater encountered during construction activities should not be allowed to enter the site surface water system without further assessment. Therefore, during construction all groundwater should be classified as ‘waste’ and all groundwater encountered will be isolated from the site surface water drainage system, contained, and managed separately.

Any groundwater recovered during construction activities will be removed from site and disposed of at a suitably permitted waste management facility by an appropriately licensed waste contractor in accordance with the relevant waste management legislation. In the event that groundwater is found to have impacted site surface water management systems, refer to section 7.1.1 of the report, and follow emergency procedures.

Alternatively, dewatered groundwater can be isolated and stored on site, tested in a UKAS/MCERTS accredited laboratory and assessed to determine if there is a risk of contamination. Where groundwater is found to be acceptable for discharge (meets the environmental quality standards (EQS) for surface water), and where agreed in writing by NRW, could be discharged to surface water.

6.5 Passive Recirculation Chemical Treatment Measures

Settlement testing and dosing trials have demonstrated that passive treatment measures may potentially prove to be insufficient in achieving adequate sediment settlement. Accordingly, the use of gel-based flocculants may be required to enhance sediment settlement and improve solids removal efficiency, particularly during winter months when reduced temperatures and lower biological activity may further limit natural settlement rates.

- Gel Flocculant 494+394 demonstrated a high level of treatment efficiency during settlement and dosing trials, both should be used in unison to maximise flocculation and sediment removal prior to discharge and avoid building deposition of settlement within the drainage infrastructure.

Alternatively, where additional treatment is necessary to reduce the level of suspended solids to an acceptable level, water should be circulated through an inline pipe reactor (containing flocculant gel blocks) to remove sediment from waters within the basin, prior to discharge. Water discharged from the pipe reactor should be done via a silt polishing channel.

6.5.1 Use of flocculants

The deployment and use of flocculants should be undertaken under appropriate approval from NRW, via a Bespoke Environmental Permit.

Where employed, all flocculants, present on the site should be deployed and utilised in accordance with the manufacturer's instructions.

Depending on-site conditions and requirements, flocculants may be deployed in pump assisted (active) systems via means of an inline pipe reactor, containing gel flocculant blocks. The gel flocculant in line pipe reactor may be used to circulate and treat water within the on-site attenuation basins, prior to outfall. The length of the capture channel, after treatment, will be defined by the flow rate of the water to ensure that all gel flocculant and sediment have the required time to settle, within the site boundary. This will ensure that only water is discharged from the site boundary, leaving sediment and spent gel flocculant to be managed within the site boundary.

The placement and use of the flocculant, where deemed necessary, to remove sediment from surface water prior to outfall as effluent, will be designed so that surface water can be dosed with appropriate flow rates. This will be designed to provide maximum efficiency

so that the lowest amount of flocculant can be used, and to ensure suitable attenuation is provided for the flocculant and sediment to drop out of suspension, within the site boundary, prior to discharge. The exact locations will be determined based on-site progress and requirements. Treatment via the use of gel flocculant will provide secondary measures to the primary mitigation detailed above.

6.6 Material Management

- Utilise topsoil/subsoil stockpiling procedures to ensure that the number and condition of stockpiles maintained on-site are closely maintained and monitored in accordance with NRW guidance on best practice guidance for topsoil storage during the construction phase. The number of stockpiles maintained on-site will be regularly reviewed and superfluous material, not required to support site operations, will be removed from site for subsequent re-use or disposal at suitably licensed facilities
- Any stockpiles should have a silt fence placed around the base to prevent runoff from mobilising sediment downgradient. Stockpiles not required for future development should be removed from site as soon as possible.
- Any soil stockpiles maintained on-site should be located within a designated area as far as practicably possible from surface water courses and site boundaries.
- Where required or applicable, stockpiles shall be seeded or covered with an appropriate covering to provide additional stability, prevent water ingress, and reduce the potential for sediment run-off and dust generation.
- Dewatering of excavations should be undertaken via a pump to pumping cell comprising a silt sock or dirt bag (dewatering bag), situated on a bed of gravel and a pallet, within an area where it can be contained, prior to disposal or testing and analysis for suitability to discharge. The pump cell should be surrounded by straw bales wrapped in geotextile membrane to capture any remaining sediment. Pump cells should be set up in an area of soft landscaping away from the active works area and away from disturbed soils.
- Restrict the surface area of soils being disturbed.
- Topsoil and subsoil should be replaced in the order they were excavated. Large areas of bare soils should be hydroseeded if climate and seasonal conditions allow or covered with erosion control blankets (coir) while vegetation regrows. This will limit sediment mobilisation from surface water runoff.
- Ensure that any pre-existing voids or openings, such as land drains, identified in any of the excavations, which could provide a preferential flow pathway for site drainage are blocked and sealed.

6.7 Daily considerations by the Site team

- Regular review of the effectiveness of silt management measures to ensure that sediment is not building up behind the silt fences of sediment forebays making them ineffective.

- Continued monitoring of run-off generated from access roads throughout the development site to identify whether the run-off contains silt.
- Continued implementation, review, and revision to the site's traffic management plan.
- Continued implementation, review and revision to the site's emergency spill procedure.
- General good housekeeping of the site.

6.8 General management control measures

In addition to the above area specific measures, the following procedural and management control measures shall be implemented with due consideration to site activities, build programme and commensurate to the associated risk posed by site activities:

6.8.1 Site access roads, surfacing and vehicle movements

- Early installation of suitably surfaced access roads to provide a clean running surface and reduce vehicle movements over bare/exposed ground (e.g., gravel cover).
- Install a suitable running surface along any temporary access roads to reduce the likelihood of soft ground disturbance generating sediment run-off (e.g., gravel cover).
- Establish, maintain, and review vehicle movement routes across the site.
- Minimise, as far as practicable, the movement of machinery on and offsite access roads to prevent tracking excess soil onto roads and highways.
- Prevent, as far as practicable, the movement of machinery on undisturbed ground, such as retained areas of vegetation.
- Utilisation of a road sweeper, or other suitable road cleaning equipment, on-site roads and surrounding public highways where necessary. Frequency of road cleaning to be continually assessed and updated as appropriate to address site conditions.
- Install a suitable surfacing in construction material storage areas, site compound, contractor car parking areas and key access points to each development phase (i.e., gravel cover).

6.8.2 Vegetation retention & growth

- Vegetation buffers should be retained as far as practicable across the site and along area boundaries, particularly with the existing watercourse. Areas that currently still hold vegetation, such as along the eastern and northern watercourse should retained as far as practicable.
- Replacement of topsoil and landscaping of completed areas shall be undertaken as soon as practicable following their installation.

6.8.3 Hazardous material storage

- All hazardous materials, including fuel, oils will be stored in suitable containers within an appropriately bunded area and situated on impermeable ground.

- Mortar silos will be located in designated areas away from surface water receptors and securely bunded to prevent surface water run-off.

6.8.4 Spillage control

- A supply of surface water protection and silt management equipment; including spill kits, silt mats, floc mats, coir rolls and silt fence, will be maintained within the site compound/material storage for rapid deployment in the event of an emergency. If necessary, a supply of materials will also be maintained next to any temporary works being undertaken in sensitive areas, such as in close proximity to a surface water course or a location where surface water run-off has the potential to circumvent installed protection measures.
- Maintain sufficient bungs on-site to install in discharge pipework and prevent discharges from surface water detention basins in the event of an emergency. Due to the potential for working near flowing water, bungs should only be installed when safe to do so.

6.8.5 Installation of physical control measures

The physical control measures discussed above will be installed in a phased approached determined by activities being undertaken across the site and the associated levels of risk posed to identified sensitive receptors.

6.8.6 Maintenance of physical control measures

Installed physical control measures discussed above shall be maintained throughout the construction period and for the duration that a risk to the identified receptors remains.

Condition and efficacy of physical control measures will be monitored and those measures, such as silt fencing and silt curtains, shall be replaced and repaired as required to ensure continued efficiency.

6.8.7 Removal of physical control measures

The site management team will undertake weekly reviews of protection measures installed at the site and whether the level of protection remains commensurate to risks posed by site activities. When required, advice shall also be sought from specialist environmental advisors.

Physical control measures will be removed in a phased approach determined by the residual risk posed to sensitive receptors.

In areas of the site where development activities have ceased, physical control measures will be reduced commensurate with the lower risk.

Complete removal of physical control measures will only be undertaken when the risks posed to sensitive receptors from construction related activities is negligible.

6.9 Site personnel and documentation

The following measures are recommended for implementation to increase awareness and bring existing site documentation up to date:

- Include a detailed section relating to surface water and silt protection within the site induction folder for all phases of the work.
- Continued documented review by the site management team of the existing site conditions in relation to this CSWMP and update the requirements on a routine basis.
- The site management team or principal contractor on-site to undertake documented weekly (daily during periods of heavy rainfall) site inspections and obtain support from the appointed Environmental Consultant if/when required.
- Conduct a site pre-start meeting with all relevant parties to agree methods of working to control surface water and silt management.
- Undertake additional detailed site-based awareness training (site Briefing/Toolbox Talk) on surface water and silt management and protection for all pertinent site staff including groundworkers. Clear guidance should be given on the mitigation measures discussed.

Actions reported for project personnel include:

Technical team:

- Ensure this CSWMP is communicated to the site management team and updated as necessary.
- Undertake regular reviews of site inspection documents to identify potential areas where additional protection is required and communicate this to both the site management team and to their appointed environmental advisor.

Site managers / Principal Contractor:

- Review contractor method statement for works in and around surface water features and obtain advice from the appointed Environmental Consultant.
- Undertake environmental monitoring of the on-site and offsite surface water features.
- Undertake field monitoring and record keeping of surface water discharge quality from Pond E.
- Ensure the measures presented within this CSWMP are implemented by the site construction contractors.
- Brief sub-contractors and site operatives on effective water management and their responsibilities.
- Undertake weekly documented inspections and checks to ensure the effectiveness of the pollution prevention measures, especially before, during and after heavy rainfall events, adverse weather and during the wetter seasons (winter and spring).
- Undertake as a minimum weekly inspection, with additional inspections during periods of heavy rainfall. Inspections of both basin inlets and the associated forebays to confirm that, if applied, gel flocculant is effectively promoting flocculation and sediment settlement.
- Inspections should verify that sediment accumulation behind the forebays is not excessive as to render them ineffective. Where significant build-up is observed,

prompt removal and appropriate disposal of accumulated sediment should be arranged.

- Undertake as a minimum weekly inspection, with additional inspections during periods of heavy rainfall, monitoring inspections of the condition of the watercourse, downstream from the site, ensuring pollution events are not occurring and reporting any degradation in condition.

Key monitoring points have been identified as:

- **M1:** Site entrances, where site access meets the existing highway;
- **M2:** Central on-site highways and general development area of northwestern zone (general conditions);
- **M3**: Onsite attenuation basins (general state of basin, inlets, features within etc.) and associated outfall;
- **M4:** Onsite northern watercourse and final discharge point where surface waters are discharged to existing watercourse in the completed occupied phase;
- **M5:** Central on-site highways and general development area of southeastern zone (general conditions);
- **M6:** Onsite mid-northern attenuation basin (general state of basin, inlets, features within etc.);
- **M7:** Onsite eastern watercourse and final discharge point where surface waters are discharged to existing watercourse in the completed occupied phase;
- **D:** Temporary discharge point during the construction phase.

Contractors:

- Ensure that this CSWMP is communicated to all relevant site teams and groundworkers.
- Ensure appropriate water management controls are included in relevant risk assessments and method statements, as well as detailed arrangements regarding increased supervision and management during adverse weather, or large scale works that may impact upon the drainage basins/surface watercourses.
- Ensure gully protection is fitted as soon as the surface water drainage system is completed and thereafter maintain the gully bags until completion of the construction phase.
- Report any damage to silt mitigation features (e.g. silt fencing) as a result of plant movement or work and arrange for repairs to be made as soon as practicable.
- Follow and implement water management and pollution prevention controls as instructed by the site manager and identified in the risk assessment/method statements (RAMS).
- Immediately report to the site manager if pollution prevention measures are not in place, are damaged or ineffective, or if works results in a silt release to surface water or the storm water sewer system.
- Report any environmental incident or near miss to the site manager immediately.

6.9.1 Maintenance activities

- Replacement/repair of storage equipment and site equipment/plant containing hazardous materials (e.g., fuel and oils) if damage or evidence of leaking is observed.
- site plant will be inspected routinely for damage and wear by plant users.
- Any defects noted by site personnel will be reported to the site management team so repairs can be scheduled.
- All plant items and equipment will be serviced and maintained with due regard to the manufacturer's recommendations in order to minimise the risk of breakdown or leaks.

6.10 Dewatering of excavations

Given the site's historic use as a landfill and elevated concentrations of ammoniacal nitrogen and Iron, identified within the groundwater beneath the site, it is unlikely that the discharge of dewatered excavations, containing groundwater, would meet the strict requirements of the Regulatory Position Statement (RPS 261) the temporary dewatering from excavations to surface water. Surface water attenuated within excavations may be suitable for discharge. However, these waters are unlikely to meet the requirement of the RPS. Therefore, no water should be discharged until a bespoke environmental permit to discharge is granted and a suitable monitoring and sampling strategy is in place.

7 SITE MONITORING PROCEDURES AND RECORDS

7.1 Surface water monitoring

The following monitoring procedures should be carried out on a regular basis (at least weekly, and during/immediately following a storm event) by the site management team to enable continuous review of the measures listed above.

A comprehensive record of the effectiveness of surface water management measures will be maintained to enable further review by any parties attending site. Examples of site monitoring checklists (proformas) are included in **Appendix E.**

- **Discharge Point (NGR ST 16005 88153**): monitor and sample the water quality and discharge to the adjacent watercourses. A supply of 1 L plastic bottles to be retained on a site in case of inspection or testing purposes.

The site management team should undertake weekly inspections of the wider site to monitor and keep records of the water quality upgradient, downgradient and at the final outfalls for each works area. The inspections will continue on a regular basis for the duration of the works with records kept. It is recommended that daily inspections are completed for the outfall to the offsite watercourse. All inspections should consider the following points;

- Regular inspection of implemented surface water and silt management measures (e.g., silt fencing and headwall protection measures).
- Regular inspection of all gullies and conditions of the public highway at site entrances.
- All records should be reviewed on a regular basis, but advice can be obtained by the site management team at any time from an appointed Environment Consultant (RSK).
- Calls to the appointed Environmental Consultant (RSK) should be made in the event of heavy rainfall breaching protective measures or silt pollution incidents being recorded.
- To enable a prompt response to changing site conditions, it is advisable to ensure a supply of silt fencing and silt matting is readily available to implement emergency measures.
- A comprehensive record of the effectiveness of surface water management measures should then be maintained to enable further review by any parties attending site.
- Any emissions to surface water identified will result in the implementation of the protocols detailed herein. Any complaints in relation to surface water emissions will be fully investigated as detailed in the following sections. The resultant actions will be recorded in site records.

7.1.1 Meteorological conditions

Meteorological forecasts and weather conditions (including precipitation) which could result in increased run-off will be monitored. Records of significant weather conditions,

such has high precipitation and named storms, and their impact on the site will be maintained.

Additional reviews, and implementation of additional site management measures will be undertaken in response to significant weather event forecasts.

7.1.2 Inspection and monitoring

Visual monitoring techniques will principally be used within the boundary of the site. These should be supplemented by the collection of water samples from designated surface water monitoring points identified as:

- The outfall from the onsite basins discharging to both watercourse (Pond E discharge point); and
- Upstream and downstream water samples from the offsite unnamed watercourse.

Weekly visual inspections of surface water discharge quality as well as the overall condition of the wider site will be undertaken as part of general site walkovers completed by the site management team and site operatives during their daily tasks.

Additional monitoring beyond the site boundary will be completed in response to the identification of potential emissions to surface water from the site or upon receipt of complaints. All monitoring will be carried out in cognisance of the prevailing weather conditions and site activities.

In addition to this, weekly routine inspections of the site to monitor and record surface water run-off quality and other environmental issues will be undertaken by the site management team or other appointed person. Records of these inspections will be kept for the duration of the project for reference.

The Client's safety, health, and environment team will also undertake monthly inspections which will include the condition of internal roads, adjacent public highways, and any immediate surface water receptors.

Inspection frequencies will be increased as required in response to prevailing meteorological conditions.

7.2 Water sample collection and testing

To supplement the routine visual inspection of site surface water discharges, NRW has requested that instantaneous (spot) water samples are collected on a fortnightly basis from the active discharge point and from agreed upstream and downstream locations within the receiving watercourse. Sampling will be undertaken by the site management team (or a nominated deputy) and submitted to a UKAS/MCERTS accredited laboratory for analysis to demonstrate compliance with the emission limits specified in **Table 4.**

The sampling programme will initially be undertaken on a fortnightly basis throughout the early stages of the works. Results of the monitoring/sampling and associated laboratory results will be reported to NRW on a quarterly basis. Subject to 12 consecutive weeks (three months) of monitoring demonstrating compliance with the permitted emission limits and no exceedances of the agreed trigger values, it is recommended that the routine water sampling frequency may be reduced to monthly, in accordance with agreement reached with NRW.

Sampling will be undertaken at the active discharge point (ST 16005 88153) and from upstream and downstream locations within the receiving watercourse, to ensure consistency, NGR's for sampling points will be taken as the discharge point.

Records of the points monitored and sampled will be retained by the site team and reported to NRW on a quarterly basis. Samples collected for laboratory analysis will be tested for the determinands and limits presented in **Table 4**. In addition, field readings may be collected to record the pH, temperature and turbidity (NTU) of the surface water discharge from each discharge location. Based on the NTU to TSS calibration curve provided in **Appendix D,** An upper limit of NTU has been calculated as 92.226 representing a TSS of 40 mg/l. A maximum action limit has been set at 10% below the calculated equivalent level, at 83 NTU.

Table 4: Discharge Point Monitoring Parameters and Limits

Parameter	Limit (Including Unit)	Compliance Statistic
Total suspended solids (TSS)	40 mg/l	Maximum
Turbidity (NTU)*	83 (NTU)	Maximum
pH	6 to 9	Minimum and maximum
Oils and Greases	No significant trace	Visual/descriptive
Iron	1 mg/l	Maximum
un-ionised ammonia	0.162 mg/l	Maximum
* Guided as a site-specific maximum based off NTU correlation curve calculation		

Sampling frequencies may be increased accordingly during periods of higher rainfall. If there is no water being actively discharged at the time of sampling, no sample will be taken and this will be recorded in inspection records and reflected in the factual reports. Supplementary monitoring will be undertaken as part of the sampling regime. This will comprise a testing suite that includes the sampling of Total Suspended Solids (TSS), Iron and un-ionised ammonia through an accredited laboratory.

The turbidity (NTU) of discharged water will be recorded using a suitable field monitoring device, such as a portable turbidity meter. Additionally, a portable pH meter will be utilised as required to provide an on-site indication of the pH level of water being discharged from the site.

A quarterly factual report will be produced by a specialised environmental adviser. The report is to include:

- Analytical results,
- sampling details and;
- any relevant observations recorded during the monitoring period.

The quarterly factual reports will be submitted to NRW to demonstrate compliance with permitted emission limits and provide an auditable record of discharge performance. Any exceedances or issues identified will be investigated and appropriate corrective actions implemented.

7.3 Site records

In addition to regular site monitoring, the following significant events at the site will be recorded:

- Maintenance.
- Breakdowns.
- Emergencies.
- Site inspections.
- Despatch of records to NRW.
- Severe weather conditions.
- Complaints received.
- Visitors to the site.

The site management team or nominated person(s) will maintain a record of all the above information in the site log, on inspection forms, or as part of wider environmental management records. They are also responsible for ensuring that silt management measures are maintained and repaired, as required.

Records relating to significant events will be kept for up to 6 years or until construction activities have been completed. Events may include off-site environmental effects or pollution of land or water.

All records and copies of inspection forms will be maintained and will be made available for inspection at all reasonable times by any authorised officer of NRW.

8 EMERGENCY PROCEDURE AND COMPLAINTS HANDLING

8.1 Emergency Procedure

Supplementary surface water protection measures or off-site removal of surface water shall be deployed as necessary to provide additional surface water treatment/containment/management capacity.

If required, advice should also be sought from specialist environmental advisors.

8.1.1 Elevated concentrations identified in site water management system

In the event that routine monitoring or water quality assessments identify elevated contaminant concentrations within the site surface water management system or receiving watercourse, an incident response procedure will be implemented. The response will be proportionate to the nature and severity of the identified exceedance and will include, where appropriate, the following actions:

- The occurrence will be reported immediately to the site management team and the relevant environmental personnel.
- Where impacted waters are identified within the site drainage system and there is a risk of discharge, trained site operatives will take immediate action to prevent further release by isolating the discharge pathway, including the installation of a temporary bung or other suitable isolation measure at the affected basins outfall.
- Affected waters will be retained within the site water management system while an assessment is undertaken and advice is sought from a specialist environmental advisor.
- Water samples will be collected and submitted for laboratory analysis to determine the nature and concentration of any contaminants present. The analytical results will be used to determine the appropriate management response;
    - Where testing confirms that water quality is acceptable and contaminant concentrations are below relevant assessment criteria, the retained waters may be discharged from site in accordance with the permit conditions.
    - Where concentrations are elevated to the relevant EQS standards, the affected waters will be removed from site and managed as waste in accordance with relevant legislation, including disposal by a licensed waste contractor.
- No further discharge from the site will occur until it has been determined how groundwater has impacted the site water management system, appropriate corrective actions have been implemented, and monitoring confirms that discharge water quality is acceptable.

8.1.2 Emergency reporting

Any environmental incident will be reported to NRW and the Local Authority as soon as practicable, with details of the incident, containment measures undertaken, investigation findings and any corrective actions implemented. Spillage emergency procedure.

In the event of a liquid spillage/leak the following actions will be taken, where appropriate:

- Report the occurrence to the site management team immediately;
- Trained facility operatives to take immediate action to try and contain the spillage/leak where it is safe to do so using appropriate materials (such as spill kits);
- If it is safe to do so, the cause of the spill or leak will be isolated and/or moved to a bunded area;
- Inert material such as clay or sandbags are to be used to make a temporary containment bund to prevent pollution of any water or land;
- Drainage covers will be installed over any road gullies to prevent ingress into the site's drainage system;
- Access to the immediate area will be restricted until a disposal/clean up solution is implemented;
- If the spillage cannot be contained using approved methods, senior management will be contacted immediately, and specialist advice and help will be sought; and
- If a vehicle is identified as leaking, wherever practicable, it is to be stored on an impermeable pavement within a bunded area, where the spillage can be contained until such a time as the vehicle is repaired.

Once the spillage has been contained the site management team will make necessary arrangements for the appropriate removal of the spillage from the site.

Any incidents or near misses should be reported as soon as possible so that the appropriate environmental advisor is notified as soon as possible. Where damaged or missing protection measures have been identified, the site manager should implement repairs or replacements as soon as possible.

Report any environmental incident (such as silt ingress to the stream/drain) through the appropriate Principal Contractor emergency contact procedures, to a designated coordinator who will contact/report the incident with NRW where necessary.

Site staff should immediately report to the site manager if pollution prevention measures are not in place, are damaged or ineffective, or if works results in a silt release to surface water or the storm water sewer system.

8.2 Complaints process

Any complaints received at the site or via the regulatory bodies (including NRW and Local Authority), will be recorded and investigated via a combination of visual inspection at the location of the complaint and collection of water samples for analysis to determine the source of the pollution to be identified.

Where possible, as much information and detail about the complaint will be recorded, whether this be from the relevant authority or complainant. This information will assist the investigation in determining the source of the surface water pollution.

Should a complaint be received, the following information will be gathered and recorded:

- Complaint details (including the address of the complainant where possible) and the location where surface water pollution is perceived;
- Weather conditions including rainfall levels;
- Results of the latest round of monitoring carried out by site personnel;
- Operational status of the site (noting any abnormal conditions that may have caused the complaint);
- Inspection of site conditions upon the receipt of a complaint (where feasible); and
- Details of the proposed corrective action, if required.

A subsequent follow up to the complainant shall be provided, detailing whether the corrective action, if required, was successful. If not, details shall be set out of any new strategy implemented, until the issue is resolved.

Records of complaints received will be kept for inspection and review by both internal and external personnel.

In the event that surface water discharges from the site are found to be causing a pollution incident – as determined by investigation into offsite complaints or during routine monitoring, the following measures will be taken to confirm the source:

- Supplementary monitoring will be undertaken to identify the extent and potential cause of the event i.e., damage to perimeter protection measures;
- Examination of the operational activities at the site at the time of the complaint or event identification;
- Examination of the meteorological conditions at the time of the complaint or event identification;
- Examination of the process conditions via the plant operational records/telemetry (where recorded);
- A review of the operational procedure, process controls and the instigation of any control measures immediately following identification of the pollution; and
- Further visual monitoring will be carried out to ensure the issue has been addressed and to monitor the effectiveness of any control measures undertaken.

All complaints will be investigated however, direct calls to site from complainants will allow for an immediate response and investigation. However, it is the site management team's experience that complaints submitted to regulatory authorities can sometimes be made long after the occurrence of a surface water pollution event. This can result in a delayed notification to the site management team and commencement of investigation works. Due to the transient nature of surface water pollution and meteorological conditions, this may result in the pollution pathway being unidentifiable.

FIGURES

FIGURE 1
SITE LOCATION PLAN



Rev	Date	Amendment	Drawn	Chkd	Appd
C01	30.06.2026	First Issue	BS	KW	KW

RSK GEOSCIENCES
The Old School
Stillhouse Lane
Bristol
BS3 4EB
Tel: +44(0)1179 471006
Email: info@rsk.co.uk
Web: RSKGeosciences.co.uk

Client: Persimmon Homes East Wales

Project Name: Virginia Park, Pen y Castell

Description: Site Location Plan

Dimension	Size	Scale	Geolocation	Project ID	Drawing no.	Rev	File name
m	A4	1:25,000	316017,188079	316254	11101	C01	316254-BL-111-XX-D-G-11101-C01

FIGURE 2
SURFACE WATER AND SILT MANAGEMENT PLAN

Notes:

This schematic is to be displayed in the site manager's office to aid communication of silt-related pollution risks to all relevant site staff.

The schematic provides a visual summary of the identified sources of silt generation, receptors sensitive to pollution, pathways by which silt may be transported, and the specific mitigation measures required to reduce the identified silt pollution risks.

Ground conditions pertinent to sources of silt pollution risk

BGS mapping indicates that the site is underlain by the Grovesend Formation, comprising mudstone, siltstone and sandstone, with superficial deposits of Till, Devensian Diamicton. The bedrock geology is classified as a Secondary A Aquifer, whilst the superficial deposits are classified as Secondary (Undifferentiated).

Receptors identified at risk from silt pollution

On-site

- All on-site attenuation and retention basins.
- Gullies and surface water sewers within the drainage system (upon installation).
- Northern watercourse.
- Eastern watercourse.

Off-site

- The receiving watercourse, Porset Brook.
- The wider catchment, namely the Rhymney River and Nant yr Aber.
- The wider public highway network beyond the site entrance and boundary.

Specific silt mitigation interventions to be implemented:

- Silt fencing should be provided along site boundaries, between development and non-development areas, and around attenuation/retention features to control sediment runoff.
- Vegetated buffer zones shall be retained and clearly demarcated to maintain natural runoff filtration and reduce sediment transport.
- Rock filter check dams shall be installed at key basin inlets to trap sediment and dissipate flow energy.
- Erosion control matting shall be used at minor inlet/outfall points to reduce localised erosion and sediment loss.
- Silt-fenced forebays should be provided at attenuation basin inlets to capture sediment
- Silt fence check dams should be installed at basin outfalls to increase retention time and reduce sediment discharge.
- Attenuation basins shall be constructed early, rapidly stabilised with topsoil and seeding and designed to minimise exposed soils and maximise storage.
- Basin levels shall be set to maximise attenuation capacity and flow retention prior to discharge.
- Basins shall be compartmentalised to improve attenuation performance and promote sediment settlement.

Good Practices silt mitigation interventions to be implemented:

In addition to the specific measures above, general good practice shall be implemented during site establishment, plant and machinery operation, stockpile management, road and sewer maintenance, dewatering, and reinstatement activities to mitigate silt pollution risks.

Monitoring and maintenance requirements:

Primary monitoring locations

M1: Site entrances, where site access meets the existing highway.

M2: Central onsite highways and general development area of the northwestern zone (general conditions).

M3: Onsite mid-northwestern attenuation basin (general condition of basin, inlets and internal features, etc.) and outfall.

M4: Onsite northern watercourse and final discharge point where surface waters are discharged to the existing watercourse (Porset Brook).

M5: Central onsite highways and general development area of the southeastern zone (general conditions).

M6: Onsite mid-northern attenuation basin (general condition of basin, inlets and internal features, etc.).

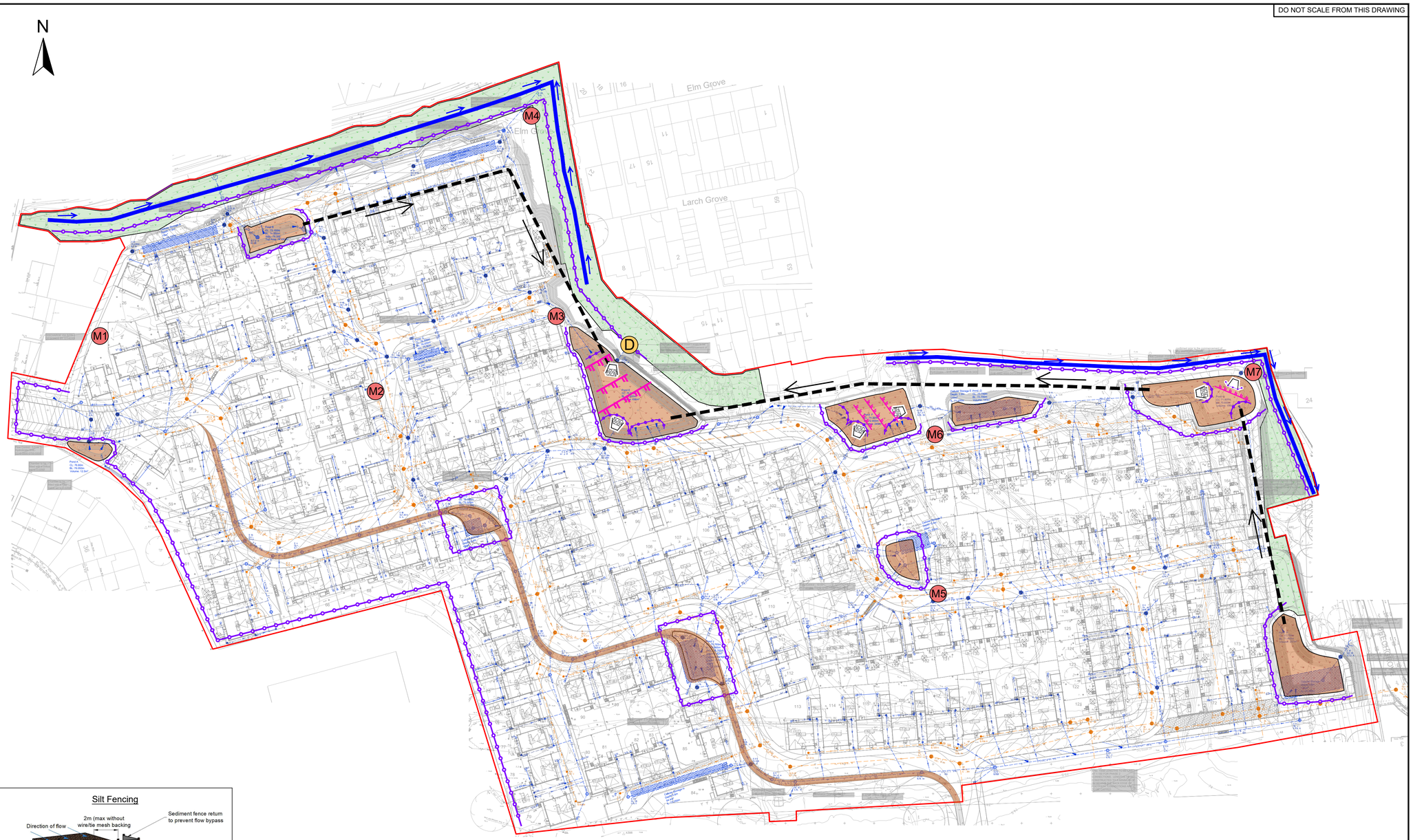
M7: Onsite eastern watercourse and final discharge point where surface waters are discharged to the existing watercourse (Porset Brook).

Monitoring of all other implemented specific pollution mitigation measures shall also be undertaken to assess their effectiveness and identify any maintenance requirements.

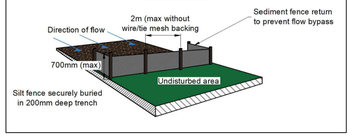
- Roads and gullies: Monitor road surface conditions for evidence of track-out and inspect the condition and effectiveness of road gully and chamber protection measures within active construction areas. Undertake maintenance as required to maintain effectiveness.
- Stockpiles: Monitor each stockpile for evidence of uncontrolled runoff. Assess the need for silt fencing at the toe of stockpiles to control runoff. Undertake maintenance as required to maintain effectiveness.
- Excavations: Monitor all excavations to determine whether runoff is entering or flooding excavations. Assess the need to install an upgradient bund or silt fence to control runoff flow paths. Undertake maintenance as required to maintain effectiveness.

A photographic and written record of all monitoring activities (and any maintenance undertaken) shall be maintained at least weekly to demonstrate due diligence.

DO NOT SCALE FROM THIS DRAWING



Silt Fencing



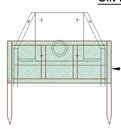
Rock Filter Check Dam



Silt matting packed behind basket and weighted down with sand bags

Gabion basket tightly fitting between headwalls lined with silt fence and filled with gabion stone

Silt Fence Check Dam



4x2" tanalised timber wooden frame to be double wrapped in silt fence material and staked to fit across the headwall apron

Rev	Date	Amendment	Drawn	Chkd	Appd
C01	30.06.2026	First Issue	BS	KW	KW

LEGEND

- Site boundary
- Surface water drainage
- Foul water drainage
- Pumping route (Arrow shows flow direction)
- M1 Primary monitoring location
- D Discharge point
- Surface watercourse (preexisting) (Arrow shows flow direction)
- Recommended line of silt fencing
- RFC001 Rock filter check dam
- Silt fence check dam
- Buffer zones
- Recommended area of revegetation or hydroseed
- Sediment basin baffle

Notes:
The schematic drawing is not meant to be an accurate engineering drawing but is used to present the general relative locations of features on, and surrounding, the site. Features annotated on this schematic are not drawn to scale but are centered over the approximate location. Such features should not be used for setting out, nor should it be considered a schedule and should be considered indicative only.
Details (such as height, width or depth) of mitigation features such as bunds, grips or ditches shall be designed by the temporary works designer, accepted by the principal designer and recorded on the temporary works register in accordance with BS5975.

RSK shall not be liable for the use of this drawing, or the information contained within, for any purpose other than that which it was provided.

Base plan provided by Client
Drawing Ref.: Base file.dwg

RSK GEOSCIENCES
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
Tel: +44(0)1442 437500
Email: info@rsk.co.uk
Web: RSKGeosciences.co.uk

Dimensions	Scale	Size
m	NTS	A1

Client: Persimmon Homes East Wales

Project Name: Virginia Park, Pen y Castell

Description: Construction Surface Water Management Plan

File Name: 316254-BL-276-XX-D-G-27601-C01

Project ID	Drawing no.	Revision
316254	27601	C01

APPENDIX A
SERVICE CONSTRAINTS

1. Service Constraints

1.1. This Report (the “Report”) and any study, inspection, investigation, sampling, testing and or interpretation carried out in connection with the Report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) trading as RSK Geosciences, for the Client named in the first paragraph of the Report (the "Client") in accordance with the terms of an RSK Fee Proposal including RSK Environment Standard Terms and Conditions (the “Appointment”) between RSK and the Client, unless otherwise stated in the first paragraph of the Report. The Services were performed by RSK with the reasonable skill and care ordinarily exercised by a geo-environmental consultant at the time the Services were performed. Nothing in this Report shall be construed as imposing any fitness for purpose obligation. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the Client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.

1.2 Other than that, expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services. RSK shall not be liable in respect of any action or proceedings arising out of or in connection with this Report whether in contract, in tort, for breach of statutory duty or otherwise after the expiry of six (6) years from either (i) the date of the Report or (ii) such earlier date as prescribed by law, unless varied in the terms of the Appointment.

1.3 Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the Client. RSK is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent, or condone any party, other than the Client relying upon the Services. Should this Report or any part of this Report, or details of the Services or any part of the Services, be made known to any such party, and such party relies thereon, that party does so wholly at its own and sole risk, and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent geo-environmental consultant and/or lawyer.

1.4 The Client shall not, without the prior written consent of RSK, assign, transfer, charge, mortgage, subcontract, or deal in any other manner with all or any of the benefits provided in this Report. Unless specified in the Appointment, RSK shall not be obliged to assign the benefit of the Report whether by collateral warranty, third party rights pursuant to the Contracts (Rights of Third Parties) Act 1999, letter of reliance or otherwise. If RSK agrees to any assignment of the benefit of this Report, in whatever form, benefits to third parties through collateral warranties, third party rights or letters of reliance shall not be provided unless a fee for each right, warranty or letter is agreed. The form of wording used in the warranty or letter shall be provided by RSK for agreement by the Client. Any reasonable changes to the form of wording will be implemented by mutual agreement, however the terms in the warranty or letter cannot offer the third party any greater benefit than the Appointment offered to the Client.

1.5 It is the understanding of RSK that this Report is to be used for the purpose described in the introduction to the Report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the Report is used, or the proposed use of the site change, this Report may no longer be valid and any further use of or reliance upon the Report in those circumstances by the Client without the review and advice of RSK shall be at the Client's sole and own risk. RSK shall not be liable for any use of this Report for any purpose other than that for which it was provided.

1.6 The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the Report inaccurate or unreliable. The information and conclusions contained in this Report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the Report in the future shall be at the Client's own and sole risk.

1.7 The observations and conclusions described in this Report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out, or required by the Appointment between the Client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this Report, RSK did not seek to evaluate the presence on or off site of asbestos, invasive plants, electromagnetic fields, lead paint, heavy metals, radon gas, fuel storage, persistent bio-accumulative or toxic chemicals (including PFAS and related compounds) or other radioactive or hazardous materials, unless specifically identified in the Services.

1.8 The Services are based upon RSK's observations of existing physical conditions at the Site gained from a visual inspection of the site together with RSK's interpretation of desk based publicly available information, including documentation, obtained from third parties and from the Client on the history and usage of the site, unless specifically identified in the Services and the limitations below:

a. The Services were based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely.

b. The Services were limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the visual inspection.

c. The Services did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the Client or third parties, including laboratories and information services, during the performance of the Services.

d. The Client has identified in writing to RSK, the information, reports, findings, surveys and preliminary works RSK may not rely upon when providing the Services.

RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK, and including the doing of any independent investigation of the information provided to RSK, save as otherwise provided in the terms of the Appointment between the Client and RSK.

1.9 Any site drawing(s) provided in this Report is (are) not meant to be an accurate base plan for scale measurement but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for accurate setting out and should be considered indicative only.

1.10 Should RSK be requested to review the Report after the date of issue of this Report, RSK shall be entitled to additional payment at the existing rates, or such other terms as agreed between RSK and the Client.

2. Service Constraints where the Report provides an intrusive assessment of ground conditions:

2.1 The intrusive environmental ground investigation aspects of the Services are a limited sampling of soil from the site, at pre-determined locations based on the known historic / operational configuration of the site. The conclusions given in this Report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent

of the limited area depends on the properties of the materials adjacent and local conditions, together with the position of any current structures and underground utilities and facilities, and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters (as stipulated in the scope agreed between the Client and RSK, based on an understanding of the available operational and historical information) and it should not be inferred that other chemical species (not tested) are not present.

2.2 The comments given in this Report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. The extent of the exploratory holes, laboratory testing and monitoring undertaken may have been restricted due to a number of factors including accessibility, the presence of buried or overhead services, current development, site usage, timescales or the Client's specification. The exploratory holes only assess a small proportion of the site area with respect to the site as a whole, and as such may only provide an indicative assessment of ground conditions on site. There may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows, may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised. The presence of hotspots of undisclosed contamination or exceptional and unforeseen ground conditions cannot be discounted.

2.3 Where the Services include Investigation of an exploratory nature or relating to physical ground works, any costings and prices provided in the Report are estimated and provided for guidance purposes only. The actual cost and time quantities shall be remeasured and shall be dependent upon the ground or other conditions, constraints present, and number and depth of the investigation locations, which shall influence the number of samples and tests required, and the quantities of soil being classified.

2.4 Asbestos is often observed to be present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of brownfield and demolition sites indicates that asbestos fibres may be present more widely in soils and aggregates, which could be encountered during more extensive ground works. However, this Report does not constitute an asbestos survey. On this basis, the presence of asbestos on site cannot be discounted and a full asbestos survey should be undertaken.

2.5 Unless stated otherwise, only preliminary geotechnical recommendations are presented in this Report and these should be verified in a Geotechnical Design Report, once proposed construction and structural design proposals are confirmed. Eurocode 7 gives guidance on the type of sampling, sample quality, number and spacing of intrusive investigations, and number of laboratory tests required. It is intended that the Geotechnical Information section of this Report will fulfil the general requirements of the Ground Investigation Report as set out in section 6 of Eurocode7, although this is subject to the restrictions imposed on the investigation, as listed above. For geotechnical design, Eurocode 7 requires the Geotechnical Design Report to address both the geotechnical and structural aspects of the geotechnical design for both the limit and serviceability states. The Geotechnical Appraisal section of this Report will not meet the requirements of a Geotechnical Design Report (GDR) and should therefore be used for preliminary guidance only.

3. Service Constraints where the Report relates to Surface Water Management:

3.1 The Surface Water Management Inspection (SWMI) Report, documents provided, observations, actions, and recommendations, with respect to the management of potential pollution issues to surface waters, made during the site Inspection visit, are those present at the time of the visit, and may not represent those recorded by others on the same day.

3.2 The comments given in this Report and the opinions expressed are based on the weather, ground and ground water conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the inspection and therefore could not be taken into account. In addition, groundwater levels and flows, may vary from those Reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.

3.3 RSK places a degree of dependence upon oral information provided by site representatives, which is not readily verifiable through visual inspection, or supported by any available written documentation. RSK shall not be held responsible for conditions or consequences arising from relevant facts that were not fully disclosed by facility or site representatives at the time this Report was prepared.

3.4 This Report is a live document, to be continually reviewed and updated as the development progresses or other changes occur on site. RSK can only maintain the currency of this Report through the Client requesting support with supplementary site visits or attendance at meetings ahead of key stages of the development in relation to surface water management. Our risk rating assesses a number of risk factors in line with the source-pathway- receptor model and is therefore subject to constant change.

3.5 Standard design drawings are indicative. Material types, dimensions and construction details will need to be adjusted by the Client to suit the specific conditions / flows on Site.

3.6 The full responsibly for implementing the site-specific protection and maintenance measures to protect the surface water system as stated in this Report, remains with the Client and their site management team. Additional control measures may be required to achieve the objectives set out in the Surface Water Management Plan to be implemented and financed by the Client.

4. Service Constraints where the Report relates to Waste Management:

4.1 In accordance with the definition provided in the Waste Framework Directive (WFD), materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded, by the holder'. Naturally occurring soils are not considered waste if re-used on the site of origin for the purposes of development. Soils such as made ground that are not of clean and natural origin (irrespective of whether they are contaminated or not) and other materials such as recycled aggregate, do not necessarily become waste until the criteria above are met. Excavation arisings from the development may therefore be classified as waste if surplus to requirements and/or unsuitable for re-use.

4.2 It is the duty of the waste producer, to ensure that all waste is accurately classified prior to waste disposal. Technical Guidance WM3 (EA, 2018) sets out in its Appendix D requirements for waste sampling. It is a legal requirement to correctly assess and classify waste. The level of sampling should be proportionate to the volume of waste and its heterogeneity. Unless otherwise stated, the waste assessment presented in this Report should be considered as preliminary and further testing and assessment of the waste under the provisions of a Waste Sampling Plan may be required to obtain the necessary level of data required for basic characterisation of the waste in support of disposal.

4.3 Unless stated otherwise in the Report, information relating to historical operations at the site was not reviewed as part of the assessment by RSK. In addition, unless otherwise stated in the Services, RSK was not present during the collection of the samples nor had any input on the chemical testing suite. Therefore, the waste assessment and classification detailed in this Report are based solely on any information that were provided to RSK (e.g., laboratory chemical data, exploratory hole records) and were completed without prejudice for our Client.

4.4 RSK's assumes that any ground investigation data, chemical testing results etc., that were provided by the Client to inform the waste assessment and supporting review were carried out in accordance with current best practice and relevant guidance/ standards, where applicable. Thus, the

comments given in this Report and the opinions expressed are based solely on the information provided by the Client. However, it is noted that there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account as part of the RSK assessment.

5. Service Constraints for Construction Environmental Management Plan Reports:

5.1 This Report should be considered in the light of any changes in legislation, statutory requirement or industry practices that may have occurred subsequent to the date of issue.

5.2 The measures and comments outlined in this Report and any opinions expressed are based on the plans provided at the time and discussions with relevant parties. However, there may be conditions pertaining to the site that have not been disclosed by investigations and therefore could not be taken into account.

5.3 This CEMP is a live document and is subject to change throughout the project, as and when necessary, to ensure management of environmental aspects remains relevant, and to ensure continued compliance with legislation and commitments as they may change. RSK understands that this CEMP will be reviewed by the Client every six months and updated as and when necessary.

5.4 It is the full responsibility of the Principal Contractor/ Client to ensure that their works do not contravene legal requirements, and adherence to this CEMP alone cannot be a full defence regarding legal action against the Principal Contractor.

6. Service Constraints where the Report relates to Ground Gas Membrane Verification:

6.1 This Report is limited to the verification of the gas resistant membrane/vapour membrane/ radon barrier after installation and no inspections were undertaken of the substrate (i.e. prepared ground). The Report therefore does not constitute as a full verification of ground gas protection system.

6.2 The comments given in this Report and the opinions expressed, are based on the condition of the ground gas membrane as encountered at the time of inspection by suitably qualified personnel. RSK cannot accept liability for any subsequent change to the status of the gas membrane by follow-on trades or other construction activity.

6.3 Where not designed by RSK, the verification of protection measures is carried out with reference to the gas protection design provided by the Client. RSK assume the scope of gas protection measures as determined by third parties to be correct and to have achieved any required approval from authorities.

6.4 The Ground Gas Design Report/Remediation Strategy and Verification Plan contains details of the procedures to be adopted for inspection and validation of the works. However, it should be noted that responsibility for the correct implementation of the strategy lies with the appointed contractor. RSK cannot be held responsible for any remedial works that are carried out without the agreed procedures involving either direct supervision by RSK, or inspection and validation of the works by a representative from RSK.

7. Service Constraints for Environmental Due Diligence (EDD)Reports:

7.1 The comments given in this Report and the opinions expressed are based on the information obtained and reviewed as part of the desk-based assessment. However, there may be conditions pertaining to the Site that have not been disclosed by the assessment and therefore could not be taken into account. Furthermore, no intrusive investigations, monitoring or sampling have been undertaken to confirm the environmental status of the site, therefore any comments relating to ground conditions and subsurface contamination are based solely on a review of desk-based information.

7.2 This Report describes the results of the EDD exercise. The scope of this EDD Report, where appropriate, covers legal or regulatory compliance with respect to UK or international regulations associated with environmental matters.

7.3 As with any EDD exercise, there is a certain degree of dependence upon information provided by the target company. The EDD does not include a site walkover / visit or liaison with site representatives unless identified in the Services. Therefore, the assessment is based on the available desk study information. Also, there is a certain degree of dependence upon oral information provided by site representatives, which is not readily verifiable through visual inspection, or supported by any available written documentation. RSK shall not be held responsible for conditions or consequences arising from relevant facts that were not fully disclosed by facility or site representatives at the time this EDD exercise was performed.

7.4 This Report, including all supporting data and notes (collectively referred to hereinafter as "information"), was prepared or collected by RSK for the benefit of its Client.

7.5 The comments given in this Report and the opinions expressed are based on the information obtained and reviewed as part of the desk-based assessment and the site inspection visit. However, there may be conditions pertaining to the Site that have not been disclosed by the assessment and therefore could not be taken into account. Furthermore, no intrusive investigations, monitoring or sampling have been undertaken to confirm the environmental status of the Site therefore any comments relating to ground conditions and subsurface contamination are based solely on a review of desk-based information and observations collected during the site inspection visit.

8. Service Constraints for Ground source heat energy Reports:

8.1 It is understood that this is a desktop survey only and that there are no requirements for a site walkover, service utility survey, or provision of service plans. These services can be provided upon request if required.

8.2 At a later stage, it is possible that a thermal response test (TRT) will need to be completed, for which a test borehole will have to be drilled, and these would be costed at the time. RSK can provide all aspects of subsequent site work for a GSHP system if required.

9. Service Constraints for Water Abstraction Borehole Reports:

9.1 The Report aims principally to only identify and assess the suitability of the site for a water abstraction borehole. This Report should be considered in the light of any changes in legislation, statutory requirements, and industry practices, that have occurred subsequent to the date of the Report.

9.2 Unless stated in the Report, the opinions expressed in this Report including all comments and recommendations provided are on the basis of the information obtained from a desk-based assessment.

APPENDIX B
SETTLEMENT TESTING AND DOSING TRIAL

Clear thinking
for cleaner water

Frog Environmental

Settlement test and flocculant validation report

RSK Geosciences
Virginia Park, Parc y Castell
FC8024
June 2, 2026

+44 (0) 345 057 4040
info@frogenvironmental.co.uk
frogenvironmental.co.uk

Company number: 973815

Project 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, we are not in control of the construction site or any portion of the construction site at any time. Frog Environmental does 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 & 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.

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.

+44 (0) 345 057 4040
info@frogenvironmental.co.uk
frogenvironmental.co.uk

Frog Environmental Ltd.
The Stables, Blakenhall Park,
Bar Lane, Barton under Needwood,
Staffordshire, DE13 8AJ, UK

Purpose and scope

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 results 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.

Technical summary

Natural settlement at Virginia Park, Parc y Castell reduced turbidity from a Start (Control) value of 1,000 NTU to 1,000 NTU over a period of 10 mins. After 2 hours NTU, turbidity further decreased to 276 NTU, with visible change. A 24-hour settlement provided a reduction in turbidity to 32 NTU.

Testing showed the most effective Gel Flocculant to be a combination of 494+394. The flocculant validation test comprises of three stages:

- The first stage of testing reduced turbidity from 1,000 NTU to 199 NTU.
- A second stage lowered turbidity further to 93 NTU.
- The third stage reduced turbidity to 85 NTU.

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2. Conclusions and next steps 7
3. Factors affecting the risk of silt pollution 7
4. About Gel Flocculant 8
5. Test process 8

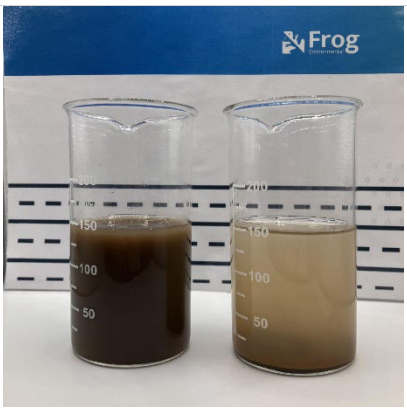
+44 (0) 345 057 4040
info@frogenvironmental.co.uk
frogenvironmental.co.uk

Frog Environmental Ltd.
The Stables, Blakenhall Park,
Bar Lane, Barton under Needwood,
Staffordshire, DE13 8AJ, UK

1. Results

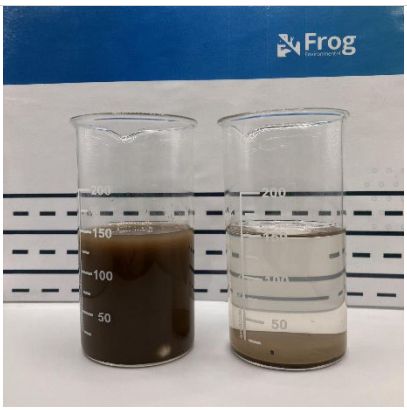
Natural Settlement.

Water temperature (°C)	pH
4 °C	7.55



Control vs Settlement 2 hours

Turbidity
1,000 NTU to 276 NTU



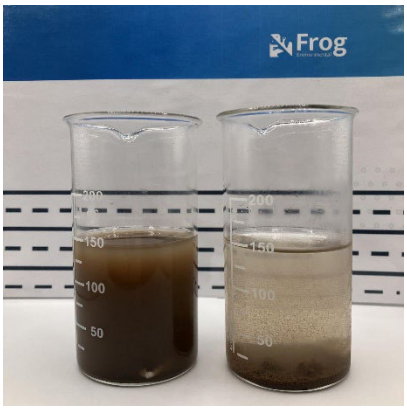
Control vs Settlement 24 hours

Turbidity
1,000 NTU to 32 NTU

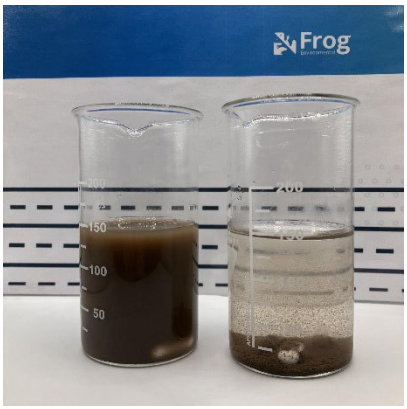
Natural settlement period	Turbidity
Control (start)	1,000 NTU
10 mins	1,000 NTU
30 mins	996 NTU
1 hour	672 NTU
2 hours	276 NTU
12 hours	82 NTU
24 hours	32 NTU

Natural settlement at Virginia Park, Parc y Castell reduced turbidity from a Start (Control) value of 1,000 NTU to 1,000 NTU over a period of 10 mins. After 2 hours NTU, turbidity further decreased to 276 NTU, with visible change. A 24-hour settlement provided a reduction in turbidity to 32 NTU.

Gel Flocculant Validation



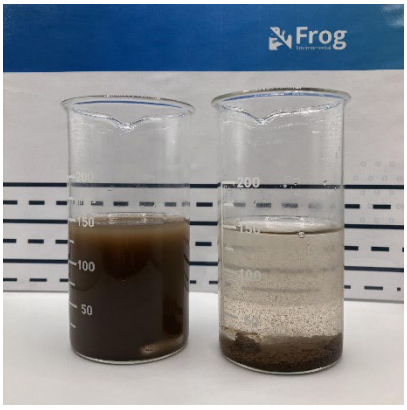
A. Test 1 Control vs Gel Flocculant 494+394
(15 seconds agitation plus 30 seconds settlement)



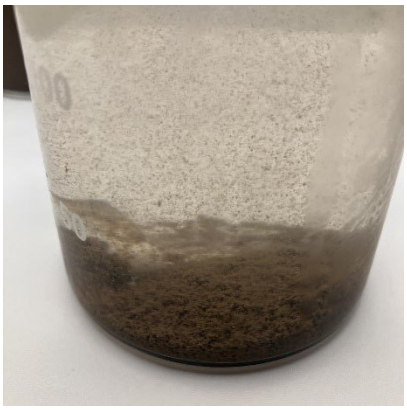
B. Test 2 Control vs Gel Flocculant 494+394
(further 15 second agitation from Test 1 plus 60 seconds settlement)

Turbidity
1,000 NTU to 199 NTU

Turbidity
199 NTU to 93 NTU



C. Test 3 Control vs Gel Flocculant 494+394
(further 15 second agitation from Test 2 plus 60 second settlement)



Turbidity
93 NTU to 85 NTU

Test 3 Close-up

Testing showed the most effective Gel Flocculant to be a combination of 494+394. The flocculant validation test comprises of three stages:

- The **first stage** of testing reduced turbidity from 1,000 NTU to 199 NTU.
- A **second stage** lowered turbidity further to 93 NTU.
- The **third stage** reduced turbidity to 85 NTU.

+44 (0) 345 057 4040
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frogenvironmental.co.uk

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Staffordshire, DE13 8AJ, UK

2. Conclusions and next steps

Physical settlement can produce clear water at Virginia Park, Parc y Castell under laboratory conditions. However, achieving the same results on-site is unlikely unless large attenuation can be provided and external factors such as weather and flow are managed. Therefore, treatment is recommended to enhance sediment deposition and improve treatment performance, provided this is part of a structured deployment plan.

To discuss next steps, contact: natalia@frogenvironmental.co.uk.

3. Factors affecting the risk of silt pollution

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:

- Mixing: the mixing of effluent with Gel Flocculant, through passive or forced measures.
- Capturing: trapping flocculated particles, either in attenuation features, Silt Capture Channels or a combination of measures.
- Maintenance: removing accreted silt from attenuation features or Silt Capture Channels
- Monitoring: testing effluent quality to ensure compliance
- 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.

4. 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 in 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 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.

5. 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.

Clear thinking
for cleaner water

Frog Environmental

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+44 (0) 345 057 4040
info@frogenvironmental.co.uk
frogenvironmental.co.uk

Frog Environmental Ltd.
The Stables, Blakenhall Park,
Bar Lane, Barton under Needwood,
Staffordshire, DE13 8AJ, UK

APPENDIX C
MATERIAL SAFETY DATA SHEETS

SAFETY DATA SHEET

Gel Flocculant 394

SECTION 1: IDENTIFICATION OF MIXTURE AND COMPANY

1.1 Product identifier

Gel Flocculant 394

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

0345 057 4040

www.frogenvironmental.co.uk

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_2, NO_x)

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: Red 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 Coeffecient (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_2 NO_x)

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:

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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

www.frogenvironmental.co.uk

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_2, NO_x)

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 Coeffecient (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_2 NO_x)

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.

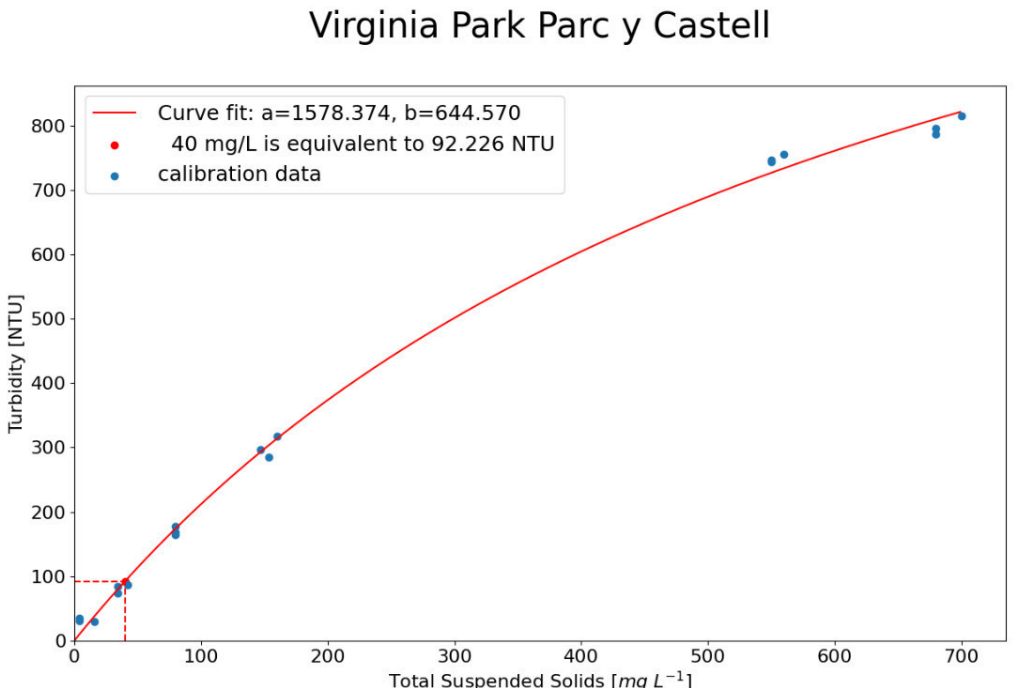
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APPENDIX D
TSS NTU CORRELATION CURVE

TSS-NTU Correlation Curve

Virgina Park Y Castell-RSK

(NTU)	(mg/L)
Turbidity reading	TSS reading
5	2.05
10	4.11
15	6.18
20	8.27
25	10.37
30	12.49
35	14.62
40	16.76
45	18.92
50	21.09
55	23.27
60	25.47
65	27.5
70	29.91
75	32.16
80	34.41
85	36.69
90	38.98
95	41.28
100	43.6
150	67.69
200	93.53
250	121.31
300	151.26
350	183.66
400	218.8
450	257.06
500	298.86
550	344.73
600	395.29
650	451.29
700	513.68
750	583.59
800	662.48
850	752.2
900	855.15
950	974.49
1000	1,114.45



Note: The Regulator will express the permit condition for total suspended solids (TSS) as a dry weight measured in mg/l, this limit is site specific and dependent on the sensitivity of the receiving water. The 40mg/l illustrated is indicative and should not be used in substitution of the permitted requirements. In the field suspended solids are measured as turbidity (NTU), an expression of the colouration or clarity of water. There is not a consistent or direct correlation between TSS (m g/l) and turbidity (NTU) so, it is important to establish the relationship on a site specific basis.

T: 0300 431 8888
E: info@frogenvironmental.co.uk

frogenvironmental.co.uk

APPENDIX E
INSPECTION CHECKLIST EXAMPLES

RSK GEOSCIENCES

GULLY INSPECTION CHECKLIST
SITE: VIRGINIA PARK

Date	Road or Gully Ref.	Gully clear and functional (yes/no)	If no - action required: e.g. (gully clean / gully bag replace)	Further comment	Sign off / Signature

SITE INSPECTION CHECKLIST
SITE: VIRGINIA PARK

Name of person undertaking inspection: .....

Date: .....

Current weather conditions: .....

Description	Comments	Action	Initial
1) What is the current condition of the gully protection measures within the active areas of the site? *Note any gullies requiring maintenance measures*			
2) Are site roads clean and relatively free of mud? Is the frequency of visits by the road sweeper adequate? *Consider whether additional visits should be scheduled.*			
3) Are there currently unsurfaced areas being trafficked which may be causing silt to enter the site drainage? *Note if additional measures are required to reduce the run-off from these unsurfaced areas.*			

5) Are control measures in place to prevent silt run-off from unsurfaced areas and soil stockpiles? *Note if the control measures are adequate and whether the increased runoff requires an increase in the frequency of inspection of any control measures.*			
6) What is the current condition of run-off? *Note any discolouration of the water or obvious sign of sediment within the water.*			
7) What is the current water condition at the at monitoring locations? *Note any discolouration of the water or obvious sign of sediment within the water.*			
8) Is any off-site run-off occurring? *Note whether any run-off is occurring – especially in the vicinity of any boundaries.* *Note any control measures in place.*			
9) Is there any dewatering of excavations taking place on site? *Note what activities are taking part and their location.*			

Note any control measures in place.			
Further notes and actions to be taken:			

Completed by	Name	Signature	Date
Site Manager			