frog environmental

silt control & water quality specialists

Client ref: Oaklands Rise, Twyn y rodyn
Frog ref: FR3120_SWMP
Date of report: July 2023

PERSIMMON HOMES

OAKLANDS RISE

TWYN Y RODYN

Surface Water Management Report

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Customer Notice

The control of silt pollution from site is a statutory responsibility that remains with the customer and/or Principle Contractor at all times.

Construction sites are dynamic and subject to the influence of multiple agents, both natural and anthropogenic. Frog Environmental are not 'in control' of the construction site or any portion thereof at any time.

Advice given via reports, email, phone call, video conference or at site meetings does not constitute design advice and Frog Environmental does not accept design liability for silt control advice or proposals.

All product specifications, technical drawings, sketches and site plans provided by Frog Environmental are proposals and should be reviewed and approved by the Permanent Works Designer. Proposals are always based on the best available data but may not be able to account for all variables.

Management of silt pollution risk and the subsequent development of intervention strategies are reliant on surface water information provided by the customer.

Frog Environmental are not professional hydrologists and recommend that a Senior Engineer working on behalf of the client reviews and provides the input required to support the co-development of an intervention strategy.

Most silt control interventions have optimal flow rates for effective treatment. Failure to comply with these limitations may result in reduced treatment efficacy.

The scope of advice from Frog Environmental focusses solely on the assessment and control of risk from particulate silt pollution. Unless otherwise noted, advice from Frog Environmental does not encompass the following technical areas:

- Risks associated with contaminated land
- Risks associated with chemical contaminants in effluent
- Risks associated with high pH waters
- Ecological risks & designated sites
- Hydrological & flood risk

Silt pollution can present a serious risk to the environment as well as a threat to normal, profitable operations of a business. If any aspect of the advice or proposals from Frog Environmental is unclear, we strongly recommend that you contact our Technical Team.

Revision	Description	Issued by	Checked by	Date
00	Draft for client comment	NP	LOD	15.03.23
01	Revision following client meet	NP	LOD	10.05.23
02	Settlement test addition	NP	LOD	31.07.23
03				
04				

All advice, 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. Proposals are based on the best available data at the time of writing.

The advice contained within this report is for the purpose of preventing silt pollution. The contents of this report should not be construed as design advice with regards to hydrology or permanent or temporary works design.

This report is intended for the sole use of the customer. Frog Environmental accept no responsibility to other parties to whom this report, or any part thereof, is made available. Any such party relies on the content of this report at their own risk. Construction sites are dynamic and subject to the influence of multiple agents, both natural and anthropogenic. Frog Environmental are not 'in control' of the construction site or any portion thereof at any time. The recommendations noted in this report do not constitute design advice and Frog Environmental does not accept design liability for pollution control recommendations detailed within this report. The control of pollution from site is a statutory responsibility that remains with the customer and/or the Principal Contractor at all times.

Supplementary information to provide context such as location and layout of proposed actions will be appended to this document.

Author	Signature	Date
Natalia Perez del Postigo	*Natalia*	31.072023

Reviewer	Signature	Date

Contents

1. PROJECT BACKGROUND

Project Name	Oaklands Rise, Twyn y Rodyn	**Date of site visit(s)**	03/02/2023
Address	off the A4060 bypass in Merthyr Tydfil CF47 0LR	**Frog staff on site**	Natalia Perez Del Postigo Technical Specialist
Grid Reference	SO059059	**Data collection protocol**	A
Project Stage at visit	Pre-development	**Weather conditions**	Cloudy
Type of Project	Residential	**Site Area**	6.3 Ha
Previous Land Use	Agricultural	**Operating under Permit(s)**	NA at time of visit - TBC
Commencement date	March 2023	**Completion date**	December 2026

Table 1: Summary of site information

Frog Environmental has been appointed by Persimmon Homes to prepare a Pollution Risk Assessment and provide a series of Pollution Control Measures for the temporary works phase of Oaklands Rise at Twyn Y Rodyn.

Oaklands Rise is located off the A4060 bypass in Merthyr Tydfil off the A465 road if coming from the north, and off the A470 if coming from the South, at the end of Elm Tree Grove.

The project commences in March 2023 and is anticipated to until Q4 2026.
Postcode: CF47 0LR. NGR: SO059059

Figure 1 Oaklands Rise site location plan

2. SCOPE OF SURFACE WATER MANAGEMENT PLAN FOR TEMPORARY WORKS

The purpose of the surface water management plan is to provide an assessment of the silt pollution risk of a construction site during its temporary works phase. Based on the observation during the site visit and information gathered from the customer, practicable silt control actions and good management practices will be identified, and responsibilities suggested for delivery of these actions.

This plan will provide all the required supporting information for an environmental permit, bespoke water discharge activity application.

On this basis, the plan will consider:

- Pollution control risk assessment focusing on silt
- Site topography, geology and known contamination
- Watercourses and potentially sensitive environmental receptors
- Pollution sources, pathways and receptors risk assessment
- Site drainage catchment
- Soil settlement and flocculation
- Commentary on the current regulatory position
- Specific pollution control measures, including water treatment options
- General site management to prevent pollution
- Site inspection, monitoring and dynamic review of the pollution risks

In order to carry out the assessment the following data will be utilised:

- DEFRA MAGIC online mapping
- Environment Agency online flood mapping
- British Geographical Survey online mapping
- National River Flow Archive online datasets
- Site topographical and utility survey drawings
- Site geo-environmental Phase 1 and Phase 2 studies
- Proposed site plan and drainage layout

Whilst frog can provide detailed site-specific advice on the suitability of different types of silt control interventions, the final positioning of silt control interventions is the responsibility of the customer, who will also need to consider any potential hazards introduced by the deployment of silt control interventions such as slips, trips and falls, manual handling and machine access, if required. Frog Environmental will not be in possession of this information and cannot reasonably take on the responsibilities of a designer. Whilst the water management plan includes a map showing areas that can be used for silt control interventions, the map itself does not constitute a detailed design for use in construction. Frog Environmental are not ‘designers’ as defined by CDM.

3. ROLES, RESPONSIBILITIES AND CONTACTS

Table 1: Responsibilities for surface water management during temporary works

Role	Responsibility for surface water management during temporary works
Project Manager	Ultimate responsible for ensuring that there is no pollution from site; ensure temporary works can accommodate necessary water storage and treatment. Support and check that the water management plan, associated guidance and processes are being followed with support from the environmental manager and contracted environmental support. Secure environmental permits and consents. Foster the dynamic nature of water management, highlighting new areas of work that may present environmental risk and ensure these are proactively managed.
Site Manager	Highlight new areas of work that may present environmental risk. Lead on developing new ways of working to avoid, reduce and mitigate pollution, obtain support from the environmental manager and contracted environmental support and sign off from the HSEQ manager. Communicate and where necessary supervise the delivery of the agreed work and any additional actions. Act in the event of pollution incidents.
Principle Contractor i.e. Earthworks, Groundworks and Water Management Support	Follow processes communicated with respect to environmental protection and specific methods of work to prevent pollution. Delivery of temporary works including the implementation of site drainage, water storage and treatment following the water management plan and any site-specific measures. Report to site manager any pollution and near miss incidents. Act in the event of pollution incidents.
Environmental Manager / HSEQ Manager	Lead on proposals to address strategic environmental risk and present these to the business. Ensure incidents, monitoring, non-conformances, and complaints are discussed at weekly team progress meetings and ensure environmental risk is considered with any change or variation in the working method. Support development and sign off method statements for high-risk activities. Ensure that update to the water management plan and site-specific protection measures are communicated. Provide environmental training to all staff.
Site Staff	Follow processes communicated with respect to environmental protection and specific methods of work. Report to their immediate supervisor any pollution and near miss incidents observed. Act in the event of pollution incidents.
Contracted Environmental Support	Provide silt control products and services as contracted; support to evaluate environmental risk and advise on developing ways of working to avoid, reduce and mitigate pollution. Site monitoring and advise on new site-specific protection measures; discuss recommended actions with site manager, environmental advisor and HSEQ manager; agree responsible persons and timeframe for delivering on actions. Provide advice in the event of pollution incidents. Provide environmental training to all staff.

Table 2: Points of contact for surface water management during temporary works

Point of contact	
Person(s) acting as normal contact with the Regulator about this plan	Name: Anthony Harris Tel: 07721 260989 Email: anthony.harris@persimmonhomes.com
Person(s) acting as 24-hour contact with the Regulator in case of emergency (i.e. if there is an imminent risk of pollution or where pollution is occurring)	Name: Anthony Harris Tel: 07721 260989 Email: anthony.harris@persimmonhomes.com
Person(s) acting as the environmental lead with the Regulator about this plan	Name: Caroline North Tel: 07548 218673 Email: caroline.north@persimmonhomes.com
Person(s) acting on behalf of the operator as a contracted environmental support	Name: Natalia Perez del Postigo (Frog Environmental) Tel: 07827 765 850 Email: natalia@frogenvironmental.co.uk

4. POLLUTION CONTROL RISK ASSESSMENT

A site meeting and walkover was undertaken on the 3rd February by Adam Spiller, when the site was not live and all the vegetation was present. The walkover sought to identify sources of silt pollution from site as well as foreseeable sources based on information provided by site staff, the construction programme and the geography of the site.

4.1 Topography

There is a gentle gradient of land falling from northeast to southwest. This equates to an approximate 25m variation across the site, from approximately 240m to 215m.

4.2 Geology

The bedrock geology is predominantly comprised South Wales Lower Coal Measures Formation - Mudstone, siltstone and sandstone. The superficial deposits are mainly Till, Devensian - Diamicton. Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.

The soil type Stagnosol, which is a slowly permeable wet acid upland soil with a peaty surface and impeded drainage.

4.3 Known Sources of Contamination

The site investigation provided by Persimmon Homes was carried out by Merthyr Tydfil Borough Council and it is dated May 2007. A more recent document would be more informative. Nevertheless, this document states that no hazards related to coal mining are present within the investigated area, and that it has not been subjected to remedial works.

4.4 Settlement Test

Water samples will need to be collected to assess the presence of natural settlement or the need for flocculant dosing to enhance sediment deposition and capture.

4.5 Potentially Sensitive Environmental Receptors

The Nant Cwmblacs, an ordinary watercourse runs (culverted underground) across the southern site boundary from east to west, between the attenuation features Basin B and Basin A.

Flowing in a south-westerly direction for a further 450m the stream confluence with the Afon Taff, a main river at SO 053050.

The National River Flow Archive database was consulted to acquire flow data for the Afon Taff, the ultimate receiving body. The nearest fixed gauging point (Gauging Station 57015 datum 170.55m AOD") is located in Merthyr Tydfil (NGR: SO043068).

The 95% Exceedance (Q95) river flow is recorded as 0.746m^3/s whilst the 10% Exceedance (Q10) river flow is 9.6 m^3/s.

The site is not located in a flood risk area according to NRW flood records.

Further details of potentially sensitive environmental receptors are shown in Appendix B.

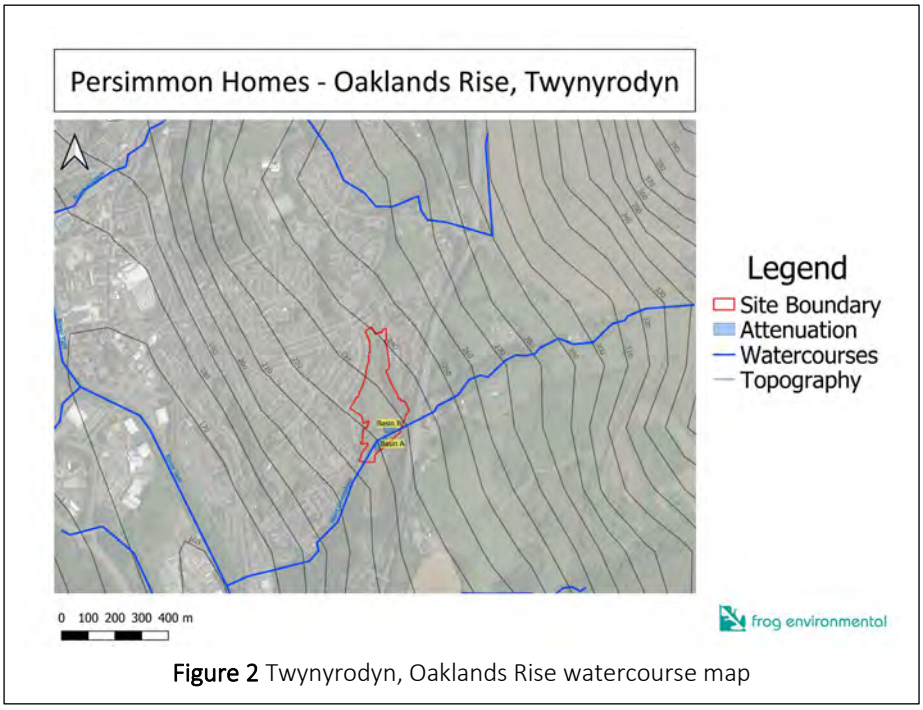
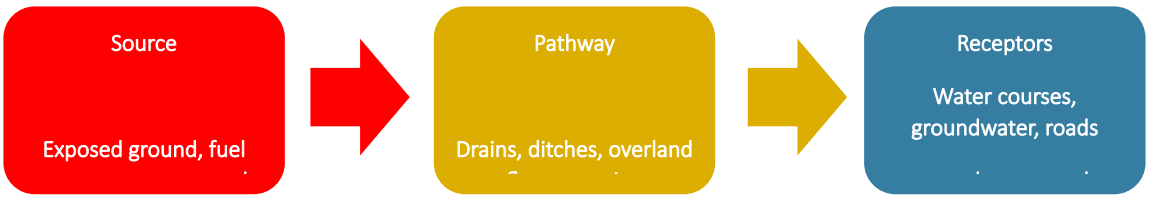


Figure 2 Twynyrodyn, Oaklands Rise watercourse map

4.6 Pollution Sources, Pathways and Receptors Risk Assessment

All pollution risks have three features:

- a source of pollution,
- a pathway for pollution to travel and,
- a receptor where the potential damage or harm is done.



The full risk assessment using the Source-Pathway-Receptor model can be viewed in Appendix B.

The assessment also provides an overview of the control measures that would be needed to ensure the risk is reduced. These Pollution Control Measures are detailed in the Action Plan in Section 7 of this report.

4.7 Site Drainage Catchment

The approximate surface area of the construction site is approximately 52,575m^2 with limited infiltration because of the soil type defined in Section 4.2.

Temporary attenuation must be designed based on the accepted discharge rate and required storage capacity defined by the lead local flood authority i.e. greenfield runoff rate and 1:100-year rainfall event, if downstream flood risk is high an additional 40% attenuation could be added to the final calculation. As an example a 10mm rainfall event, over a 24-hour period, would generate 525,750 litres (525.75 m^3) of surface water.

The NRW River Levels, Rainfall and Sea Data Website identifies the most local weather stations as:

- Llwynon Reservoir rain gauge located at SO0121811456.
- Pontsticill Upper rain gauge located at SO0588011910.

Over the past year rainfall has exceeded 10mm per day on 37 occasions and 40mm per day on 1 occasions (data available from March 2022):

Table 1 Rainfall data records exceeding 10mm/day Pontsticill year 2022 (source: NRW)

March	April	May	June	July	August	September	October	November	December
								33	
								20.2	
								15.4	
						12.8			
							21.6		
	14.6							10.2	
								34.8	
						10.4		14.4	
								21.4	
18.4		18.2							
10.3	10.8								
					11.4		15.2	20.4	
									22.8
									40.8
							29.2	24.2	
							10.6	30.6	20.8
				10.2			10.4	17.2	
							10		
								13.6	
			10.4						17.8
									24.2
						11.8			12.2

	13.4	24.2

frog environmental are not professional hydrologists, we recommend that a Senior Engineer working on behalf of the client collates and reviews information on drainage catchment size (m^2) that may extend beyond the limits of the site boundary, forecast infiltration rates and topography, with a view to calculating correct attenuation size during the temporary works phases.

4.8 Discharge Rate and Location

The surface water discharge from site will be intermittent, only undertaken as the need arises following local rainfall events. It will not be a continuous flow and unlikely to occur in dry weather.

Only rainfall surface water will be captured, treated to remove suspended solids, and released from site into Nant Cwmblacs.

The proposed discharge points are:

Reference	Description	Grid Reference	Max. Discharge Rate*
Discharge Point 1	Basin A Headwall	SO059055	

*The discharge rates have been agreed with the local council and approved through planning

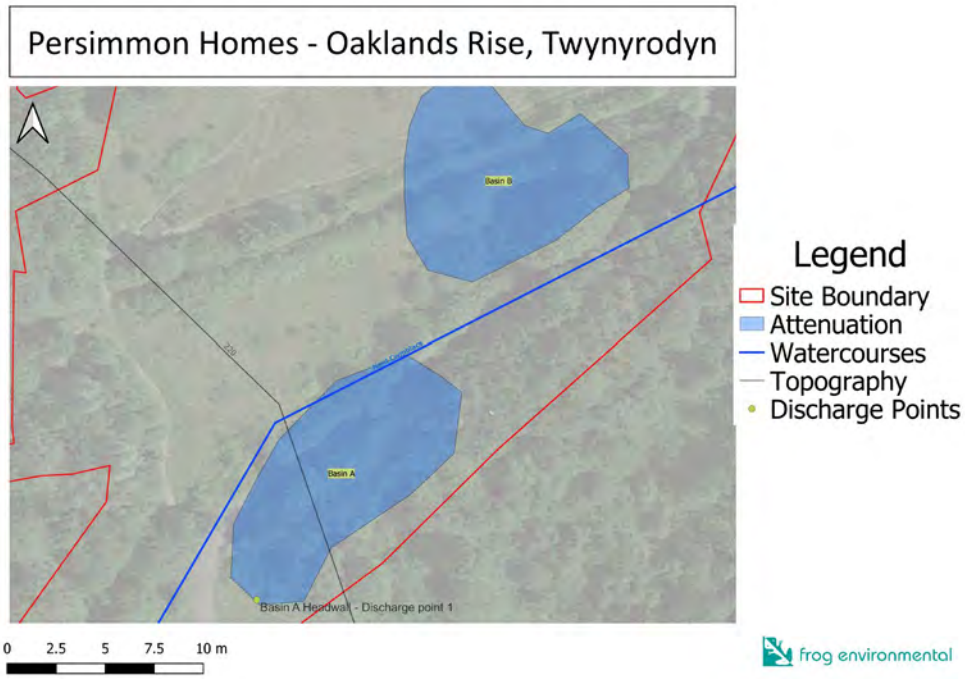


Figure 3 Discharge locations

Example of rate of discharge rates calculation:

- *If the discharge is gravity feed through drainage network (i.e. not exceeding 8.3L/s (498L/min)):*

  Calculation in m^3

  0.0083m^3/sec | 0.498m^3/min | 29.88m^3/hour

  Operating for 12 hours 358.56m^3

  Operating for 24 hours 717.12m^3

Please find out your discharge limit from your discharge consent and revise your drainage network restrictions to perform a similar calculation for your discharge location to as above.

5. SURFACE WATER DISCHARGE CONSENTS PERMIT REQUIREMENT

Guidance provided in the regulatory position statement (RPS) for temporary dewatering from excavations to surface water states that only uncontaminated water consisting of clean and clear rainwater or infiltrated groundwater may be released from a site for up to three consecutive months under exemption. Further detail can be found in Appendix C.

Taking this into consideration, our assessment is that it will not be possible to meet the conditions set out in the RPS and therefore a bespoke environmental permit will be required for a discharge activity during the temporary construction works.

Permits can take several months to be determined, so early engagement with the local environment officer is advised.

6. ENVIRONMENTAL MANAGEMENT SYSTEM

This Surface Water Management Plan should be part of the Persimmon Homes Environmental Management System (EMS), certified to ISO 14001:2015.

The plan is designed to identify environmental risk and outline the methods and philosophy behind avoiding and reducing pollution risk, as well as mitigating effect; collecting, treating and discharging water from site in a suitable manner so as not to impact surface and ground waters during construction.

The Surface Water Management Plan is a live, dynamic document and will be a standing agenda item on the weekly site progress meeting.

6.1 Communication

Environmental issues will be reviewed internally at weekly site progress meetings. The agenda will include:

- Identify change or variation in the working method and whether this alters the environmental risk profile
- Environmental incidents, complaints and non-conformance; assignment of corrective actions and sign off on previous actions
- Provide specific instruction to subcontractors and site staff
- Environmental information will be delivered to contract personnel in the following way:
    - Including environmental issues as an agenda item on project progress meetings
    - Inductions, topic-specific training, toolbox talks
    - Posting information on notice boards
    - Company communications, such as cascade briefings, intranet. Additionally, within the contract, information will be communicated through:
        - SHEQ meetings
        - Supply chain meetings
        - Weekly Project review meeting
        - Other meetings e.g. design team meeting

6.2 Record Keeping

Environmental records will be included in the Site Environment Folder and/or online project files:

- Staff competence and training records
- Environmental risk register and management systems, including instructions for methods of work and any pollution control plans
- Permits, licences and consents
- Inspections
- Site visit records (by others)
- Internal and external audit reports
- Minutes of progress meetings
- Correspondence including complaints and regulatory visits, including investigation reports
- Environmental survey reports
- Routine monitoring and compliance records and subsequent actions taken
- Incident and investigation reports
- Environmental data e.g. recycled aggregates, sustainable timber, etc.

6.3 Training and Awareness

Training is to be given in accordance with the relevant company's personnel development and training processes. However, as a minimum during this project:

- All project operatives and supervisory staff will receive a site-specific induction that covers environmental issues associated with their roles and responsibilities including environment.
- More detailed training, such as that required for pollution control measures and waste management plans, will be given to staff as required.
- Training on specific environmental topics will be given by suitably qualified personnel where required.
  Site supervisors, engineers or Environmental Advisor will give toolbox talks to operatives on key issues such as silt control, water pollution prevention, spill response, protected species and waste management, drawing upon the full suite of Toolbox Talk's (TBT's) as relevant to the project.
- Details of task specific Environmental Operational Controls including any permit conditions and detailed methodologies shall be included in RAMS.
- Display posters such as silt control, spill response
- Ensure permits to pump are in place

7. PROPOSED POLLUTION CONTROL MEASURES

Persimmon Homes have considered pollution control measures throughout the planning and implementation of the project. Whilst surface water management and pollution control systems will be in place from project commencement, these will need to be reviewed on a regular basis as the site works progress making this a dynamic plan managed through the monitoring process.

The surface water management for the temporary works will primarily use passive silt control options i.e., good working practices, drainage and settlement. Only when this avenue has been exhausted will active controls such as the use of flocculants and, or coagulants be introduced as a water treatment recommendation. Any active measures implemented will be done so incrementally to ensure treatment using the least flocculant.

The following tables define the recommended pollution control measures:

- **Table 3:** General good practice on site
- **Table 4:** Site specific water treatment and monitoring measures
- **Table 5:** Emergency and contingency measures

Table 3: General Good Practice on Site

Action	Description
A1	**Environmental Responsibility** - Identify a responsible person for environmental management - Ensure everyone on site has a basic awareness of silt control measures and their importance to avoid pollution (silt control toolbox talk Appendix D) - Provide specific instruction to subcontractors and site staff - Arrange more detailed CPD directly with Frog Environmental for those who require a more in-depth knowledge of silt control
A2	**Consents** - Land Drainage Consent from Lead Local Flood Authority for to do work on, over under or near (within 9m) an ordinary watercourse; earthworks, temporary and permanent crossings that include culverting, outfalls from site including headwall structures and flow volume. - Confirm that any abstraction such as over pumping can be operated within the water abstraction and impounding (exemptions) regulations 2017 (small scale dewatering in the course of building or engineering works) Section 5 - Bespoke Surface Water Discharge Consent for 6 locations
A3	**Access** - Formalise public highway access, establish a site compound with visitor parking. - Separate the delivery/unloading of materials ensuring sufficient space for this activity. - Separate the contractors, plant and machinery compound and ensure that there is always an oil pollution kit available as well as a plan to manage oil pollution incidents. - Provide suitable oil and chemical storage. **Haul Road** - Create a central 'spine' haul route to enable access to dig the attenuation ponds. - Haul Roads are to be constructed and maintained to a design capable of carrying site traffic. A regime of inspection & maintenance will be implemented. - Haul roads will be kept free from sludge, movement of vehicles will stop should ground conditions become too wet

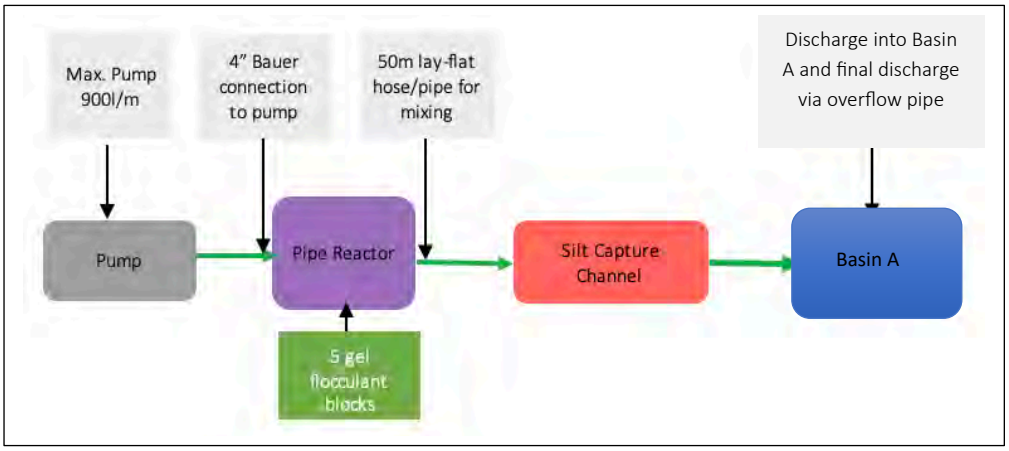
A3	**Haul Road Drainage (continuation)** - Create a V-ditch to the south (downhill) of the haul road to intercept water and move it to the attenuation ponds. Refer to Interceptor and Treatment Ditch Design Guidance (Appendix E). - Water must be prevented from flowing across the road. If excess water builds up on the north then create further ditches to intercept and pipe it across the road to the southern ditches/attenuation ponds, maintain clean flows wherever possible.
A4	**Sewage and Grey Water** - Connect to mains sewage if possible - Alternatively collect and tanker sewage from site or install a sewage treatment plant, this may require permits.
A5	**Construction Phase Planning** - Stabilise stock piles, and protect/cover any stock piles that are not being mobilised during the winter months. This will prevent excess surface water run-off to be treated. - Minimise soil stripping in winter months, install bunds to reduce runoff.
A6	**Materials Storage** - Refer to Materials Storage Guidance Note (Appendix F) - Specifically, bund/store soil at least 10m away from watercourses - Silt fencing will be installed around the base of all subsoil stockpiles.
A7	**Dust** - Should dust become an issue; wet down surfaces or vegetate to bind surface.
A8	**Pumping Standing Water** - Refer to Pumping Standing Water and Excavations Guidance Note (Appendix G) - Do not allow the pump hose or strainer to rest on and draw silts from the base of the excavation or area of standing water to avoid mobilisation of settled silt. Instead create a sump, stone pad, use a dolphin or float the head on a pontoon to extract water just below the surface. - Stop work within the excavation prior to it being pumped, this will prevent the disturbance of the material and contamination of the water. - Work within the specification of the water management plan, transferring water to a point where it may be treated and or discharged. - Consider issuing permits to pump to ensure that full consideration is given to the operation before the pump is started. This will include any monitoring requirements and detail water quality parameters to be achieved as well as noting any other limitations such as flow rate.
A9	**Concrete Wash Out** - Refer to Managing Concrete Wash Water and Runoff (Appendix H) - Make provisions and a method statement concerning high pH water/concrete wash water from various activities. - Concrete washings or high pH water must not be allowed to flow into any drain or watercourse.

A10	**Road Sweep Wash Water** - Managing Road Sweep and Wheel Wash Water (Appendix I) - It may be necessary to employ a road sweep to remove mud from the public highway to maintain a clean surface - Regular inspections will be undertaken in according to risk, e.g. prevailing weather conditions - A plan of drain maintenance, upkeep of roads, disposal of road sweeper spoil and vehicle wash down material will greatly reduce impact on the local highway and any unplanned pollution incidents - Road sweep washings and vehicle wash down runoff will be dirty with silt and possibly other contaminants. It is important that it is not released directly into the surface water drains or direct into the watercourses without treatment. - Preferentially remove road sweeper waste waters from site for disposal or identify a suitable location where treatment can take place.
A11	**Oil & Chemical Management** - Fuels, oils, paints, solvents and other Control of Substances Hazardous to Health (COSHH) materials will be kept in lockable containers, with controlled access to keys, and in line with legal requirements including the Control of Pollution (Oil Storage) (England) Regulations 2001 e.g. 110% bunding, use of drip trays, etc. - Oil and diesel storage facilities will be at least 30m from any watercourse including surface water drains and at least 50m from any borehole or well. - Regular maintenance on all vehicles and equipment. Daily check for oil leaks. Plant nappies and bunds on all static equipment. - No refuelling will be undertaken within flood zones - Fuelling operations will be planned to minimise the risk of spillage and environmental risk. Plant nappies will be used during all refuelling activities. Appropriate spill kits and drip trays will be provided for all equipment and at locations where any liquids are stored and dispensed. - A site-specific fuel delivery procedure shall be included within the site delivery RAMS. All those allocated the task of re-fuelling should be suitably briefed and maintain appropriate fuelling records where required. - Suitable precautions will be taken to prevent spillages from equipment containing small quantities of hazardous substances (for example, chainsaws and jerry cans) including: each container or piece of equipment will be stored in its own drip tray made of a material suitable for the substance being handled; and containers and equipment will be stored on a firm, level surface.
A12	**Waste Management** - Ensure the waste hierarchy is followed (in order): reduce, re-use, recycle/compost, energy recovery and disposal. - A Site Waste Management Plan has been developed during the early design stage. This will be reviewed and updated throughout the project in relation to any design changes or change in material use and subsequent waste streams. o Foul effluent from welfare facilities during construction shall be collected and removed from site by licensed waste contractors. o Waste fuels, oils and COSHH items shall be stored and disposed in line with waste management process.

A12	**Waste Management (continuation)** - Waste Movement Duty of Care. All waste movements will be covered by or accompanied by the correct Duty of Care documentation. o Waste Characterisation. Anticipated waste streams and their EWC codes shall be estimated prior to construction o Waste Carrier License checks shall be carried out and the Environmental Permits/Exemptions of planned disposal sites obtained prior to any waste movements. - Waste Storage & Segregation O Suitable skips, bins and storage areas shall be provided and closed or sheeted where required to prevent the escape of wind-blown debris. Waste storage must be suitably signed and display the correct EWC code.
A13	**Biosecurity** - No invasive plants and animals have been identified on site. - Do not enter any watercourses with machinery or pumps, if necessary, ensure that all equipment is cleaned prior to and following use in the watercourse - Reuse soil from on site, should any additional need to be sourced; use a reputable supplier who can guarantee that it does not contain any invasive plants. Any soil imported onto site must be from a trusted source to be clean of weeds. - Any trees and plants should be British grown where possible, sourced from pest and disease-free area and a supplier who adheres to the plan health management standard or other biosecurity management system. - Plant and tree stock health should be monitored

Table 4: Site specific water treatment and monitoring measures

Action	Description
A14	**Watercourse and Field** - Do not allow any vehicles to ford the watercourses or other open ditches/drains. - Develop a method statement that allows for temporary protection on the existing watercourse whilst the permanent/temporary culverts and attenuation ponds are constructed. This might require the protection of the banks to prevent runoff, over-pumping, or diversion of the channel as structures are installed. - Consider whether any downstream pollution control is required for the duration of these works such as silt mats - Refer to the Temporary Surface water crossing Guidance Note (Appendix J)
A15	**Stream and Cutting Protection** - Bund or silt fence along the edge of the stream if exposed whilst constructing the basins. - Ensure that water capture behind the bund can't escape into the drainage network or that a system of pumping is in place to ensure that it doesn't overtop the bund.
A16	**Property Protection** - Bund or silt fence along the site perimeter where it passes close to private property (gardens and buildings) and the gradient from site could result in water pathways being created. - Install an interceptor ditch inside the perimeter bund - Ensure that water capture behind the bund can escape into the drainage network or that a system of pumping is in place to ensure that it doesn't overtop the bund.

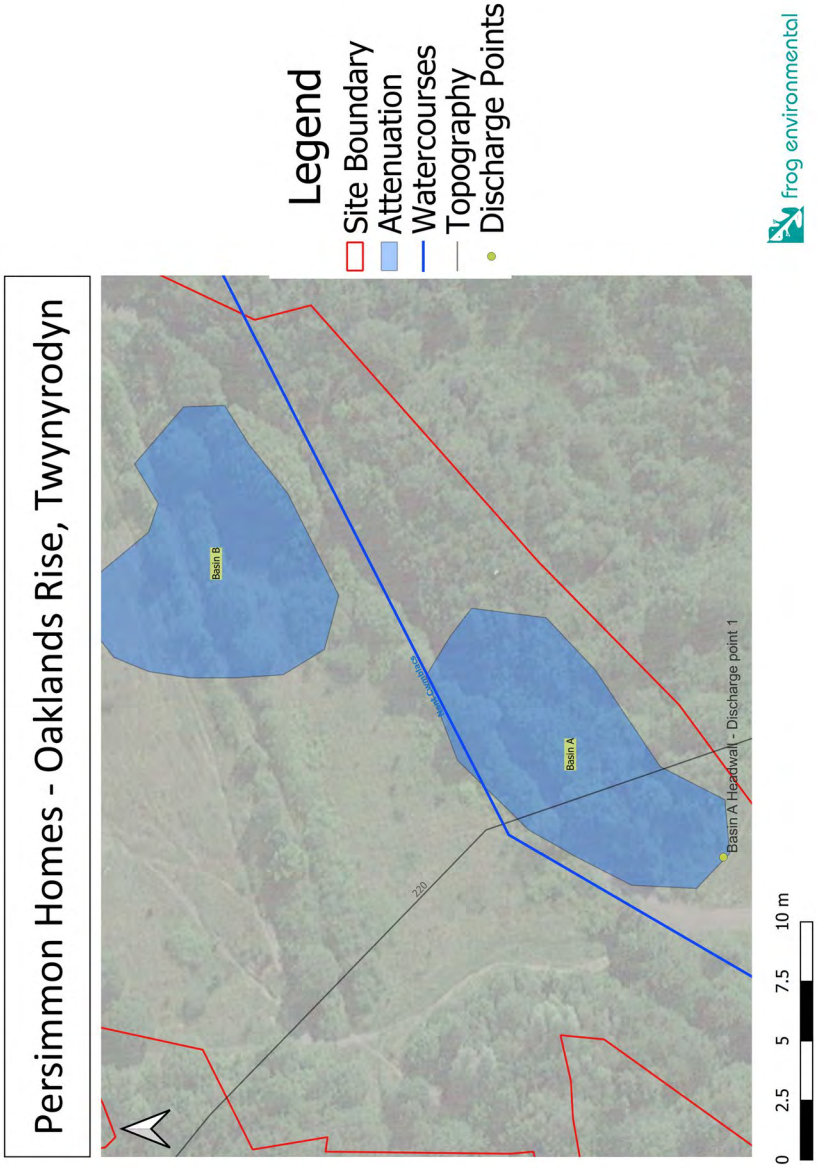
A17	**Perimeter Capture Ditch / Treatment Ditch** - Create an interceptor ditch on the southern perimeter to stop any water leaving the site, direct the water into Basin B. - Water treatment may be included within the drainage features under gravity flow, such as the introduction of Water Lynx gel flocculant blocks to aid the settlement of flocculated particles in the attenuation basins, this would reduce the cost of final treatment from site as sediment capture will be contained on site and not within the silt capture channels. - Refer to Interceptor and Treatment Ditch Design Guidance (Appendix E).
A18	**Attenuation Ponds/Basins** - Form the attenuation ponds early in the project, or as each section of road is opened to provide adequate drainage control. - Refer to Settlement Pond Guidance Note (Appendix K) for design principles. o Do not form the permanent outfall – water should be pumped via a treatment system o Prevent scour and erosion as the water enters the pond. o Use a geotextile curtain to create a forebay promoting settlement and stopping shortcutting. o Form a sump or use a floating pump head to extract water from the pond.
A19	**Water Treatment from Attenuation Basins** - Refer to Pipe Reactor Mobile Water Treatment System Guidance Note (Appendix L) and the Silt Capture Channel Installation Methodology - Constantly treat and release water to ensure maximise capacity in the attenuation feature. - Use a sump or floating pump head to reduce the transfer of silt when pumping. - Introduce water treatment to transfer water from attenuation pond to stream - Ensure the water treatment system is easily accessible to enable regular maintenance. - Treatment following the attenuation/settlement in Basin B should be introduced via a pipe reactor containing Water Lynx blocks (WL494 | WL360) and across a Silt Capture Channel, into Basin A for further settlement prior to discharge via overflow pipe.  - Pumping rate will be an important aspect of treatment, it is suggested that a maximum flow rate of 900L/min should be introduced with a single Silt Capture Channel and 1800L/min with two Silt Capture Channels and the flow split between them. - A 4" pump may be fitted with a flow restrictor/gate to physically reduce the flow rate and offer greater control. - The discharge should be direct to the stream from the silt capture channel without any further sediment contamination.

A19	**Water Treatment from Attenuation Basins (continuation)** - Prevent scour as water enters the stream, protecting the bank and bed as necessary - Consider utilising the attenuation ponds to remove the heavy sediment loading by introducing Water Lynx gel flocculant into the ditches and drains that feed the ponds. This will improve the treatment efficacy of the pipe reactor and silt capture channels as well as reduce ongoing maintenance costs.
A20	**Headwall Installation** - On completion of site drainage finalise the attenuation feature and install the headwalls. - Refer to Outfall Headwall Installation Guidance Note (Appendix M)
A21	**Silt Management** - Plan where any excess captured silts will be stored and/or used on site to prevent their re-entry into the surface water system. - Ensure that any waste material from the attenuation tanks and water treatment tanks can be emptied without causing any risk to the wider environment i.e., by a road sweeper suctioning out material and that the excess material can be moved to appropriate storage location. - Plan where any silt control materials such as Floc Mats and Silt Mats may be moved to or disposed of as appropriate.
A22	**Road Drainage** - Install gully guards in all drains on unmade roads and part complete roads https://www.forestgroupuk.co.uk/wp-content/uploads/2019/09/Gully-Guard-Installation-Guide.pdf - Check that the gully guards are installed correctly and not sitting in the bed of the main drainage pipework to ensure that they are not causing the accumulation of solids in the drain and that passing water does not entrain silts collected within the bags.
A23	**Monitoring** - Prepare a monitoring plan for the site. - Monitor daily the surface water being released from site as well as background levels in local watercourse both upstream and downstream of the site.

Table 5: Emergency and Contingency Measures

Action	Description
A24	- Construction will not be undertaken during extreme wet weather where it may lead to a safety concern. - In the event of a major spill of either fuel, or chemicals, the pumps lifting water out of the balancing pond to the treatment plant will be switched off. This will stop all water being discharged from the site. All contaminated will then be removed by a tanker.

8. SITE PLANS OF PROPOSED POLLUTION CONTROL



9. MONITORING

9.1 On-Site Monitoring Regime

To ensure that the mitigation and treatment process is working correctly, self-monitoring will be undertaken by trained site personnel daily when discharges are occurring.

Table 6: Monitoring locations

Monitoring Ref.	Description	Grid Reference
Discharge 1	Basin A	SO059055

The monitoring should include as a minimum; turbidity (NTU). The discharge consent will require total suspended solids (TSS) measured in mg/l. NTU may be used to provide a correlation to TSS, this offers a feel for the relationship in various environmental conditions rather than build an absolute correlation graph. It would be possibly to build greater confidence by checking the TSS values attained on site against a programme of sampling for TSS conducting in a laboratory.

To ensure that the mitigation and treatment process is working correctly, monitoring will utilise the standard monitoring record form (Appendix N), measure and record the following parameters:

Table 7: Water Testing Parameters

Parameter	Measurement	Range	Method
Weather	Visual	**Sun | Rain**	Observation
Discharge from site	Visual	**Yes | No**	Observation
Water Clarity	Visual	**Clear | Cloudy | Silty**	Observation
Turbidity	NTU	**0-150**	Palintest Turbidity Meter
TSS	Mg/l	**0-100**	Palintest Turbidity Meter
pH	pH	**6.5-8.5**	pH meter
Hydrocarbons	Visual	**sheen**	Observation

Should the monitoring regime show a rise in any of the parameters the test will be repeated. Should the test return the same elevated result, discharge from site will be ceased, site water tested, and the underlying cause investigated. If this test is within normal limits and proven not to be the source of the elevated results, then discharge will recommence. If the site water is found to be the source of the issue the discharge will cease until appropriate measures have been put in place to remove the source of pollution. Any anomalies or elevated results must be discussed with all concerned parties on site.

If a pollution event is deemed to have occurred, then the Regulator will be notified of the event, as required, and remediation measures undertaken.

Managing silt is an iterative process and any system will need to be checked regularly when it is first set up to ensure that it is operating at its optimum. Monitor the effectiveness of the interventions on a weekly basis or immediately following a storm event and scale back or up as required. All silt control measures require regular review with the aim of safeguarding against pollution events as construction progresses. Always seek specialist advice when needed.

Whilst proactive silt management will be encouraged it is acknowledged that an element of reactive work will be necessary, making the plan dynamic. Change or variation in the working method and new site activities will be assessed for their potential to impact on the water environment as well as reviewing working documentation, the implementation of that documentation and an evaluation of the site condition. Should the audit raise any issues or non-conformance with the projects EMS or best practice they will be addressed immediately during the audit. Where this is not possible or a problem with documentation and/or the EMS is identified a corrective action will be raised to the project's Environmental Advisor with a timeframe for completion.

10. ENVIRONMENTAL INCIDENT AND EMERGENCY PREPAREDNESS

Control measures to prevent and control environmental incidents and emergencies on sites are referenced in the register of environmental effects and detailed in site emergency plans.

Generally, pollution prevention will be achieved by adequate training, by the provision of containment measures such as plant nappies, absorbent mats or materials, drain covers for preventing impact on sewers or watercourses and by complying with safe working methods.

Adequate and appropriately placed spill kits will be provided for rapid incident response when and where prevention fails.

Regular drills (either practical or desktop) shall be conducted and recorded to maintain competency levels of site personnel and adequacy of response plans.

10.1 Incidents and Emergencies Response

Actions in response to environmental incidents and emergencies will be communicated at inductions and task briefings.

Site plans showing the locations of spill kits and waste facilities, in addition to the locations of health and safety facilities, will be available on-site office and welfare cabin notice boards.

Plans will include the names of personnel with specific environmental responsibilities, and actions to be taken. Cross reference will be made to contingency planning requirements.

Provision of spill kits and drainage protection (drain covers and absorbent pads) will be available on site to be used in the event of a fuel spill to protect sewer and surface water drains.

10.2 Incident Reporting and Investigation

Incidents are to be reported through the management hierarchy as soon as practically possible after they have been identified. Site management will assess the significance of the incident and determine the level of investigation.

All incidents must be reported to the Environmental Advisor and entered onto the appropriate reporting system.

Incidents must also be reported in accordance with the Persimmon Homes Environmental Incident Process.

11. APPENDICES

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Appendix A
Settlement and Flocculation Test Report

Settlement Test and Gel Flocculant Validation Report
CT-02v5

Frog reference	FR3120
Customer	Persimmon Homes
Site	Twyn y Rodyn
Sample	Collected by Natalia Perez del Postigo (frog environmental)
Date	31.07.2023
Lead Author	Natalia Perez del Postigo natalia@frogenvironmental.co.uk

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Introduction

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

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

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

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

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

About Gel Flocculant

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

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

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

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

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

Test Process

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

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

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

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

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

Disclaimer

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

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

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

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

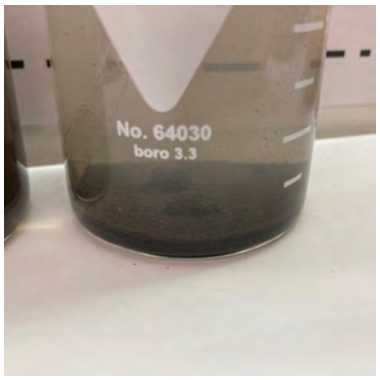
Results

Water Temperature (°C)	**17.4**	**pH**	**7.89**

A. Control vs 30 min Settlement

B. Control vs 12h Settlement

Turbidity 256 NTU to 172 NTU	Turbidity 172 NTU to 81 NTU

 A. Test 1 Control vs WL 494 / 398 (15 seconds agitation plus 30 seconds settlement)	 B. Test 2 Control vs WL 494 / 398 (further 15 second agitation from Test 1 plus 60 seconds settlement)
Turbidity 256 NTU to 287 NTU	Turbidity 287 NTU to 153 NTU
 C. Test 3 Control vs WL 494 / 398 (further 15 second agitation from Test 2 plus 60 second settlement)	
Turbidity 153 NTU to 64 NTU	Test 3 Close Up

Summary of Results

Natural settlement at Twyn y Rodyn reduced from 256 NTU to 239 NTU over a period of 10 mins. Settlement for 30 min decreased the NTU from 239 NTU to 172 NTU, with visible change. After 2 hours, turbidity decreased to 130 NTU. A further 12-hour settlement provided a further reduction in turbidity to 81 NTU.

Testing showed the most effective Gel Flocculant to be WL494 in combination with WL398. The first stage of testing did not show a quick reaction nor a visible solid-separation, with the turbidity reading showing an increase from 256 NTU to 287 NTU. The second stage of mixing resulted in a fast reaction with visible sediment deposition, reducing the rabidity to 153 NTU. The third and last stage reduced the turbidity to 64 NTU, resulting in a clear sample with noticeable deposition and a fine flocculated sediment.

Conclusions and next Steps

Physical settlement is extremely likely to achieve clear water at Twyn Y Rodyn if correct attenuation and silt management is implemented. The addition of flocculant will enhance and speed up the sediment deposition when the volumes on site hinder longer attenuation times. Settlement Testing is a key factor when it comes to assessing the risk of a construction site causing a silt pollution event. However, there are other important factors to consider:

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

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

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

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

To discuss next steps, contact: Natalia Perez del Postigo (natalia@frogenvironmental.co.uk)

Appendix B

Potentially Sensitive Environmental Receptors Assessment

Pollution, Pathway and Receptors Risk Assessment

Potentially Sensitive Environmental Receptors and Source Pathway Risk Assessment

Project Reference	FR3210
Client	Persimmon Homes
Site	Oaklands Rise Twyn Y Rodyn
Activity	Residential development
Assessor	Natalia Perez del Postigo

The significance of the risk will be assessed as Low, Medium or High, in accordance with following risk matrix.

Table 1: Risk Matrix

Likelihood of activity resulting in an impact	**Severity of the impact**		
	Low	**Moderate**	**High**
Negligible	**Low**	**Low**	**Low**
Unlikely	**Low**	**Medium**	**Medium**
Likely	**Low**	**Medium**	**High**
Certain	**Medium**	**High**	**High**

The likelihood of the activity resulting in an impact has been ascertained from discussion with the client, existing reports and professional judgement.
The severity of the impact has been determined by considering potentially sensitive environment receptors.
Site specific pollution control measures have been defined where the risk is assessed as Medium or High.

Table 2: Potentially Sensitive Environmental Receptors

Sensitivity Mapping	Yes/No	Comments	Risk
European designated sites or SSSI within 500m	No		Low
European designated sites or SSSI within 2km downstream	Yes	Cwm Glo a Glyndyrys SSSI 1km away to the west of the site	High
Spring, well, borehole not used to supply water for domestic or food production purposes within 50m	No		Low
Spring, well, borehole used to supply water for domestic or food production purposes within 250m	No		Low
Surface waters within 250m	Yes	The Nant Cwmblacs flows along the southern boundary of the site, where the discharge outfall is planned to be. This brook ultimately reaches the Afon Taff around 800 m downstream to the southwest.	High
Are the surface waters a fishery	No		Low
Groundwater Source Protection Zone	Yes	Minor Aquifer beneath the site(Sheet No 35, EA Groundwater Vulnerability Map): Variably permeable, provides important local supply and base flow to rivers. Glacial till deposits, Lower Coal Measures	Medium
Classified as a flood zone	Yes	Medium-high flood risk from surface water and small watercourses on site. 800m from area with medium-high flood risk from rivers	Medium
Critical Drainage Area	No		Low
Surface water NVZ area	No		Low
Groundwater NVZ area	No		Low
Eutrophic NZV area	No		Low
Surface water safeguard zone (drinking water)	No		Low
Groundwater safeguard zone (drinking water)	No		Low
Water abstraction from surface waters within 250m	No		Low
Public Rights of Way	No		Low
Industrial Land Use	No		Low
Contaminated land	No		Low
Buildings/houses within 250m	Yes	Neighbouring houses adjacent to western south boundary.	Medium

Groundwater Aspects				
Sensitivity	**Superficial Aquifer**	**Bedrock Aquifer**	**Vulnerability**	**Detail**
	Secondary A	Secondary B	MEDIUM-HIGH	Secondary 'A' Aquifer of the Superficial Deposits: Variable permeability sand and gravel for the glaciofluvial deposits and Low permeability clay with some silts, sands and gravels for the alluvium. Secondary 'B' Aquifer of the Tetragraptus Beds: Variable moderate permeability and porosity with intergranular flow possible.

Table 3: Source, Pathway and Receptor Risk Assessment

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Residual Risk (Significance)
					Likelihood Negligible Unlikely Likely Certain	Severity Low Moderate High	Risk Significance Low Medium High			
R1	Seasonal weather	Highway drains, site ditches, land drains, surface runoff and infiltration	Local roads Watercourses groundwater	Deterioration in water quality (silt)	Certain	High	High	Rainfall will contribute to the need for pumping water in excavations	Minimise subsoil exposure Make provision for water management on site and silt control as detailed in plan. Have emergency provision in place should attenuation reach capacity.	Low
R2	Access roads (for office, visitors, and site vehicles)	Drainage	Local roads	Mud on local roads Deterioration in water quality (silt)	Certain	High	High		Tarmac access for all visitors. No visitor's cars are allowed on the haul road. Only site inspection vehicles are allowed to access the main haul road. Do not allow machines to track offsite.	Low

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Residual Risk (Significance)
					Likelihood Negligible Unlikely Likely Certain	Severity Low Moderate High	Risk Significance Low Medium High			
R3	Car park and compound	Drainage and infiltration	Local roads groundwater Watercourses	Oil, chemical, concrete and silt pollution	Certain	Moderate	High	Site office and associated car park	The main site office has a stoned car park for office vehicles and visitors. Create a separate stoned compound for contractors, plant and machinery, material deliveries and storage. Supply suitable oil and chemical storage facilities	Low
R4	Foul and grey water	Office drainage system	Watercourses	Deterioration in water quality	Certain	Moderate	Medium		Sewage will be collected and tankered from site if there's no access to permanent foul drainage	NA
R5	Boot washing	Infiltration	Groundwater	Deterioration in water quality (silt)	NA	NA	NA		Provide boot wash	NA

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Residual Risk (Significance)
					Likelihood Negligible Unlikely Likely Certain	Severity Low Moderate High	Risk Significance Low Medium High			
R6	Material storage	Wind, rainfall	Watercourses groundwater	Deterioration in water quality (silt)	Certain	High	High		Store materials in main compound - defined storage facility or area with protection from the weather. Waste materials must be moved from site to be processed in the main compound. Soils in the exception that may be kept for reuse/reinstatement.	Low
R7	Earthworks, removal of topsoil, subsoil etc	Silt production from surface water runoff	Watercourses groundwater	Increased sediment load in runoff	Certain	High	High	Limited earthworks extent, mainly excavating drainage measures and reinstating with additional capacity	Phase the work to retain as much of the vegetated areas as possible and avoid exposing soils. Plan to reinstate the area at the soonest opportunity when seed will grow optimally.	Low
R8	Haul roads (for site machinery)	Surface water runoff	Watercourses groundwater	Increased sediment load in runoff	Likely	High	High		Ensure haul roads are made of compacted soil and have surface water run-off protection/interceptor features.	Low

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Residual Risk (Significance)
					Likelihood Negligible Unlikely Likely Certain	Severity Low Moderate High	Risk Significance Low Medium High			
R9	V ditches	Surface water runoff	Watercourses groundwater	Increased sediment load in runoff	High	High	High	Small ditches may be utilised to help manage water	Consider using ditches manage water on site, slow the flow of the water runoff and direct it to an area where it may be treated.	Low
R10	Watercourses Working near water Working on floodplain	Drainage and Runoff. Direct access on the water course banks and flowing water	Watercourses	Deterioration in water quality (silt/oil)	Certain	High	High	Watercourses present to the West and south of the site.	Bund the boundaries to the West and South to prevent any water escaping site into the watercourses. Formalise discharge to avoid scouring and untreated run-off ingress. Implement flocculant/coagulant water treatment to prevent any silt pollution leaving site if need (see results from settlement test Appendix A).	Low
R11	Road drainage Surface water drains	Drainage and runoff	Watercourses	Deterioration in water quality (silt/oil)	Certain	High	High	Once the surface water drains are present on site	Protect the surface water drain on site to prevent runoff. Bund or place wattle around the feature. Wrap the lid in geotextile, use gulley protection; geotextile-type interceptors beneath the guard to trap solids. Regularly maintain. Protect drainage on the access road using geotextile guards. Road sweep access route if likely to become muddy.	Low

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Residual Risk (Significance)
					Likelihood Negligible Unlikely Likely Certain	Severity Low Moderate High	Risk Significance Low Medium High			
R12	Field Ditches	Connection to controlled water	Watercourses	Silt pollution	Likely	Medium	Medium	Former field ditches will be encountered on site	Should any existing ditches be utilised for surface water management, please refer to the Interceptor and Treatment Ditch Guidance Note for best practice	Low
R13	Existing Land Drains	Connection to controlled water	Watercourses	Silt pollution	Unlikely	High	Medium	No land drains identified on-site	Should land drains be encountered ensure that they are severed to prevent direct run off to watercourse and pump water to treatment areas.	Low
R14	Standing water and excavations	Pumping	Watercourses	Silt and oil pollution	Certain	High	High	Standing water present on site. Excavations are required 1-2m deep and water may accumulate	Only pump with a permit in place, do not draw through heavy sediments. Use a floating pump head or sump. Use specific flocculant/coagulant water treatment measures to reduce the transfer of heavy silt when pumping (see Appendix A to confirm if flocculant is required)	Low
R15	Attenuation (Interception tanks, lagoons and basins)	Infiltration, pumping, overtopping	Watercourses groundwater	Deterioration in water quality (silt/oil)	Certain	High	High	Attenuation ponds will be constructed nearby the receptor	Protect the receptor from run-off during construction of the ponds. Formalise ponds outfall and protect from scour. Plan to pump excavations should they fill with water.	High

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Residual Risk (Significance)
					Likelihood Negligible Unlikely Likely Certain	Severity Low Moderate High	Risk Significance Low Medium High			
									Introduce water treatment to remove the clay fraction using flocculants/coagulants.	
R16	Discharge from attenuation	Infiltration or pumped	Watercourses groundwater	Deterioration in water quality (silt, oil, flocculant, coagulant)	Certain	High	High	Water will need to be moved from excavations on site.	Obtain an environmental permit for discharge activity. Demonstrate that the flocculant/ coagulants and any other treatment used will not cause degradation to the ground water or abstraction for drinking water. Scour protection in watercourse. Monitor the surface water being released into the drainage at the point of discharge.	Low
R17	Groundwater	Intrusion into excavations	Site Watercourses	Deterioration in water quality	Likely	Moderate	Medium	Groundwater intrusion into excavations may occur.	Obtain an abstraction license should pumping exceed 100m^3/day. Form dewatering pits with gravel sump to allow clean water to be extracted.	Low

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Residual Risk (Significance)
					Likelihood Negligible Unlikely Likely Certain	Severity Low Moderate High	Risk Significance Low Medium High			
R18	Directional drilling using bentonite	Break out through natural fissures	groundwater Watercourses	Deterioration in water quality	NA	NA	NA	No drilling		NA
R21	Liming	Infiltration Runoff	Watercourses groundwater	Alkaline water and silt pollution	NA	NA	NA	No liming		NA
R22	Contamination	Water transfer	Watercourses	Deterioration in water quality	Unlikely	Low	Low	Site Investigation (ref: 14130/LW/22/SI) confirms no contamination	If any signs of contamination are encountered during works such as visual or olfactory oils or gases cease work to investigate and determine a way forward.	Low

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Residual Risk (Significance)
					Likelihood Negligible Unlikely Likely Certain	Severity Low Moderate High	Risk Significance Low Medium High			
R23	Flocculants & coagulants used for water treatment	Water treatment Infiltration Pumping	Watercourses groundwater	Deterioration in water quality	Certain	High	High	Inappropriate use of flocculants and coagulants could cause significant damage in the water env	The gel flocculant blend will be confirmed through jar tests and management calculations produced to ensure that the concentrations are within the EQS and Drinking Water Standards. MSDS will be provided.	Low
R24	Concrete wash water	Drainage and infiltration (soil)	Watercourses groundwater	Deterioration in water quality (high pH)	Certain	High	High	Concrete will be required for foundations	Do not allow wash water to enter surface waters or groundwater. Only pour in dry conditions Ask the concrete providers to utilise an away wash unit to remove the need for any concrete wash out on site. Should this not be feasible utilise a concrete wash out that has been established at the main compound where there is less risk of pollution. Separate the solids and dispose on the concrete crush pile and treat high pH water.	Low
R25	Dust: dry weather, cutting and cleaning operations	Wind Roads	Watercourses	Deterioration in water quality (silt)	Certain	Low	Medium	The fine particles sizes mean that dust would quickly form in dry conditions	If dusty, wet down surfaces or vegetate to bind surface. Shield cutting, drilling and piling operations, manage the water runoff from the activities to ensure it is collected and treated.	Low

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Residual Risk (Significance)
					Likelihood Negligible Unlikely Likely Certain	Severity Low Moderate High	Risk Significance Low Medium High			
R26	Vehicle and equipment leakage	Infiltration (soil) and drainage systems	Watercourses groundwater soil	Oil pollution	Unlikely	Moderate	High	Many of the vehicles on site have hydraulic hoses and are working remote to the yard	Regular maintenance on all vehicles and equipment. Daily check for oil leaks. Plant nappies and bunds on all static equipment. Spill response plan.	Low
R27	Oil and diesel fuel storage	Infiltration (soil) and drainage systems	Watercourses groundwater soil	Oil pollution	Certain	High	High	Oil storage is limited on site to bowsers and few small bottles of specific engine oil	Locked fuel bowsers, spill mats refuelling protocol. Spill response plan.	Low
R28	Refuelling activities	Infiltration (soil) and drainage systems	Watercourses groundwater soil	Oil pollution	Certain	High	High	Refuelling away from depot is a requirement and there are large number of machines on site	Refuelling protocol via bowser on site to be followed. No fuelling to take place near the dock. Fuel bowser to be checked daily for damage and kept locked unless in use.	Low
R29	Chemical storage	Infiltration (soil) and drainage systems	Watercourses groundwater soil	Chemical pollution	Likely	Low	Low	Chemicals associated with water treatment will be stored.	Chemical storage, containment, and inspection guidance to be followed. Inventory of chemicals and COSHH to be maintained. Spill response plan.	Low

Risk No	Source	Pathway	Receptor	Impact of pollution	Risk Assessment			Rationale	Control Measures	Residual Risk (Significance)
					Likelihood Negligible Unlikely Likely Certain	Severity Low Moderate High	Risk Significance Low Medium High			
R30	Road sweeping and vehicle wash down	Site drainage	Watercourses groundwater	Oil and silt pollution	Unlikely	Medium	Medium	Road sweeper may be needed if access road becomes muddy.	All dirty water collected and removed from site for disposal. No wash waters will be released directly into surface water drains or ponds.	Low
R31	Waste management	Wind, rainfall	Watercourses groundwater soil	Oil, chemical or silt pollution	Unlikely	Moderate	Medium	Limited waste is being generated on site.	Waste management hierarchy and best practice. Identification (EWC), separation, storage and disposal for each waste stream listed. Waste carriers and final disposal site to be confirmed and checked. Waste transfer & consignment notes completed and retained on site.	Low

Sources and pathways for pollution risk assessment

Site Name:	Oaklands Rise, Twyn y Rodyn	Date of site visit:	03/02/2023
Client:	Persimmon Homes	Assessor:	Natalia Perez del Postigo
Map of site?	Yes, see SWMP	Project start:	March 2023
Topography/inclination?	Gentle gradient falling NE to SW	Project duration:	3 Years
Infiltration area?	Slowly permeable	Regulator Involvement?	Yes
Geology? Observations..	Mudstone, siltstone and sandstone with stagnosol deposits	Water Sample:	No
Aquifer/Groundwater protection zone?	Low productivity aquifers.	Silt Sample:	No

Monitoring:
Baseline information? Not acquired yet
Consented discharge levels? Persimmon Homes to consult NRW
What types of monitoring do they hope to achieve and frequency? On site testing of pH and turbidity by Persimmon Homes appointed staff.
What are likely pollutants? pH, , Silt .. Metal contaminant are possible to be present on site due to the recent road construction near the eastern site boundary.

Notes:
Initial site visit on 3rd Februaryl, when the site was not live, just a greenfield.
Further visits will collect samples of silt and muddy water once the groundworks commence.

Sources and pathways for pollution risk assessment

Source	Pathway	Receptor	Controls / Risk Management Techniques	Exposure
Activity or location on site where silt may be produced	Describe the route the silt may take to get to the receptor e.g. overland flow, runoff, spring, ditches, land drains, infiltration to ground	Surface water or foul drain, river, stream, groundwater	Describe possible controls that could be implemented to prevent pollution or minimise risk	Is this likely to be happening on this site?
Site Investigations	N/A	N/A	Use the route of the main haul roads for any temporary access routes. Vehicles with tracks/wide tyres etc for least impact River/stream/ditch crossings	N/A
Site Access including site compound/parking	Run-off, infiltration to ground	Afon Taff, unnamed water course	Formalise access onto main road Ensure this is hard standing – does it need to be a raised pad with /flow diversion berm to trap material on site Wheel wash or grid system to remove mud from site vehicles? Road sweeper utilisation - tarmac/concrete roads	Likely
Road sweeping/wheel wash facilities	Run-off, infiltration to ground	Main road	The road sweeper washings should be removed from site for disposal at a suitable treatment facility Define area for infiltration	Likely

Sources and pathways for pollution risk assessment

Source	Pathway	Receptor	Controls / Risk Management Techniques	Exposure
Drains (existing and those created)	Infiltration to ground	Are they surface water, foul or both? Afon Taff	Map existing drains Mark drains on site (colour coded) Drain guards, variety depends on risk (oil/silt) Clean roads – road sweep Oil/chemical storage	Likely
Foul and grey water	Infiltration to ground, run-off	Afon Taff	Connected to mains drainage – is consent in place with utility company? Sewage treatment plant – manage discharge Collect and remove from site	Likely
Haul Roads	Run-off	Overland, Afon Taff	Compact surface to prevent mud build up Can it be stabilised? Stand down during heavy rain conditions Drainage – what type? Where eg side of road? Map the drainage	Likely
River stream and ditch crossings	Overland flow and run-off	Afon Taff	Formalise crossing – method to achieve this minimising pollution – note depth of water/width of crossing. Advice on best practice for silt control	Likely

Sources and pathways for pollution risk assessment

Source	Pathway	Receptor	Controls / Risk Management Techniques	Exposure
Overland flow entering the site from up-slope or other point (water travelling from third party land onto the site)	Steep gradient area by site entrance	Flow overland, Afon Taff	Consider leaving the area vegetated and construct bunds and flow diversion channel. Interceptor ditch	Likely
Point source entering the site (water travelling from third party land onto the site)	N/A	N/A	Keep this clean. Define how this can be achieved as it travels through the site eg culvert or French drain	unlikely
Topography – inclination on site, natural low points	Steep gradient area by site entrance	Flow overland, Afon Taff	Where will the water run too? Do we need protection in place? Can it be kept clean? Is a silt fence useful?	Likely
Natural Spring(s)	N/A	N/A	Identify natural springs/water sources that can become contaminated and carry water off site. Identify the source/route, pipe/culvert/French drain to prevent contamination from site activity	Unlikely

Sources and pathways for pollution risk assessment

Source	Pathway	Receptor	Controls / Risk Management Techniques	Exposure
Topsoil stripping - Cut and fill operations	Overland		Phase topsoil stripping/ cut and fill operations Creating batters/slopes/embankments? Protection of slopes – baffles/surface roughness, geotextile, hydraCX seeding, re-vegetation Direction of tracking Drainage	
Surface water runoff from exposed soils			Is it causing erosion? Slow water down – would it help to hold water on land? Is there infiltration? Intercept water – send to ponds for treatment Silt management in drainage ditches	
Land drains			Can these be intercepted? Send to ponds for treatment or other treatment?	
Ditches			Method for cutting a good ditch with flat bottom and sloped edges. Stabilise high velocity ditches line with geotextile, insert scour protection. Can be used to support silt control using baffles and sumps	

Sources and pathways for pollution risk assessment

Source	Pathway	Receptor	Controls / Risk Management Techniques	Exposure
Dewatering - standing water and excavations	Pumping	Overland flow, Afon Taff	Don't pump standing water and excavations directly to any watercourses, infiltration, use the attenuation pond as settlement or introduce chemical treatment. Advice on best practice for pumping such as permit to pump.	Likely
Attenuation basin	Run-off	Overland flow, Afon Taff	Utilise the planned attenuation basins to help settle silts. Can the discharge be controlled? Do they have adequate capacity in winter or during heavy rainfall -1in10 year event?	Likely
Water treatment	Run-off	Overland flow, Afon Taff	Once the site is live, a representative sample will be collected to advise settlement rates and flocculant validation. If flocculant dosing is needed, introduce a Pipe reactor with SCC. Details on SWMP.	Likely
Working near water	Run-off, overland flow, infiltration	Overland, Afon Taff	Develop site specific method statements for working near water. Is a flood risk activity permit (FRAP) required?	Likely

Sources and pathways for pollution risk assessment

Source	Pathway	Receptor	Controls / Risk Management Techniques	Exposure
Working in water e.g. Headwall installation	Run-off, infiltration	Afon Taff	Develop site specific method statements for working in water. Isolate the area, diverting water around the work area or damming and over-pumping the stream. Will an abstraction licence be required? Vegetate the banks at the earliest opportunity. Is a flood risk activity permit (FRAP) required?	Likely
Dredging, desilting and managing silt accumulations	N/A	N/A	Is silt non-hazardous? Where is it in excess? Where can it be used? Removed from site? What measures are needed to protect downstream environment if in a watercourse	Unlikely
Outfall/Discharge to river/stream etc	Run-off, infiltration	Afon Taff	Ensure the point at which water is pumped off site is protected from scour. Does the river/stream have capacity for excess water? Will a discharge licence be required? Will monitoring be required?	Likely
Stockpiles	Run-off, infiltration	Afon Taff	Separate soil types e.g. topsoil/subsoil and materials. Do not store above 3m in height, store away from water/drains/bore holes, stabilise/cover, consider fencing or wattles to prevent material flowing towards water	Likely

Sources and pathways for pollution risk assessment

Source	Pathway	Receptor	Controls / Risk Management Techniques	Exposure
Concrete wash water	Run-off, infiltration	Afon Taff	Suitable provision should be made for the washing out of concrete mixing plant or ready mix concrete lorries. Can lorries take washings back to yard – use cap on end of chute with a concrete sock. Silt Buster/Kelly tanks pH treatment. Mudtech pH blue treatment	Likely
Grouting/piling				
Dust: dry weather, cutting and cleaning operations	Air, haul roads	Afon Taff, overland	Wet down surfaces, use soil stabiliser to bind surface of roads etc Shield cutting and drilling operations, manage the water from the activities to ensure it is collected and treated	Likely
Diesel fuel storage	Run-off, infiltration	Afon Taff	Oil storage guidance - Impermeable surface. Locked fuel bowsers, refuelling protocol. Spill response procedures.	Likely

Sources and pathways for pollution risk assessment

Source	Pathway	Receptor	Controls / Risk Management Techniques	Exposure
Refuelling activities	Run-off, infiltration	Afon Taff	Develop a refuelling protocol and spill response	Likely
Plant maintenance	Run-off, infiltration	Afon Taff	Daily check on hydraulics for leaks etc	Likely
Chemical storage	Run-off, infiltration	Afon Taff	Chemical storage, containment and inspection guidance. Inventory of chemicals and COSHH Rock salt storage – a specific risk? Chemical cleaners in office - Use ecological cleaners to protect the bacteria in sewage treatment plant and surface water diversity	Likely
Waste management	Run-off, infiltration	Afon Taff	Waste management best practice. Separation, storage and disposal routes for each waste stream to be identified, waste carriers and final disposal site to be confirmed and checked	Likely

Sources and pathways for pollution risk assessment

Source	Pathway	Receptor	Controls / Risk Management Techniques	Exposure
Biosecurity	Run-off, infiltration	Afon Taff	Biosecurity assessment to identify site-specific risks including the presence of invasive plants and animals, whether land or water based. These risks should be assessed with appropriate actions put in place and highlighted to all site personnel.	Likely

Appendix C

Temporary Surface Water Discharge Consents Guidance Note

frog environmental

England Guidance Note

GN-02: Environmental Permitting (Water Discharge Activity) England

In England, discharges to a surface watercourse require permission under The Environmental Permitting Regulations. For low risk, short-term discharges a fee-free exemption applies (The "RPS"), however, the applicability of this for large construction sites is severely limited.

For the majority of cases a BESPOKE permit is needed, requiring the allocation of resources, review & good planning. This guidance note provides background on the permitting structure and assistance on the key aspects needed to complete a bespoke permit application.

When is permission needed?

Permission is required from the Environment Agency (EA) for the temporary discharge of surface water into any watercourse- for example, discharging overland run-off from a construction site.

Contractors often cite agreement for headwalls, drainage assets, and a defined final flow rate from site, acquired via the Lead Flood Authority (LFA) or Local Authority (LA) as being permission to discharge to a watercourse during the temporary works phase.

These permissions generally apply to the final, completed scenario, when drainage systems, landscaping and hardstanding are complete, leading to the routine discharge of clean, uncontaminated surface water only.

Permission from the LA, LFA or planning body **does not** relate to the temporary works position where bare ground and exposed soils require active management in order to prevent pollution, often for a period lasting several years.

Planning Approval may bring a conditional requirement to manage silt and sediment run-off, but in practice this is enforced by the Environment Agency, rather than the Local Authority.

Where a discharge is made to a Local Authority ("Ordinary") watercourse, experience shows that permission is still required by way of an Environmental Permit, obtained from the EA as the regulatory body for "Main Rivers". This is due to the fact that minor watercourses inevitably flow to the main rivers that the EA are responsible for.

Summary of Key Takeaways

- The Regulatory Position Statement is of limited use to serve temporary drainage discharges from construction projects. It is applicable for the discharge of clean, surface water only, and for a maximum period of 3 months.
- A Bespoke Permit is required to discharge water from a construction site, even if the discharge does not directly enter a main river.
- A Bespoke Permit can take over 10 months to obtain. Make sure you factor this into your programme to avoid potentially costly delays.
- Once a permit is issued, it will come with conditions relating to water quality. It is the duty of the permit holder to ensure that all conditions noted on a Bespoke Permit are adhered to.
- Bespoke Permits have an annual subsistence fee. A permit will remain in place until the EA are notified by the applicant that the permitted activity has finished, at which point the permit can be surrendered.

For more information about silt pollution and how to control it, visit: https://www.frogenvironmental.co.uk/

For training and CPD sessions on silt pollution, visit: https://www.frogenvironmental.co.uk/product/silt-control-training-cpd/

Is my planned discharge activity exempt?

Guidance provided in the Regulatory Position Statement (RPS) for temporary dewatering from excavations to surface water states that only uncontaminated water consisting of clean rainwater or infiltrated groundwater may be released from a site for up to three consecutive months under exemption.

In summary, the discharge must:

- ☑ consist of clean water only (no silt, oils or contaminants)
- ☑ not operate for longer than 3 months
- ☑ not be formed from any roadway drainage, storage area or work areas
- ☑ not contain any flocculant or coagulant (e.g., secondary treatment)

Bespoke Permitting (Water Discharge)

You must apply for a bespoke permit if your activity does not meet the conditions for the RPS or a Standard Rules Permit (applicable to small sewage systems only)

How to apply and what is needed?

Applications are made to the Environment Agency for which a fee is payable.

A standard determination period of 4 months is often exceeded (further details on timescales below).

Within the application for a bespoke permit, the EA seek to receive detail on the proposed discharge, an assessment of the risk, and information on how water quality will be controlled and monitored via a management system.

Most commonly this is achieved by presenting a Water Management Plan (WMP) containing:

- **An overview of temporary works.** Detail site setting, receiving water & nature of discharge (inc. Non-Technical Summary). If contaminants are known / anticipated you must carry out a Specific Substance Assessment.
- **A Risk Assessment (Source-Pathway-Receptor model)**. To follow EA Guidance "Risk Assessment for your Environmental Permit"
- **Controls & Treatment.** Detail on the treatment processes(s) that will be followed. This will require detail of the type of treatment used, including comparison against Environmental Quality Standards (EQS) where a flocculant or coagulant is used.
- **Monitoring and Control.** Detail how interventions be checked and monitored, with a clear process for remedial actions.

EA permitting forms

For most permit applications 4 forms need to be completed. Links to the forms (along with EA Guidance Notes) are noted below. **NOTE: EA forms and guidance may be revised at any time, always check that you use the most recent forms or your application may be rejected.**

A About Yourself

- Company detail including company registration number
- Contact details – technical and financial
- Detail of company directors and company secretary

Form EPR: Application for an environmental permit – Part A about you

Application for an environmental permit
Part A – About you

Environment Agency

You will need to fill in this part A if you are applying for a new permit, applying to change an existing permit or surrender your permit, or want to transfer an existing permit to yourself. Please check that this is the latest version of the form available from our website.

You can apply online for Waste standard rules environmental permits, bespoke waste permits and bespoke Medium combustion plant permits

Apply online for an environmental permit.

Please read through this form and the guidance notes that came with it.

The form can be:

1) saved onto a computer and then filled in. Please note that the form follows a logic that means questions will open or stay closed depending on a previous answer. So you may not be able to enter text in some boxes.
2) printed off and filled in by hand. Please write clearly in the answer spaces.

Note: If you believe including information on a public register would not be in the interests of national security you must enclose a letter telling us that you have told the Secretary of State. We will not include the information in the public register unless directed otherwise.

It will take less than one hour to fill in this part of the application form.

Where you see the term 'document reference' on the form, give the document references and send the documents with the application form when you've completed it.

Contents

1 About you

Are you applying as an individual, an organisation of individuals (for example, a partnership), a company (this includes Limited Liability Partnerships) or a public body?

An individual ☐ Now go to section 2 and if you are applying for a new permit or transferring a permit for an installation or waste activity please also fill in Appendix 1

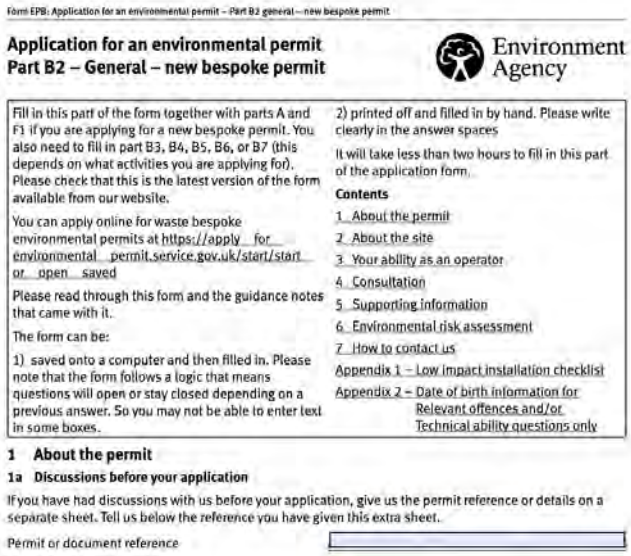
An organisation of individuals (for example, a partnership) ☐ Now go to section 3 and if you are applying for a new permit or transferring a permit for an installation or waste activity please also fill in Appendix 1

A public body ☐ Now go to section 4

A registered company or other corporate body ☐ Now go to section 5 and if you are applying for a new

B2 General New Bespoke Permit

- Site Detail
- Detail of Environmental Management System(s)
- Discharge plan
- Baseline reporting
- Reference: Non-Technical Summary
- Reference: Environmental risk assessment



Form EPB: Application for an environmental permit – Part B2 general – new bespoke permit

Application for an environmental permit
Part B2 – General – new bespoke permit

Environment Agency

Fill in this part of the form together with parts A and F1 if you are applying for a new bespoke permit. You also need to fill in part B3, B4, B5, B6, or B7 (this depends on what activities you are applying for). Please check that this is the latest version of the form available from our website.

You can apply online for waste bespoke environmental permits at https://apply for environmental permit.service.gov.uk/start/start or open saved

Please read through this form and the guidance notes that came with it.

The form can be:

1) saved onto a computer and then filled in. Please note that the form follows a logic that means questions will open or stay closed depending on a previous answer. So you may not be able to enter text in some boxes.

2) printed off and filled in by hand. Please write clearly in the answer spaces

It will take less than two hours to fill in this part of the application form.

Contents

1 About the permit

1a Discussions before your application

If you have had discussions with us before your application, give us the permit reference or details on a separate sheet. Tell us below the reference you have given this extra sheet.

Permit or document reference

B6 New Bespoke Water Discharge Activity

- Detail on type and nature of discharge
- Typical coding is (1.3.13) Trade and/or non-sewage effluent discharge to surface water or groundwater with a volume greater than 5 m^3/ day (not requiring specific substances assessment)
- Location of discharge to receiving waterbody
- Flow rate detail – m^3 discharged per day for x number of hours
- Full detail of treatment & control (using EA coding)

F1 Charges and Declaration

- Compile cost of discharge and means by which the fee has been paid
- Declaration
- Signature by approved person(s) – Director level

Fees and Charges

The permitting fee is payable in advance under the EA fees and Charges Scheme – 2022 Copy.

NOTE: The EA do not produce invoices. The fee must be paid to the EA prior to submission (Typically by BACS under a payment reference outline in Guidance notes for Form F1)

Worked example under 2021/22 Charge Scheme

Scenario:

Site surface water is directed to 2 no. attenuation ponds for primary, gravity settlement of sediment.

At each pond water is further treated by using a 10" Pipe Reactor holding 5 no. Gel Flocculant Blocks. Water is directed across a Silt Capture Channel at each pond, capturing sediment and ensuring that clean water is discharged to the watercourse at a maximum rate of 900 litre per minute per channel, to a total rate of 1,800 litres per minute from the site.

EA Code	Description	Cost
1.1.13	First Discharge. Rainfall related discharges to surface water with a volume greater than 5m^3 a day (not requiring specific substances assessment).	£4,652
1.1.13	Second Discharge location. As above, but charged as 10% of first discharge.	£465
1.19.2	Habitat Assessment	£779
		£5,896

Determination Process & Timescales

The EA determination period is 4 months, however, at the time of writing (summer 2022) the turnaround is closer to 10 months, make sure you leave plenty of time to submit your bespoke permit, or works could be delayed.

Upon submission the EA will undertake a screening assessment to ensure that all mandatory information has been received, including pre-payment. Once the EA are satisfied they have all of the information they require to assess the permit, the application will be classed as 'duly made' and passed to a Permitting Officer for determination.

If the EA find they are missing information, they will notify the applicant directly. The submission cannot be classed as 'duly made' until any missing information is received. This will result in further delays to the permit being assessed.

What conditions might be included on my permit?

The information, criteria and conditions displayed on a permit are site specific and determined by the nature of the discharge activity and sensitivity of the receiving environment.

The EA will consult externally with a number of stakeholders and internally with their own technical specialists, to ensure that an appropriate level of environmental protection is in place.

For suspended solids (typically composed of silt/soil/sediment), the key compliance value is Total Suspended Solids (TSS). Compliance values are usually set between 25 mg/l and 100 mg/l. Once this value has been set on a bespoke permit, it is the duty of the permit holder to ensure that the threshold is not breached. This will be achieved by having a monitoring plan in place.

For a further explanation on monitoring suspended solids and the difference between turbidity monitoring and Total Suspended Solids monitoring, refer to ***Guidance Note GN05, Monitoring Suspended Solids and Turbidity***.

Below is an example of typical water quality and flow rate conditions that have been set within a bespoke permit:

Schedule 3 - Emissions and Monitoring

Table S3.1 Point Source emissions to water (other than sewer) - emission limits and monitoring requirements

Effluent(s) and discharge point(s)	Parameter	Limit (including unit)	Reference Period	Limit of Effective Range	Monitoring Frequency	Compliance Statistic
Trade effluent consisting of settled site drainage via Outlet 1	Maximum rate of discharge	15 litres per second	Instantaneous (spot sample)	N/A	N/A	Maximum
	Suspended solids (measured after drying at 105°C)	40 mg/l	Instantaneous (spot sample)	N/A	N/A	Maximum
	pH	6 to 9	Instantaneous (spot sample)	N/A	N/A	Minimum and maximum
	Visible oil or grease	No significant trace present so far as is reasonably practicable	Instantaneous (visual examination)	N/A	N/A	No significant trace

Subsistence and Surrender process

In order to maintain a permit, an annual subsistence fee is payable.

Charges are weighted towards volume, so care should be taken to ensure that the application accurately reflects the activity on site, particularly if water may be pumped during standard work hours only.

2022 charges range from £194/year (<20m³/day) to £3,371/year (>50,000m³/day).

2.3.68	Rainfall related discharge with no specific substances with a volume greater than 50,000m³ a day	£3,371
2.3.69	Rainfall related discharge with no specific substances with a volume greater than 1,000m³ a day and up to and including 50,000m³ a day	£1,686
2.3.70	Rainfall related discharge with no specific substances with a volume greater than 20m³ a day and up to and including 1,000m³ a day	£718
	Specified discharge which is rainfall related	
2.3.71	Rainfall related discharge with no specific substances with a volume up to and including 20m³ a day	£194

Permits and corresponding charges remain in place until the point that they are surrendered.

In order to surrender a permit, the permit holder must advise the regulator that the activity is no longer being carried out.

The latest advice on this process can be found online: https://www.gov.uk/guidance/change-transfer-or-cancel-your-environmental-permit

Summary of Key Takeaways

- The Regulatory Position Statement is of limited use to serve temporary drainage discharges from construction projects. It is applicable for the discharge of clean, surface water only, and for a maximum period of 3 months.
- A Bespoke Permit is required to discharge water from a construction site, even if the discharge does not directly enter a main river.
- A Bespoke Permit can take over 10 months to obtain. Make sure you factor this into your programme to avoid potentially costly delays.
- Once a permit is issued, it will come with conditions relating to water quality. It is the duty of the permit holder to ensure that all conditions noted on a Bespoke Permit are adhered to.
- Bespoke Permits have an annual subsistence fee. A permit will remain in place until the EA are notified by the applicant that the permitted activity has finished, at which point the permit can be surrendered.

For more information about silt pollution and how to control it, visit: https://www.frogenvironmental.co.uk/

For training and CPD sessions on silt pollution, visit: https://www.frogenvironmental.co.uk/product/silt-control-training-cpd/

for silt control advice contact:
0345 057 4040
info@frogenvironmental.co.uk
frogenvironmental.co.uk

Appendix D

Silt Control TBT

Silt Control Toolbox Talk

Managing silt does not need to be hard work or expensive.

This toolbox talk will help you manage silt before it becomes a problem.

Why do we need to control silt?

- Silt has the potential to harm aquatic plants and animals, smother important habitat, reduce water quality and transport other contaminants such as oil and chemicals.
- Silt pollution can also impact abstractions, affecting drinking water supplies, irrigation, aquaculture and angling as well as damaging the general recreational and amenity value of water.
- It is an offence to allow polluting materials to drain into a watercourse. Silt pollution can result in prosecution and with it the potential for large financial penalties and reputational damage.

What are the sources of silt?

There are a number of high-risk areas on site that are prone to silt mobilisation during rainfall:

- roads and parking areas
- exposed soil
- dewatering muddy excavations
- plant and wheel washing facilities
- vehicles tracking across rivers, streams and ditches
- material storage areas and stockpiles
- uncontrolled concrete wash waters

How does silt pollution escape from site?

Once sediments are mobilised they will travel the path of least resistance, often resulting in muddy water leaving site.

Key pathways include:

- ditches and streams
- overland flow
- land drains
- surface water and foul drains
- bore holes

What are the benefits of silt control?

- reduce the risk of delays and the associated cost
- save space and land acquisition costs by managing settlement ponds
- improve relationships with the client, regulator and neighbours
- reduce complaints, disputes and the potential for compensation claims
- enable quicker, cheaper and better land reinstatement
- maintain and improve reputation within the industry

Remember: it's easier and cheaper to prevent pollution than to have to respond to and control a pollution event

The following site checklist can be used as a guide to help plan silt management:

DO:

Before works start:

☑ Be aware of all rivers, streams, ditches and drains and where they flow to, plan to protect these from mobilised silt

☑ How much rainfall can reasonably be expected? Ensure any settlement ponds are sized appropriately

☑ Check what silt control interventions are needed e.g. filtration devices, pipe reactors, silt capture channels. Seek advice early if unsure

☑ Plan to divert clean water away from exposed soils and working areas i.e. minimise silt creation

☑ Plan ahead for disposal for silt and include this in the Site Waste Management Plan

☑ Minimise the extent and duration of soil disturbance, establish new vegetation on bare ground as soon as possible

☑ Retain a vegetated strip (buffer zone) adjacent to rivers, streams and ditches

During construction:

☑ As the site develops check if the silt control measures are still adequate

☑ Report to construction manager any pollution or evidence of discoloured water leaving site

☑ Prevent contaminated water from entering watercourses untreated

☑ Roads and drains on site should be kept free of sediment build up

☑ Keep site access clean and free from mud and standing water

☑ Check site drainage and silt control interventions after rainfall events

☑ Check silt treatment systems are working and that water being finally discharged from site is clear of silt on a daily basis

☑ Monitor lagoons and silt traps, ensure they are working as planned

DON'T:

☒ Don't strip land of vegetation unless it is necessary. Aim to reduce exposed soil on site

☒ Don't store piles of excavated material within 10m of a river, stream or ditch

☒ Don't pump muddy water to rivers, streams or ditches without treatment in place

☒ Don't release muddy water from excavations or lagoons without appropriate controls

☒ Don't release road-sweeper waste or concrete washout directly onto the land or into drains, use designated site-specific methods of disposal

☒ Don't hose down roads, concrete or cement spills directly into rivers, streams, ditches or drains without controls in place

☒ Don't wash off any tools or plant directly in rivers, streams or ditches

It is less expensive to prevent silt pollution than to receive a fine.

Even with good planning, intense downpours can lead to silt control problems. If conditions change, contact the site manager.

frog environmental

for silt control advice contact:
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www.frogenvironmental.co.uk
@frogenv

Appendix E

Interceptor and Treatment Ditch Design Guidance GN-09v1

Interceptor and Treatment Ditch Guidance Note

GN-09v1



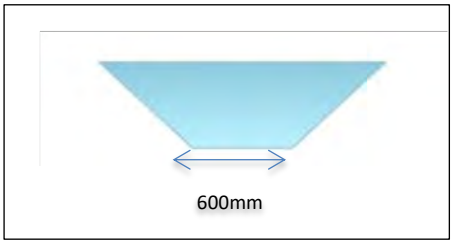
Interceptor ditches are used to interrupt and capture overland flows, diverting water around site to a point of water attenuation or discharge.

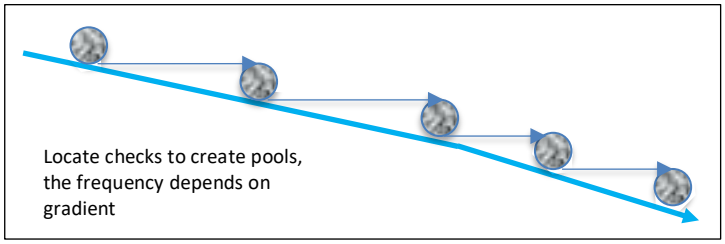
Interceptor ditches can form an important part of the silt control on site, poor design can lead to the generation of silt whilst good design can remove silts from the water.

Cut ditches as the project progresses to intercept existing drainage such as field drains or surface water runoff to enable the controlled movement of water on site. Whilst interceptor ditches are normally associated with the site boundary, they may be critical to receive water from haul roads, plateaus and low lying areas or transfer water from pumping operations.

Design Principles

- Position the ditch to remain undisturbed for the duration of the work or as long as the work programme requires.
- Create surface water crossings where haul routes interrupt the drainage route.
- Minimise ground disturbance when cutting ditches, working within the construction site footprint and tracking machinery parallel to the feature.
- Move all excavated material away from the ditch unless it is being used to manage the flow of water such as to create a bund to prevent overtopping or the control the ingress of water.
- The storage of soil on site should follow best practice guidance and not located within 10m of a water course or within an overland flow pathway that could cause erosion of the material.
- Ditches should be profiled with a flat bottom and sloping banks (30^{o} being the steepest).
- Ditches should be sufficiently deep to intercept any land drains and have sufficient capacity to move water.
- Ditches should move water by gravity wherever possible, however, should the gradient of the ditch be greater than 3degrees, create a series of step pools within the ditch using checks. These are necessary to slow the flow, reducing erosion of the bed.





- Checks can be made from a variety of materials such as loose clean aggregate, rock rolls, silt wattles, brash or sand bags. Although it is common to see straw bales used in watercourses this is not advised for any significant period of time as the material starts to degrade releasing nutrients into the water.
- The frequency of the checks will depend on the gradient of the ditch.
- The checks should be contained within the profile of the ditch to prevent overtopping.
- Scour protection must be considered downslope of the check as a cascade will be created.
- Sumps can be dug in advance of the checks to encourage sediment deposition and capture, these features should be easily accessible by machine to enable future maintenance.

If the ditch is being used to remove silts prior to discharge off site

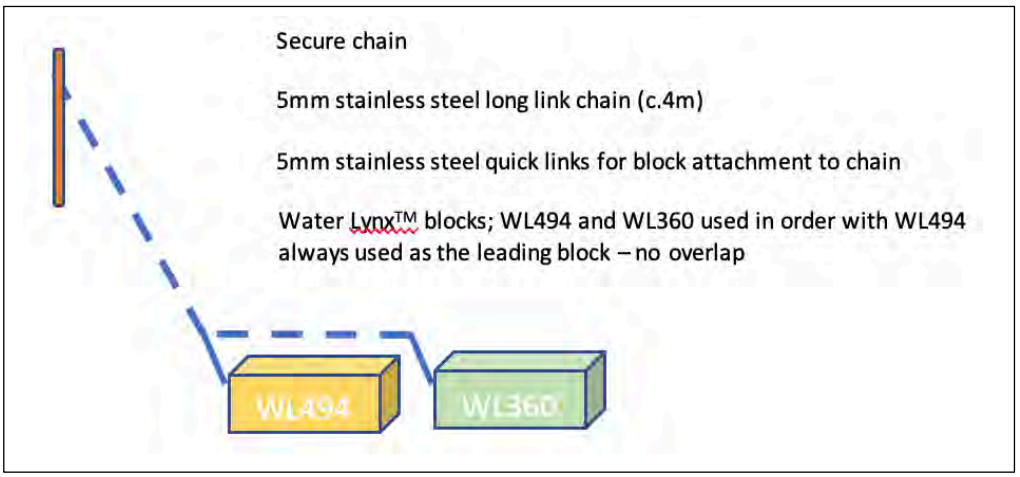
- Consider lining the ditch with a permeable membrane such as terram or erosion control blanket such as SiltNet 700 to reduce scour and the uplift of fine silt into the water column.
- A combination of Floc Mat and Silt Mat should be used to line the ditch, these should be placed in series of Floc Mats and SiltMats as illustrated.

- The number of series of these mats will be iterative depending on the polishing required. This may be lining the ditch of using just a few series at regular intervals.
- SiltMats must always the the final intervention to trap any solids.
- Secure the mats using steel fencing pins or similar.
- It is not recommended to use floc mats and silt mats in advance of a settlement pond as they are likely to become inundated with silts which could be capture in the ponds more cost effectively.

Additional Silt Control Using Flocculant

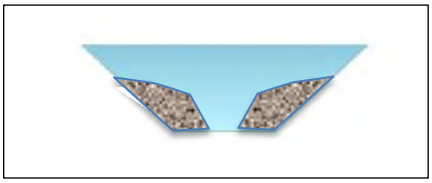
A flocculant such as the Water Lynx gel flocculant block supports the aggregation of the fine clay and silt particles into larger heavier clumps known as ‘flocs’ that will more easily fall out of suspension. This will improve the performance of the silt mats and settlement pond.

- Introduce Water Lynx gel flocculant blocks (WL494|WL360 in combination) into the ditch upstream of the silt capture (silt mat or settlement pond). Each set of blocks is comprised of 1xWL494 and 1xWL360.



Interceptor and Treatment Ditch Guidance Note
GN-09v1

- The ideal placement for the Water Lynx gel blocks in advance of a settlement pond starts 30m upstream of the inflow, then at 20m intervals upstream, the number of sets used will depend on a number of environmental factors and can be altered to achieve the water quality required.
    - Set 1 30m upstream
    - Set 2 50m upstream
    - Set 3 70m upstream
    - Set 4 90m upstream
- The ideal placement for the Water Lynx gel blocks in a ditch that transfers water off site is immediately downstream of the activity producing muddy water. If there are multiple sources of muddy water entering the ditch, then the blocks can be dispersed at c.30-50m intervals but the final placement will not be within 30m of the outfall. The number of sets used will depend on a number of environmental factors and can be altered to achieve the water quality required.
- The water must be turbulent around the blocks to allow the flocculant to be released. A simple way to create turbulence is to narrow the channel at the points of placement, use the checks to generate broken water or cascade of water over the gel blocks or place the gel blocks in a short length of pipe with a 450mm diameter.



- The Water Lynx gel blocks are contained within a net with a loop that can be secured onto a length of chain or rope using quick links.

Maintenance and Monitoring

- Monitor the surface water leaving site at the discharge point
- Checks the silt control measures for their continued integrity, implement a maintenance regime to remove excess silts from the system, replace the materisla such as Floc Mats, Silt Mats and Water Lynx Blocks.

End notes

- All consumable items are biodegradable and can be disposed of on site (with correct permissions)
- Presence of Water Lynx in mats or waste silt does not change waste classification (EWC code)
- No requirement for storage of liquid coagulants, flocculants or buffering agents is required on site
- There is no possibility of operator error regarding over-dosing or incorrect dosing
- Early engagement regarding site set up affords opportunities to rely on gravity for some parts of the treatment. This reduces reliance on pumps and can significantly reduce carbon footprint and costs, see case study: https://www.frogenvironmental.co.uk/case-study/zero-carbon-water-lynx/

Appendix F

Materials Storage Guidance Note GN-15v1

Appendix G

Pumping Standing Water and Excavations Guidance Note GN-11v1

Materials Storage

GN-15v1

Materials should always be stored in a manner that minimises risk to the environment and the potential for wastage due to exposure or damage.

Design Principles:

- Storage area to be located away from sensitive boundaries, positioned outside the flood zone, at least 10m away from surface waters including surface water and foul drains and 50m away from boreholes or wells.
- Storage areas should not be positioned within the root or crown spread of trees.
- Storage area must be sufficiently large to accommodate deliveries by artic lorries as well as material handling; an allowance of c.5m should be given for the forklift approach.
- Storage area will be defined with perimeter fencing
- Storage facilities should meet the requirements of the Safety Data Sheet (SDS) and may include weather proofed areas, lockable facilities and COSHH stores
- Suitable plant and equipment to be used to unload and handle the materials at the identified storage or point of use.
- Unload and distribute materials to their point of use to prevent the double handling of materials and reduce storage requirements
- Eliminate unnecessary wastage by storing materials in accordance with the SDS, follow good house-keeping to avoid damage and loss.
- Similar materials should be stored together to prevent wastage of part utilised items.
- Keep materials in their packaging for as long as possible to protect them from damage, store them on pallets as necessary. Protect materials from the weather to avoid loss from exposure to the elements.
- Ensure existing material containers are empty before opening new ones.
- Loose materials must be kept segregated and protected from exposure.
- Don’t compact materials or store above 3m in height.
- Be wary of light, loose materials and the potential for this to become airborne and cause a pollution or amenity issue through dust or litter.
- If there is risk of loss from wash-out use additional containment measures such silt fence or wattles as necessary.
- Use clear signage to identify loose material and stockpiles
- Different types of material will have different storage requirements, in particular depending on whether they are durable or non-durable.

Materials Storage

GN-15v1

Different types of material will have different storage requirements, in particular depending on whether they are durable or non-durable.

Cement

- Since any contact with direct or airborne moisture can cause cement to set, it must be kept dry. In terms of organisation, it is advisable for a rotational system to be used, whereby the first batch of cement delivered is the first to be used.
- Small quantities of bagged cement should be stacked to a height no more than 1 m, on a raised dry platform such as a timber pallet. A polythene sheet should be used as cover, with care being made to ensure that it is weighted down around the edges.
- Medium quantities of bagged cement may need to be stored in a watertight shed
- Large quantities of loose cement should be stored in a cement storage silo.
- Where onsite batching plants are considered refer to potential environmental risk register.

Aggregates

- It is essential for different aggregate types and sizes to be kept separate. They should be stored on a clean, hard, free-draining surface, surrounded by retaining and separating walls of bulk timbers. Stored aggregates should be regularly monitored for moisture content.
- Be wary of the potential for light, dusty aggregates to become airborne and cause pollution. Put in place measures to prevent this.

Soils

- Refer to the DEFRA Construction code of practice for the sustainable use of soils on construction sites (2009).
- Clearly define soil types, areas of soil to be stripped and stockpile locations. Segregate different grades of soil and store them in bunds no higher than 2m.
- The size and height of a stockpile will depend on the moisture and soil consistency, stripping and storing soil in dry conditions will retain the best soil properties, storage of wet soils will require increased management on reuse.
- Protect from the weather or vegetate if being stored on site longer than six months.
- If there is a risk of erosion or loss of material, then a containment barrier must be used such as silt fence or bund around the foot of the embankment.
- Be wary of the potential for light, dry soils to become airborne and consider the risks from this e.g. are sensitive receptors nearby such as neighbouring properties or public roads and whether any measures need to be adopted to prevent this such as dust suppression or screening

Appendix H

Managing Concrete Wash Water and Runoff GN-13v1

Managing Concrete Wash Water and Runoff

GN-13v1

Concrete wash waters can be highly damaging to the environment. They are strongly alkaline and can change the chemical nature of surface waters, killing or harming wildlife in much the same way as an acid. Sediment within concrete can also cause problems.

Concrete Wash Water

- Make provisions and a method statement for the management of concrete wash water from all site activities.
- Concrete washings must not be allowed to flow into any drain or watercourse.
- Any excess concrete or residue from concreting activities must also be managed and not allowed to enter the drains or watercourse.
- In advance of the work plan the location of the concrete washout facility, where any concrete waste will be stored, how the waste will be collected, treated and/or disposed, the treatment systems for the liquid phase including required capacity and how these will be operated and maintained.
- The concrete washout area should be conveniently located for washing out equipment and clearly signposted. It must be in excess of 10m from all watercourses, drainage gullies, surface water drains.
- All wash down water should be contained within an imperious bund, treated using pH adjustment systems such as CO2 to enable re-use or disposal. Alternatively, the wash water should be consigned correctly for off-site disposal at a suitably licenced waste management facility, in accordance with the Duty of Care for Waste Management.
- Concrete washout areas are generally not designed for the collection and treatment of excess concrete. Excess concrete waste should be returned to the local batching plant for treatment and re-use or placed in a site receptacle designated for concrete masonry and allowed to set.
- To minimise the amount of washout water generated, excess concrete should be scraped off the equipment before it is washed. These excess solids should be placed in a designated site storage container.
- To minimise the amount of washout generated on allow the contractors to wash down the lorry chute not the drum, request that they use an ‘away wash’ unit or chute cover, returning to their depot to washout the vehicles.

- Consider using a high pressure, low volume water spray nozzle that reduces water use and therefore treatment volume in combination with a recirculating system that reuses wash water for the cleaning process.
- Consider whether a mobile on-site batching system can be used to minimise the need for concrete deliveries and associated washout.
- Site personnel, particularly those responsible for concrete delivery and pumping, should be made aware (via induction, toolbox talks, pre-starts etc.) that a wash-down area is available on-site and when and how it is to be used.

Utilise prefabricated concrete elements such as culvert sections and head walls to minimise the use of wet concrete on site.

Concrete Runoff

- Shuttering and formwork must be checked by a suitably qualified and experienced person for integrity prior to pours and the rate of rise to be controlled during the pour
- Complete concrete pours to be carried out in good weather, as opposed to when rain is forecast. Protect newly poured concrete from the weather until it is fully set.
- Complete concrete pours in temperatures of 3 degrees or above.
- Brush off the loose concrete dust/residue to prevent it from being washed into a drain or watercourse.
- Unexpected rainfall before the concrete has set may lead to high pH water runoff entering the permanent drains, v-ditches and attenuation features. Be aware of this potential and be prepared to monitor for the occurrence, hold the water and pump it for treatment in a pH reduction plant.

Monitoring and Maintenance

- Monitor the pH of any wash water before disposal off site.
- Maintain the pH adjustment system, removing and disposing of the fines.

Appendix I

Managing Road Sweep and Wheel Wash Water GN-14v1

Road Sweep and Vehicle Wash Water

GN-14v1

As well as forming a legitimate cause of complaint, excessive mud and dirt accumulating on the public highway can also cause a hazard for members of public and other works traffic.

Mud that is washed from access roads or haul routes can cause serious damage to the local environment if it finds its way into local watercourses.

The correct planning, specification and operation of construction traffic access routes on site will help reduce environmental impact as well as keep the site tidy and reduce costs over the project lifecycle. The main mitigations for reducing this hazard and maintaining managing public relation:

Haul Roads and General Access

- Correctly specifying and maintaining access and haul roads for the duration of works. Passing places or traffic control must be included to prevent vehicles moving off the access routes.
- Maintaining separation from the 'works' area main access routes for deliveries and visitors.
- Separate the delivery/unloading of materials ensuring sufficient space for the movement of forks.
- Separate the contractors, plant and machinery compound, ensure that there is an oil pollution kit available and a plan to manage oil pollution incidents.
- Create hard standing around the office and visitor parking.

- Cut interceptor ditches along the road to move excess surface water runoff to a collection point.
- Steep roads may require drainage gullies cut at angles to move water into the interceptor ditches. These arco gullies should be formed from a solid structure to prevent collapse.
- Maintain the road; set an inspection regime and a maintenance crew who can attend to any areas prone to erosion.
- Consider road sweeping tarmac or concrete roads where machinery from site has to pass.

Road Sweep and Vehicle Wash Water

GN-14v1

Access Points and Road Crossings

- Consider creating formalised access points on to the construction site and across public roads.
- Ensure that there is sufficient width to allow for the swing of large vehicles, reducing the risk of damaging verges.
- Ensure haul roads accesses are adequately built to limit the formation of mud and that these are maintained i.e. scraped to reduce the spread of mud through the site. Should this not be possible stone, concrete or tarmac the access points.
- Consider the use of arco drains to direct surface water runoff from site away from the access point.
- Minimise the use of road crossing through planning the movement and reuse of material on site.
- Protect surface water drains in the public highway with a witch's hat type gulley guard.
- Install a waterless wheel cleaning grid or wheel wash at the access point that have been assessed as high risk, forming a hard surface to and from these systems.
- Employ a road sweep to remove mud from the public highways at the access points.
- Monitor the local roads to ensure they are kept clean and clear of mud.

It is important to note that residue from vehicles can contain substances such as oil & heavy metals. Along with suspended particles these can cause damage to the environment if allowed to be released into a surface water drain or ditch that connects to a nearby watercourse without treatment.

Road Sweep Wash Water

- Road sweep washing should be removed from site for disposal unless a suitable treatment mechanism can be put in place on site. This treatment area must be planned from the outset of the project.
- The road sweeper wash water treatment on site would be formed from two or three interconnected ponds, the first pond providing initial settlement of heavy sediments. Water is transferred from the surface into a second pond via a filter to remove fine sediment and oil. The water in the second pond can be tested before being used for dust suppression or disposal off site.
- Additional silt control may be required if releasing water from site.

Road Sweep and Vehicle Wash Water

GN-14v1

Wheel washing and vehicle wash down water

Ensure that road management and wheel washing control measures are discussed at the start of the project and implemented at the correct time.

- Whether a patented wheel washing system is used or a simple jet wash with containable drainage, the system must be kept directly away from the exit of the construction site to prevent water from being tracked onto the public highway.
- A key principle in specification is to ensure that the wheel washing system is long enough to allow 1 full rotation of each tyre. The system should have the capacity to cope with the planned number of vehicle movements plus 20%.
- Where no wastewater infrastructure agreements exist, the washing should be removed from site for disposal unless a road sweeper wash water treatment can be used on site.

- Where a jet wash is used instead of a commercial wheel washing system, this must be undertaken on hard standing with (preferably) an underwater storage tank to allow separation of solids and for water to be reused.

Appendix J

Polishing Channels GN-12v1

Polishing Channels following the Settlement Ponds

GN-12v1

The overflow channel can be used to polish water leaving a settlement pond, acting to remove the solids prior to discharge from site.

Design Principles

- Locate the channel in an area where there is limited plant movement or requirements for crossing.
- Create a formal haul route if a crossing is required, never ford the polishing channel. Reference the Temporary Surface Water Crossings Guidance Note for good practice.
- If the gradient is steep form a series of steps and pools.
- Line with channel to prevent silt entrainment and scour.
- Protect the channel from surface water runoff using bunds or silt fencing where there is a risk.

Polishing Measures

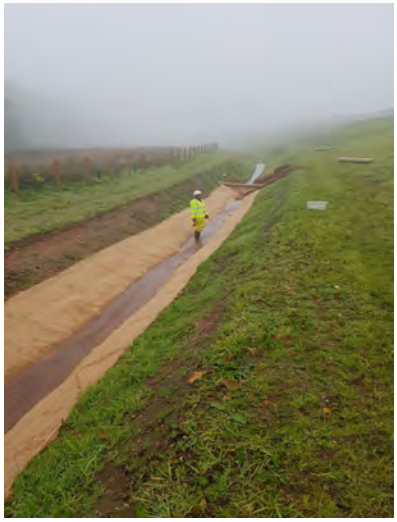
- A combination of Floc Mat and Silt Mat should be used to line the ditch, these should be placed in series of Floc Mats and SiltMats as illustrated.

- The number of mats will be iterative depending on the polishing required, this may be complete coverage or using just a few series at regular intervals.
- Silt Mats must always the final intervention to trap any solids.
- Overlap Silt Mats and Floc Mats, tucking the downstream mat under the upstream mat.
- Secure the mats using steel fencing pins or similar (sandbags or materials from site).
- Silt Mats must always the final intervention to trap any solids.

Polishing Channels following the Settlement Ponds

GN-12v1





Monitoring

- Monitor the surface water leaving site at the discharge point
- Checks the silt control measures for their continued integrity, implement a maintenance regime to remove excess silts from the system, replace the materials such as Floc Mats and Silt Mats

Appendix K

Settlement Pond Guidance Note GN-08v1

Settlement Pond Design Guidance Note

GN-08v1

Settlement Ponds

Settlement ponds and lagoons offer valuable silt control during temporary works, providing necessary water capture and retention to enable surface water management.

Settlement ponds allow physical settlement and containment of silt whilst providing the opportunity to introduce flocculant through the placement of gel blocks in the inflow promoting further separation and settlement of solids.

Temporary settlement ponds can be positioned within the footprint of the permanent pond design, making a few simple adaptations to improve their function in silt control

Attenuation ponds, or settlement lagoons that are used for storing excess surface water runoff can be made more effective for managing muddy water encountered during the construction phase of a project and improved settlement of silts, with a few simple measures.

Early Planning

- Determine the potential surface water volumes during a storm event, considering catchment size and rainfall intensity.
- Ensure that there is sufficient capacity to hold water during a storm event.
- Ensure that the ponds are watertight.

Improving the performance of settlement ponds for silt control during construction

- Early construction, creating slope roughness and stabilisation with the establishment of vegetation on the bed and banks of the basin will reduce the potential for erosion.
- Avoid installing the permanent outfall whilst the asset is being used for silt control, the headwall can be undermined causing uncontrolled egress of water. Instead create a spillway to manage the flow pathway of excess water. Consider forming this as a series of steps in the spillway to slow the flow rather than a steep channel.
- If it is necessary to install the permanent outfall, then incorporate a penstock or flap valve to allow prevent and control the release of water from site. Pipe stoppers and bungs are less reliable and bring risk of failure.
- Prevent scour and erosion as water enters the pond, consider lining the bank with a membrane, rock mattress, or concrete canvass.
- Slow the flow as water enters the lagoon, introduce baffles to reduce energy and disperse water.

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- Create a forebay or primary cell to contain the bulk of the settled solids.
- Prevent short cutting or channelisation between the income and overflow to maximise settlement in the pond. Achieved simply by utilising an impermeable barrier such as a silt curtain.
- Release water from the surface of the pond, whether this is via a spillway or pump to ensure that only the cleanest water is transferred through the system.
- Should a subsurface discharge have to be used, form a permeable bund around the outfall to prevent mud from being drawn from the bed through the outfall.
- Release water as adequate quality is achieved to ensure capacity for storm waters.



In instances where clay soils are encountered, even large attenuation ponds with a big surface area will struggle to achieve clean water through gravity settlement alone and the introduction of a flocculant needs to be considered. A flocculant such as the Water Lynx gel blocks supports the aggregation of the fine clay and silt particles into larger heavier clumps known as ‘flocs’ that will more easily fall out of suspension.

Additional Silt Control Using Flocculant

- Water Lynx gel flocculant blocks can be installed under gravity into the drains and interceptor ditches that fed the lagoon, on the spillways and within pipes between ponds.
- Water may be pumped to the settlement pond via a pipe reactor containing gel flocculant blocks.
- Floc Nets can be incorporated into the pond design, permeable to water they serve to polish the water prior to the outfall.
- Polishing water in the outfall channel using a series of Floc Mats and Silt Mats.
- In a closed pond water may be pumped via pipe reactor and silt capture channel to provide the final silt control before release from site.

Monitoring

- Monitor the surface water being released into the stream at the point of discharge.
- Please refer to the frog environmental turbidity monitoring guidance note for further information.
- Silt management is iterative, taking any of these steps will help to maximise the effectiveness of a settlement pond.

Appendix L

Pipe Reactor Mobile Water Treatment System Guidance Note GN-10v1

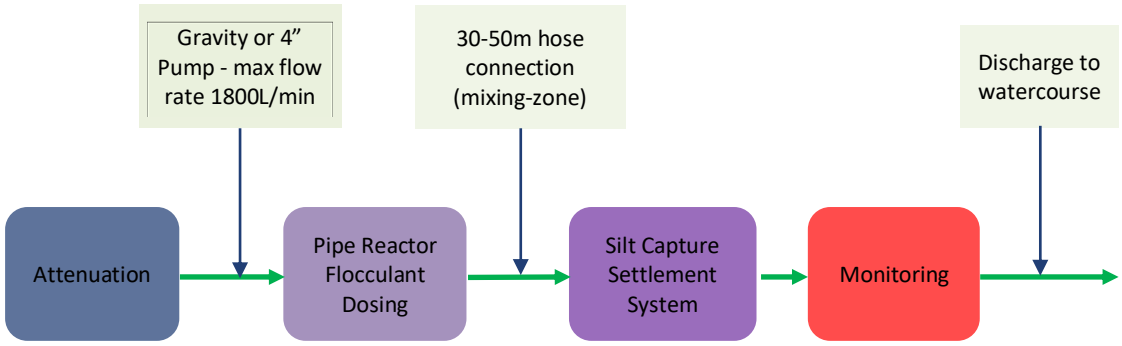
Pipe Reactor Mobile Water Treatment System Guidance Note

GN-10v1

The Pipe Reactor is designed to optimise flocculant mixing so that when water is passed through the barrel and a mixing-zone, fine silts and clays bind together. Smaller particles then become easier to trap through settlement or in a Silt Capture Channel.

Water may be pumped or moved under gravity through the Pipe Reactor, connected inline to rigid or layflat hose using a 4" Bauer coupling.

The correct deployment of the Pipe Reactor is vital to ensure the suitable mixing and binding of the flocculant, as well as the capture of silt to complete the water treatment process.



Overview of Treatment Process

Principles

- Ensure the water treatment system is easily accessible from site to enable regular maintenance.
- If a pump is used, specify a 4" model with a flow restrictor, the flow restrictor may be a separate element.
- The pump rate will be an important aspect of treatment and may need to be altered to achieve the water quality goals. The maximum flow will be 1800L/min (30L/sec).
- A mixing zone of 30-50m should immediately follow the Pipe Reactor, transferring water to the silt capture. Lay flat hose is a popular option but solid pipes may also be configured.
- The pH of water entering the treatment should be 6-9 to ensure maximum treatment efficacy.
- An NTU of over 3000 will blind the blocks and prevent the system from working effectively.

October 2021

Pipe Reactor Mobile Water Treatment System Guidance Note

GN-10v1

- Minimise the transfer of heavy silts when transferring water. Do not allow the pump hose or strainer to settle on or draw silts from the ground, instead use a sump, stone pad or float the head. If operating under gravity protect the intake. The pumping from excavations guidance note provides more detail good practice.
- Constantly treat and release water to maximise capacity within attenuation ponds

Capturing Flocculated Silt

Appropriate capture methods include the use of a settlement lagoon, settlement tank and / or a silt capture channel. This aspect should be carefully considered prior to the start-up of the Pipe Reactor.

The capture system needs to be suitably sized to physically settle and filter the 'flocs', the flow may need to be split across two tanks or silt capture channels in parallel to each other to ensure they are not inundated. Silts will need to be removed from the system at regular intervals to retain capacity and treatment efficiency.

Settlement Pond

- A settlement pond can physically settle the 'flocs' effectively separating the silt from the water.
- Ensure no muddy flows are being received by the pond, bypassing the treatment.
- Reference the settlement pond guidance note and adopt good design principles to maximise settlement.
- Prevent silts from becoming entrained in the clean water by releasing water from the surface of the settlement pond to final discharge point via a polishing channel.

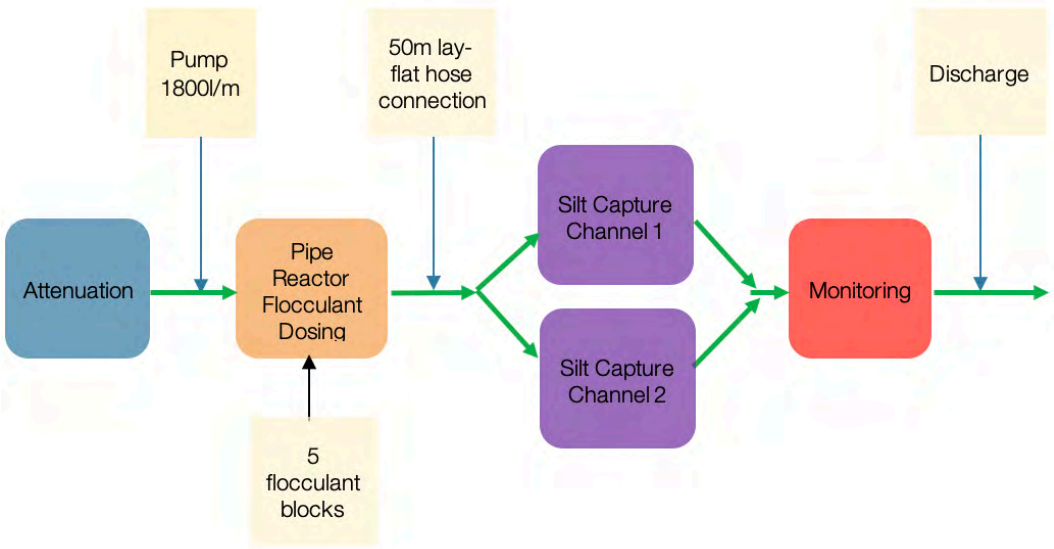
Settlement Tank

- Several tank-based systems are available on the market, each having different properties. Utilise the largest volume tank you can obtain, this must have baffles with coalescent media and/or lamella plates. A skip such as a roll on roll off or container may be adapted for this purpose.
- The flow rate will depend on the volume and effectiveness of the internal media, it will be necessary to check the final effluent and alter the flow velocity to attain the water quality required.

- It is suggested that 900L/min (30L/sec) is likely to be the maximum rate of a standard XXL settlement tank.
- Tanks may be placed parallel to each other, and water split between them to increase treatment efficiency.
- Water must be transferred from the tank to the discharge point without the possibility of new silts becoming entrained in the clean water. A polishing channel may be used before releasing water from site.

Silt Capture Channel

- The Silt Capture Channel is designed to capture silt, separating the solid fraction from water with a maximum flow rate of 900L/min.
- A typical channel is 4m wide and 20m long, lined with an impermeable membrane.
- Silt Capture Channels can be placed parallel to each other, and water split between them to increase treatment rates and efficiency.
- Reference the Silt Capture Channel Installation Method Statement.
- Water must be transferred from the end of the channel to the discharge point without entraining silts in the clean water, this may be an extension of the channel of piped outfall.



Example set up of Pipe Reactor and x 2 Silt Capture Channels

Maintenance and Monitoring

- Monitor the surface water leaving site at the discharge point.
- Ensure that there is a regime of inspection and maintenance of the silt control measures for their continued integrity, remove excess silts from the system, clean settlement media and replace the materials such as Floc Mats, Silt Mats and Water Lynx Blocks.
- Stop all water movement and connection to the discharge point whilst maintenance activities take place to ensure that there is no risk to the wider environment i.e., by a road sweeper suctioning out material and that the excess material can be moved to appropriate storage location.
- Plan where any excess captured silts will be stored and/or used on site to prevent their re-entry into the surface water system.

End notes

- Ensure you have agreement for the use of flocculants from the regulator and the MSDS is available.
- No requirement for storage of liquid coagulants, flocculants or buffering agents is required on site when using Water Lynx gel flocculant blocks.
- There is no possibility of operator error regarding over-dosing or incorrect dosing with the gel flocculant blocks.
- Floc Mats and Silt Mats are comprised entirely of natural biodegradable materials (coir and jute) and so may be reused on site following their function as a silt capture vessel, such as ground stabilisation and seeding
- The flocculants do not change waste classification (EWC code) of the material for waste disposal and reuse on site
- Early engagement regarding site set up affords opportunities to rely on gravity for some parts of the treatment. This reduces reliance on pumps and can significantly reduce carbon footprint and costs, see case study: https://www.frogenvironmental.co.uk/case-study/zero-carbon-water-lynx/

Appendix M

Outfall Headwall Installation Guidance Note GN-07v1

Outfall Headwall Installation Guidance Note GN-07v1

Outfalls into a watercourse can have many detrimental environmental impacts during the construction and operation including

- Increased erosion of the bed and bank
- Loss of riparian habitat
- Silt pollution
- Accumulation of sediment

Good design and installation practice can help to minimise these environmental risks.

Consenting (England and Wales)

In England and Wales, the formation of a culvert or an alteration to a culvert that would be likely to affect flow in an ordinary watercourse require ordinary watercourse consent from the Lead Local Flood Authority under Section 23 of the Land Drainage Act 1991.

In England and Wales, the construction of an outfall pipe less than 300mm diameter through a headwall into a main river is subject to the registration with the environmental regulator for an FRA12 exemption including confirmation that the conditions can be met:

- you plan your works to ensure there are no significant adverse effects on protected and priority species of importance for nature conservation
- the headwall is not located within 50m of another man-made structure on or in the main river
- if the headwall is on a non-tidal main river, the outfall pipe is aligned to an angle of between 30° and 60° to the direction of flow in the river
- the diameter of the outfall pipe is less than 300mm
- the height of the headwall is no more than 1.5m or no more than 75% of the height of the bank, whichever is less
- the total length of bank affected during construction of the headwall is no more than 1.5m
- the headwall, wing walls and apron do not project beyond the line of the bank prior to the works being carried out
- the headwall is not within 8m of a flood defence structure or river control works
- the outfall pipe does not pass through or under any culvert, remote defence, river control works or sea defence, or any raised embankment or wall forming part of the bank of the main river
- you remove from the floodplain all excavated material not re-used on the site of the works
- any pipe that discharges through the headwall does not pass within 8m of a flood defence structure

In England the construction of an outfall pipe of 300-500mm diameter through a headwall into a main river is subject to standard rules permit application (SR2015 No27) and associated fee payment.

You must apply for a bespoke permit if the activity does not fit within the standard rules or exemption.

Training and Awareness

- A lead operative must be identified and made responsible for environmental protection
- Deliver relevant toolbox talks in advance of work such as water vole, nesting birds and silt control
- Review the method of works with the contractors to ensure thorough understanding

Outfall Headwall Installation Guidance Note GN-07v1

Design

Each outfall should be designed to suit the site-specific conditions but there are a number of general principles that should be followed:

- The outfall pipe should be aligned at an angle of between 30° and 60° to the direction of flow in the watercourse
- No part of the outfall structure should protrude beyond the line of the bank, this includes headwalls, wingwalls and protection aprons
- The gradient of the outfall pipe through the headwall should be less than 1:50 (fall in elevation: length)
- Plan to use prefabricated headwalls and other elements
- Consider scour protection beyond the apron such as the placement of a rock mattress within the watercourse

Access

- Install location marker posts for the headwall and only conduct work on the bankside in this area.
- Complete a visual assessment for nesting birds before removing vegetation. Should any signs be observed then contact your ecologist to seek advice before proceeding.
- Remove vegetation at the point of construction.
- Complete a visual assessment for water vole activity signs (see Water Vole Toolbox talk) in advance of starting any excavation work. Should any signs be observed then contact your ecologist to seek advice before proceeding.
- Do not compact the bank; use tracked plant and equipment; remain on the access route or at least 3 meters back from the bank top.
- Machinery should work from the bank and no machinery should enter the channel.
- Store all materials in the main compound moving only the volume required for the task in hand, store these in a secure location on the bank top and pass them to the operatives in the water using mechanical lifting equipment as they are required. Do not store materials on the bank slopes or roll them down the banks to the water.
- Any machine operating on site must be inspected on a daily for its integrity of hydraulics hoses and other oil containing parts and an emergency spill kit sufficient to contain an oil spill must be kept on site for the duration of works.

Headwall Installation

- Work in dry weather and low flow conditions where possible
- Create a temporary dam around the works to separate the flow of water in the stream from the work area for the duration of the headwall installation and setting of any concrete features. The dam may be formed from sandbags or silt wattles. Do not block the stream, ensure that there is always sufficient flow past the works
- Do not pump standing water and excavations directly to the stream. Any water must be pumped onto site for treatment before it is returned to the stream. The pump head must be set at a suitable level to prevent silt uptake
- Compete excavation work for the headwall
- Complete of concrete pours (the headwall pad), in good weather, as opposed to when rain is forecast
- Shuttering to be checked by a suitably qualified and experienced person for integrity prior to pours

and the rate of rise to be controlled during the pour

- Protect newly poured concrete from the weather until it is fully set as unexpected rainfall before the concrete has set may lead to high pH water runoff
- Brush off and collect the loose concrete dust/residue to prevent it from being washed into the stream
- Reinstate the earth around the headwall and re-establish native bank vegetation at the earliest opportunity
- Utilise biodegradable geo-textile matting if there is a risk of bank slippage or washout during high flows

Pollution Control

Manage downstream pollution; should there be a risk of bed disturbance and therefore the muddy water being created then silt control measures be required.

- Place Silt Mats downstream of the temporary works activity, these should be positioned where they can be easily access and the water is no deeper than 30cm.
- Once the works have been completed remove the silt mats from the stream.
- Oil spill kits to be kept on all machinery used near water.

Operation of Outfall

Before completing the connection to the outfall

- Ensure that the pipework is jetted, if required, prior to commission
- Ensure clean and clear water is leaving site following completion of works or that there is adequate silt control measures in place to prevent a risk of pollution.

Appendix N

Monitoring Record Sheet

Suspended Solids | Turbidity Monitoring Guide

Suspended sediment, also referred to as suspended solids is muddy water, a mixture of inorganic particles (clays and silts) and organic particles (carbon and algae) that has been entrained into the flow of water.

On a construction site, silts are commonly mobilised, creating dirty water, by rain falling onto areas of exposed soils, pumping excavations, the movement of vehicles along haul roads and erosion in ditches. Should this dirty water enter a river or stream then it would cause a pollution; the murky water restricts light penetration that limits plant growth and alters fish behaviour, whilst the accumulation of sediments damages habitats for invertebrates and fish, causing a decline in the ecosystem health.

The regulators use the measurement of suspended solids to determine water quality. The limit is specified in the site permit and the value may vary from site to site as it depends on the sensitivity of the receiving water.

Suspended Solids vs Turbidity

Suspended solids (TSS) are measured in milligrams per litre (mg/l), this relates to the dry weight of solids in a litre of water. This test is conducted in a laboratory, as it requires the sediment to be filtered, dried and weighed. This can take 3-10 working days to receive the results.

Turbidity (NTU) is measured in Nephelometric Turbidity Units (NTU), this relates to the transparency or clarity of the water. This test can be conducted in a few minutes in the field using meters or as a visual check.

The regulators will express the desired water quality limit for suspended solids in mg/l.

There is not a direct correlation between TSS and NTU so, it is important to establish the relationship using an 18-point calibration curve. This will strengthen confidence in using an NTU value to equate to the TSS expressed in the site permit to be able to undertake on-site monitoring however, it is important to note that it is not an absolute value.

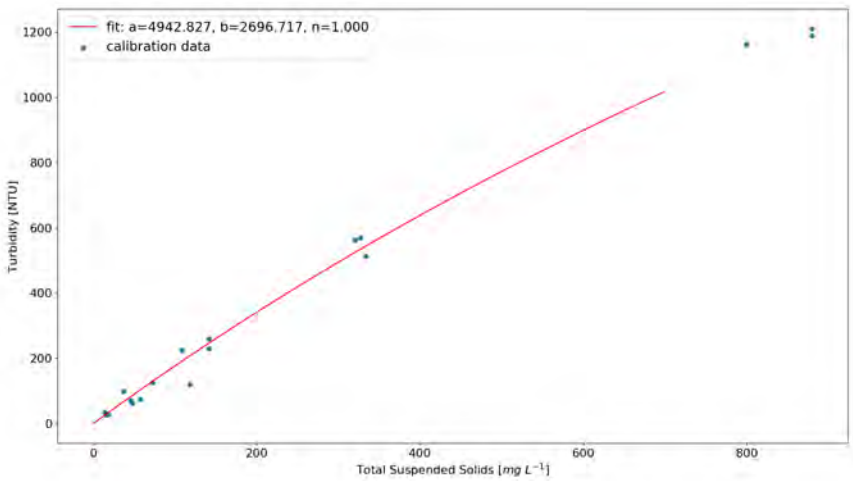


Figure 1: An 18-point calibration curve

Monitoring Plan

Monitoring requires some commitment to sample collection and record keeping. It will be these records that will evidence a proactive approach to pollution control and water management to any regulatory inquiry.

Establish your monitoring points:

- Upstream of the construction site, to determine current or background levels of silt within the water
- The discharge point, to determine the quality of water leaving site
- Downstream of discharge point, to determine whether there has been any change in quality

Frequency:

- Daily during periods of rainfall or when water is leaving site

How to collect samples:

- Using a clean sampling beaker or just a cup, collect a representative sample of the water-sediment mixture
- Take this from within the flow of water or water column
- Do not disturb the bed of the channel as this will resuspend settled sediments

Action to take if turbidity is exceeded:

- Develop a reporting method to ensure the discharge is stopped immediately, that further inspections and corrective actions are taken.

Overview of monitoring techniques

Select and implement the most appropriate monitoring technique for your site requirements. Even more simple approaches can be used to promote an increased site awareness of silt pollution issues and a company's responsibility to avoid pollution and litigation risk.

Visual Bottle Sampling

Monitoring can be as simple as filling a bottle and visually assessing the clarity of the water contained.

Date	Upstream Water	Downstream Water	Pumping/ not pumping	Visual Comments
08/11/2016 (Tues)			Not pumping	Clear water
09/11/2016 (Wed)			Pumping water because of heavy rain	Less clear
10/11/2016 (Thurs)			Not pumping	Clear water

Figure 2: An example of a visual bottle sampling approach.

This offers an immediate but crude gauge as to the water quality.

- Visually comparing the water leaving site to the baseline (i.e. upstream of the discharge point)

- To estimate turbidity, place the bottle in front of your hand. If you can't see the fingers on your hand then the turbidity roughly equates to >100 NTU, if you are able to identify fingers <60NTU and the lines on your hands and fingers <30NTU.

As with all monitoring approaches, documentation is important. A simple table displaying the photos from each day's monitoring will show a positive aptitude, enabling the team to respond to murky water that could be a result of activities on site and demonstrating conformance for the purposes of a water discharge permit, if this approach is agreed as being adequate by the regulator.

Turbidity Tube

A turbidity tube is a simple and effective way to assess water clarity. The tube is filled and/or emptied of water until the mark in the bottom of the tube can no longer be observed when looking down the tube. At this depth of water, the graduated scale on the side of the turbidity tube can be read and a value for the clarity, in the units of NTU, can be determined.

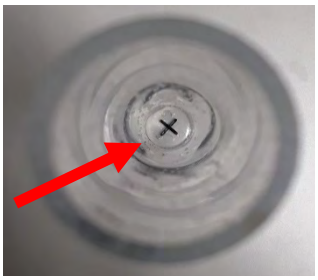


Figure 3: X Symbol

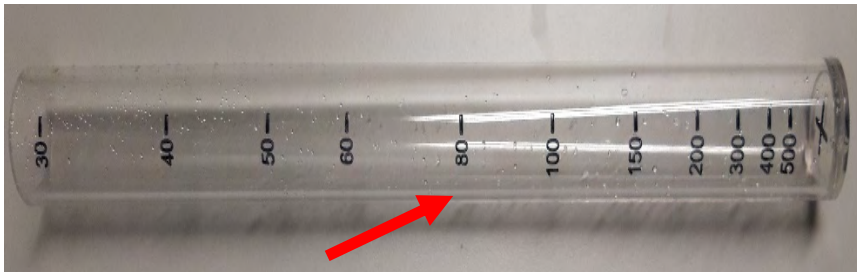


Figure 4: Turbidity Tube Measurements

Portable Turbidity Meter

A more scientific approach to monitoring uses a turbidity meter. Essentially these measure the quantity of white light penetrating the sample or being scattered by the material in the sample. These units cost a few hundred pounds.

The water sample is transferred into a vial and placed into the tester and a test button is pressed to obtain an NTU value. The equipment needs to be rinsed and dried before storing.

Figure 5: Turbidity meter

Multiparameter Water Quality Meter

A turbidity sonde can be connected to a multiparameter water quality meter. The sonde must be submerged to collect the data and therefore may not be suitable to very shallow locations with muddy bottoms. The portable meter may be used to take individual measurements or left in situ to log real-time data. Data can be manually downloaded from the meter to the computer. These units can cost 2-3 thousand pounds depending on specification.

Figure 6: Multiparameter Water Quality Meters

Remote Data Logger

An in-situ device that logs NTU at set intervals with the capability of storing the data for manual download or sharing the data by a telemetry connection such as WIFI or SMS. Data collection can be continuous or at prescribed intervals such as 2-hourly. A device will require a power source such as battery, solar or electrical connection. Alerts of exceedances can be communicated directly to site management to allow investigation.

Figure 7: In-situ turbidity measuring device used by frog environmental.

Other Water Quality Parameters

A number of other water quality parameters may be prescribed by the regulator. These typically involve determining the pH, and the presence of oils. pH strips and meters are readily available, or a sonde may be added to the multiparameter water quality meter. Oil can be checked with an oil detection strip, but visual presence is often sufficient.

Record Keeping

Water quality records should be kept. This is not only best environmental practice but will demonstrate compliance with permit conditions where they apply. Records will assist with any regulatory query or site visit, clearly showing where action has been taken to respond to and manage the site activities to prevent deterioration of water quality.

A standard monitoring form will help to guide the collection of data and prompt any subsequent actions.

MONITORING LOCATION 1 Grid Reference: Description:							
Parameter	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Weather							
Releasing Water	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
Oil Film	None Minor Major	None Minor Major	None Minor Major	None Minor Major	None Minor Major	None Minor Major	None Minor Major
Water Clarity	Clear Cloudy Coloured	Clear Cloudy Coloured	Clear Cloudy Coloured	Clear Cloudy Coloured	Clear Cloudy Coloured	Clear Cloudy Coloured	Clear Cloudy Coloured
Turbidity (NTU) threshold <60							
pH acceptable range 7-9							
Comment on colour, smell or sediment							
Distressed fish?	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
Photo	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
RECORD THE POLLUTION (OIL/TURBIDITY/PH) INCIDENT INFORMATION AND DEFINE ANY CORRECTIVE ACTION(S) REQUIRED							
Action Number(s)							

Figure 8: An example of a typical monitoring table

frog environmental have prepared a separate monitoring form that can be downloaded from the website.

Appendix O

Acrylamide and Polyelectrolyte Calculations

Gel Flocculant Block Treatment System: Environmental Calculations

Project: **Twynyrodyn FR3210**

Overview

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

Site Data

Number of Gel Flocculant Blocks / Mats in system

Type	**No.**
360	2
494	3
Total	5
Number of Floc Mats in system	18

Flow Rate

Total Discharge Rate (L / min)	900
Hours run per day	8
Discharge per day (Litres)	432,000
Days until replacement of Blocks	30
Discharge in litres per set of blocks	12,960,000

Aluminium

No. of Gel Flocculant (494)	Forced Mixing Degradation of Blocks in days (Pipe Reactor, typically >80 days)								assive mixing degradation of blocks in days (drainage ditch/ drain/ culver					
	10	20	30	40	50	60	70	80	90	100	110	120	130	140
1	0.018	0.009	0.006	0.005	0.004	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.001	0.001
2	0.037	0.018	0.012	0.009	0.007	0.006	0.005	0.005	0.004	0.004	0.003	0.003	0.003	0.003
3	0.055	0.027	0.018	0.014	0.011	0.009	0.008	0.007	0.006	0.005	0.005	0.005	0.004	0.004
4	0.073	0.037	0.024	0.018	0.015	0.012	0.010	0.009	0.008	0.007	0.007	0.006	0.006	0.005
5	0.091	0.046	0.030	0.023	0.018	0.015	0.013	0.011	0.010	0.009	0.008	0.008	0.007	0.007
6	0.110	0.055	0.037	0.027	0.022	0.018	0.016	0.014	0.012	0.011	0.010	0.009	0.008	0.008
7	0.128	0.064	0.043	0.032	0.026	0.021	0.018	0.016	0.014	0.013	0.012	0.011	0.010	0.009
8	0.146	0.073	0.049	0.037	0.029	0.024	0.021	0.018	0.016	0.015	0.013	0.012	0.011	0.010
9	0.165	0.082	0.055	0.041	0.033	0.027	0.024	0.021	0.018	0.016	0.015	0.014	0.013	0.012

Acrylamide

No. of Gel Flocculant blocks	Forced Mixing Degradation of Blocks in days (Pipe Reactor, typically >80 days)								assive mixing degradation of blocks in days (drainage ditch/ drain/ culver					
	10	20	30	40	50	60	70	80	90	100	110	120	130	140
5	0.187	0.094	0.062	0.047	0.037	0.031	0.027	0.023	0.021	0.019	0.017	0.016	0.014	0.013

Polyelectrolyte

No. of Gel Flocculant blocks	Forced Mixing Degradation of Blocks in days (Pipe Reactor, typically >80 days)								assive mixing degradation of blocks in days (drainage ditch/ drain/ culver					
	10	20	30	40	50	60	70	80	90	100	110	120	130	140
5	1.282	0.641	0.427	0.321	0.256	0.214	0.183	0.160	0.142	0.128	0.117	0.107	0.099	0.092

Project Specific Comparison: Carry Over Levels v Environmental Quality Standards

Discharge carry over aspect	**EQS Value**		**Standard**	**Project Discharge Value**	**% below EQS**
Aluminium	0.2	mg/l	Drinking Water Standard	0.018	993.67%
Acrylamide	0.1	ug/l	Drinking Water Standard	0.062	37.66%
Polyelectrolyte	7.5	mg/l	Waste Water Treatment Standa	0.427	1654.51%

SUMMARY / NOTES:

Terms

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

Appendix P

Environmental Standards

Acrylamide, Aluminium & Polyelectrolyte Calculations

Gel flocculants have been defined as part of the pollution control. Gel flocculants are synthetic anionic polyacrylamides that also have a coagulating function. Gel flocculant is non-toxic to the aquatic environment and does not bioaccumulate, remaining bound to the sediment until they degrade. Refer to the MSDS.

The next section outlines the environmental standards for the aspects of gel flocculant that are applicable and management calculations to demonstrate protection of the environment – Acrylamide, Polyacrylamide Polyelectrolyte (PP) and Aluminium.

The subsequent section shows the site-specific carry-over calculations for each of the aspects. Whilst all the parameters meet the environmental standards for drinking water quality at the exit of the treatment system it should be borne in mind that this scenario is hugely conservative. This does not account for the factor of the dilution within the receiving waterbody nor any binding to the sediments. Additionally, the gel flocculant can be expected to outlast the conservative estimate of 30 days.

Environmental Standards

The regulator quite rightly requires the assurance that the use of a flocculant will not lead to any undue environmental impact or breach an Environmental Quality Standard. As noted, gel flocculants are anionic; non-toxic to the aquatic environment and do not bioaccumulate, remaining bound to the sediment until they degrade to produce water, carbon dioxide and nitrogen oxide.

The three key elements that require assurance for environmental protection are Polyacrylamide Polyelectrolytes, Acrylamide and Aluminium. These elements are discussed generally as below.

Polyelectrolytes
In Scotland, SEPA controls polyelectrolytes via ***Regulatory Method (WAT-RM-12) "Discharges from Water Treatment Works.*** This process notes that Anionic Polyelectrolytes are preferable (Gel flocculant is Anionic) and that SEPA may consider a numeric discharge consent.

In England and Wales, the Environment Agency and Natural Resources Wales has produced guidance for water companies via: ***Control of chemicals used for dosing at wastewater treatment works.***

This notes an EQS standard *"For anionic and non-ionic polyacrylamide polyelectrolytes, we apply an EQS of 3.5mg/l as a 95-percentile limit in soft acid waters. Soft acid waters are waters with a pH 6 or less, and a total hardness of less than 20mg/l. For waters with a hardness of 20mg/l or more as calcium carbonate, we apply a 95-percentile limit EQS of 7.5mg/l."*

Acrylamide
The Environmental Quality Standard for Acrylamide is the DWI value of 0.1 μg/l.

Aluminium
The Environmental Quality Standards for Aluminium is the DWI value of 0.2mg/l.

Appendix Q

Gel Flocculant MSDS

SAFETY DATA SHEET

Gel Flocculant 360

SECTION 1: IDENTIFICATION OF MIXTURE AND COMPANY

1.1 Product identifier

Gel Flocculant 360

CHEMICAL FAMILY: Polyacrylamide/polyacrylate polymer

CAS NUMBER: none identified

CHEMICAL NAME: none identified

1.2 Relevant Identified Uses

Water treatment

1.3 Supplier

Frog Environmental Ltd

Business Contact

The Byre

0345 057 4040

Blackenhall Park

Emergency Contact

Bar Lane

Staffordshire DE13 8AJ

0345 057 4040 (not 24 hours)

24 Hour Emergency Contact

UK National Poisons Information Service: 0344 892 0111

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification

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

2.2 Label elements

No labeling required

2.3. Other hazards

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

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

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

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General

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

Skin

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

Inhalation

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

Eye

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

Ingestion

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

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

Signs and Symptoms of Acute Exposure

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

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

Skin: Mild to moderate irritation can occur.

Eyes: Can cause mild to moderate irritation.

Chronic Health Effects

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

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

Treat symptomatically.

SECTION 5: FIRE FIGHTING MEASURES

5.1. Extinguishing Media

Suitable: Use extinguishing media suitable for the surrounding fire.

Unsuitable: None.

5.2. Special hazards arising from the mixture

Hazardous Combustion Products: Carbon and Nitrogen Oxides (CO, CO2, NOx)

5.3. Advice for Firefighters

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

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

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

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

6.2 Environmental precautions

Prevent entry of concentrated solutions into waterways or sewers.

6.3. Methods and materials for containment and clear up

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

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for Safe Handling

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

7.2. Conditions for safe storage, including any incompatibilities.

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

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

8.1. Control parameters

None identified.

8.2. Exposure controls

8.2.1. Engineering Controls

No specific measures required.

8.2.2. Individual Personal Protection

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

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

Respiratory: No specific measures required.

Thermal: No hazard

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

8.2.3. Environmental exposure controls

No specific measures identified for normal handling and use.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Solid.

Colour: Green to white or off-white

Odor: Slight vinegar odour.

Melting Point: > 100 °C

Boiling Point: > 100 °C

Flammability: not flammable

Lower/Upper Flammable Limit: Not applicable

Flash Point: No Data Available

Auto-Ignition temperature: No data available

Decomposition temperature: No data available.

pH: 7 (concentration dependent)

Viscosity: Not applicable.

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

Partition 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}: 140- 150 mg/L.

Invertebrates (Daphnia magna): 48 hr EC_{50}: ≥ 125 mg/L.

12.2. Persistence and Degradability

Not readily biodegradable but complete mineralization is expected under environmental exposure. Degradation initialization and rate are dependent on UV levels.

12.3. Bioaccumulation potential

The product is not expected to bioaccumulate.

12.4. Mobility in soil

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

12.5. Results of the PBT assessment

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

12.6 Endocrine disrupting properties

The substance is not expected to have endocrine disrupting properties

12.7 Other adverse effects

None identified

SECTION 13: DISPOSAL CONSIDERATIONS

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

SECTION 14: TRANSPORT INFORMATION

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

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

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

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

14.5: Environmental hazards: None identified.

14.6: Special precautions for users: None identified.

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

SECTION 15: REGULATORY INFORMATION

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

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

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

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

15.2. Chemical Safety Assessment

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

SECTION 16: OTHER INFORMATION

DATE: December 2022: First issue:

DISCLAIMER OF RESPONSIBILITY

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

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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.

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

The Byre

0345 057 4040

Blackenhall Park

Emergency Contact

Bar Lane

Staffordshire DE13 8AJ

0345 057 4040 (not 24 hours)

24 Hour Emergency Contact

UK National Poisons Information Service: 0344 892 0111

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification

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

2.2 Label elements

No labeling required

2.3. Other hazards

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

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

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

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General

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

Skin

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

Inhalation

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

Eye

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

Ingestion

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

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

Signs and Symptoms of Acute Exposure

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

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

Skin: Mild to moderate irritation can occur.

Eyes: Can cause mild to moderate irritation.

Chronic Health Effects

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

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

Treat symptomatically.

SECTION 5: FIRE FIGHTING MEASURES

5.1. Extinguishing Media

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

Unsuitable: None.

5.2. Special hazards arising from the mixture

Hazardous Combustion Products: Carbon and Nitrogen Oxides (CO, CO_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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SAFETY DATA SHEET

Granular Flocculant 395

SECTION 1: IDENTIFICATION OF MIXTURE AND COMPANY

1.1 Product identifier

Granular Flocculant 395

CHEMICAL FAMILY: Anionic polymer

CAS NUMBER: none identified

CHEMICAL NAME: none identified

1.2 Relevant Identified Uses

Water treatment

1.3 Supplier

Frog Environmental Ltd

Business Contact

The Byre

0345 057 4040

Blackenhall Park

Emergency Contact

Bar Lane

Staffordshire DE13 8AJ

0345 057 4040 (not 24 hours)

24 Hour Emergency Contact

UK National Poisons Information Service: 0344 892 0111

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification

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

2.2 Label elements

No labeling required

2.3. Other hazards

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

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

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

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General

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

Skin

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

Inhalation

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

Eye

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

Ingestion

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

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

Signs and Symptoms of Acute Exposure

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

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

Skin: Mild to moderate irritation can occur.

Eyes: Can cause mild to moderate irritation.

Chronic Health Effects

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

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

Treat symptomatically.

SECTION 5: FIRE FIGHTING MEASURES

5.1. Extinguishing Media

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

Unsuitable: None.

5.2. Special hazards arising from the mixture

Hazardous Combustion Products: Carbon and Nitrogen Oxides (CO, CO_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: 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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SAFETY DATA SHEET

Gel Flocculant 398

SECTION 1: IDENTIFICATION OF MIXTURE AND COMPANY

1.1 Product identifier

Granular Flocculant 398

CHEMICAL FAMILY: Anionic polymer

CAS NUMBER: none identified

CHEMICAL NAME: none identified

1.2 Relevant Identified Uses

Water treatment

1.3 Supplier

Frog Environmental Ltd

Business Contact

The Byre

0345 057 4040

Blackenhall Park

Emergency Contact

Bar Lane

Staffordshire DE13 8AJ

0345 057 4040 (not 24 hours)

24 Hour Emergency Contact

UK National Poisons Information Service: 0344 892 0111

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification

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

2.2 Label elements

No labeling required

2.3. Other hazards

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

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

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

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General

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

Skin

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

Inhalation

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

Eye

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

Ingestion

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

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

Signs and Symptoms of Acute Exposure

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

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

Skin: Mild to moderate irritation can occur.

Eyes: Can cause mild to moderate irritation.

Chronic Health Effects

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

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

Treat symptomatically.

SECTION 5: FIRE FIGHTING MEASURES

5.1. Extinguishing Media

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

Unsuitable: None.

5.2. Special hazards arising from the mixture

Hazardous Combustion Products: Carbon and Nitrogen Oxides (CO, CO_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: 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:

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.

SAFETY DATA SHEET

Gel Flocculant 494

SECTION 1: IDENTIFICATION OF MIXTURE AND COMPANY

1.1 Product identifier

Gel Flocculant 494

CHEMICAL FAMILY: Polyacrylamide polymer

CAS NUMBER: none identified

CHEMICAL NAME: none identified

1.2 Relevant Identified Uses

Water treatment

1.3 Supplier

Frog Environmental Ltd

Business Contact

The Byre

0345 057 4040

Blackenhall Park

Emergency Contact

Bar Lane

Staffordshire DE13 8AJ

0345 057 4040 (not 24 hours)

24 Hour Emergency Contact

UK National Poisons Information Service: 0344 892 0111

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification

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

2.2 Label elements

No labeling required

2.3. Other hazards

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

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

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

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General

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

Skin

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

Inhalation

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

Eye

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

Ingestion

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

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

Signs and Symptoms of Acute Exposure

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

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

Skin: Mild to moderate irritation can occur.

Eyes: Can cause mild to moderate irritation.

Chronic Health Effects

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

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

Treat symptomatically.

SECTION 5: FIRE FIGHTING MEASURES

5.1. Extinguishing Media

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

Unsuitable: None.

5.2. Special hazards arising from the mixture

Hazardous Combustion Products: Carbon and Nitrogen Oxides (CO, CO_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.

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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.

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7.1. Precautions for Safe Handling

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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)

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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.

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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

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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

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SECTION 16: OTHER INFORMATION

DATE: December 2022: First issue:

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