OMS Procedure

AM-PR-005

Dewatering Procedure

Revision:	3
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Authorisation Date:	17 June 2020

This document has been approved for release and changed as per the associated eMoC.

To review changes to this document refer to previous versions held in the Controlled Document Database.

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Contents

1 Purpose

This procedure has been prepared to assist BP Oil New Zealand Limited (BP NZ) to:

- *Avoid and minimise potential adverse environmental effects* by guiding and standardising how BP Oil New Zealand Ltd (BP NZ) employees and contractors assess, manage and monitor the dewatering of tank pit excavations.
- *Obtain and maintain regulatory compliance* with district and regional plan requirements and relevant resource consent conditions. This procedure supports resource consent applications by providing a detailed description of the activity, the potential effects, and the controls and systems used to avoid and minimize those effects.

2 Scope

This procedure is intended for use by BP NZ employees and contractors involved in the planning, pre-construction and construction phases at BP NZ sites. It applies primarily to the excavation of tank pits for the installation of underground petroleum storage systems where groundwater will, or is likely to, be intercepted in the excavation and be required to be removed. It could also be used to guide dewatering from any excavation.

3 Definitions

TERM	DEFINITION
AEE	Assessment of Environmental Effects
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018)
Appropriately authorised facility	A disposal facility authorised to receive the solid or liquid waste being generated. "Authorised" means that the facility is approved by a regulatory authority under the RMA 1991 to accept the solid or liquid wastes.
BTEX	benzene, toluene, ethylbenzene, xylene
Dewatering	Dewatering is the process of lowering the groundwater level at and around an excavated area. Dewatering is undertaken by BP: so that underground tanks can be installed to the quality and standard required; and, so that contractors can carry out the works specified in a safe and relatively dry environment.
Lab prepared standard	A water sample prepared in an analytical laboratory having a specific concentration of sediment (typically 100 mg/litre) that has been collected from the site being excavated. This provides a reference to check that the discharge water is meeting the discharge standard for colour and clarity.
Settling tank	A tank for holding groundwater until sediment suspended in it settles out at the bottom of the tank and hydrocarbons separate and float to the top of the water surface
Tank pit	A hole that is dug out into which underground petroleum fuel tanks are installed.

TSS	Total Suspended Solids
TPH	Total Petroleum Hydrocarbon
Skimming	To remove (floating matter) from the surface layer of a liquid
Filtration	To pass or slip a substance (groundwater) slowly through an obstruction or a filter to reduce suspended solids.

4 Roles & Responsibilities

The following roles are based on the BP NZ retail projects roles. Other parts of the BP NZ business may use this procedure but may have different project role titles.

The **BP Project Lead** (Network Development Manager, Project Manager, Project Engineer) is responsible for:

- communicating this procedure to the Planning Consultant, Environmental Consultant, Principal Contractor, and other BP Staff,
- incorporating this procedure into resource consent applications and AEEs where dewatering is potentially required,
- ensuring draft consent conditions are reviewed by a Subject Matter Expert prior to being accepted,
- ensuring this procedure is followed, and
- ensuring consent conditions are met.

The **BP Subject Matter Expert** (Environmental Compliance Manager, Remediation Management) is responsible for:

- reviewing draft consent conditions
- advising on compliance with the requirements of this procedure, and
- advising on compliance with relevant consent conditions.

The **Planning Consultant** is responsible for ensuring that:

- this procedure is incorporated into all AEEs where dewatering is potentially required,
- the required consents are applied for, and
- that the conditions are acceptable to BP.

The **Environmental Consultant** is responsible for:

- monitoring the operation of the dewatering system to ensure compliance with any rules, consents and approvals, and
- recommending any adjustments to the dewatering system to meet the requirements of the site.
- raising issues with the *BP Project Lead* and *Environmental Compliance Manager* immediately.

The **Principal Contractor** is responsible for:

- complying with this procedure,
- complying with consent conditions, and
- raising issues with the *BP Project Lead* and *Environmental Consultant* immediately.

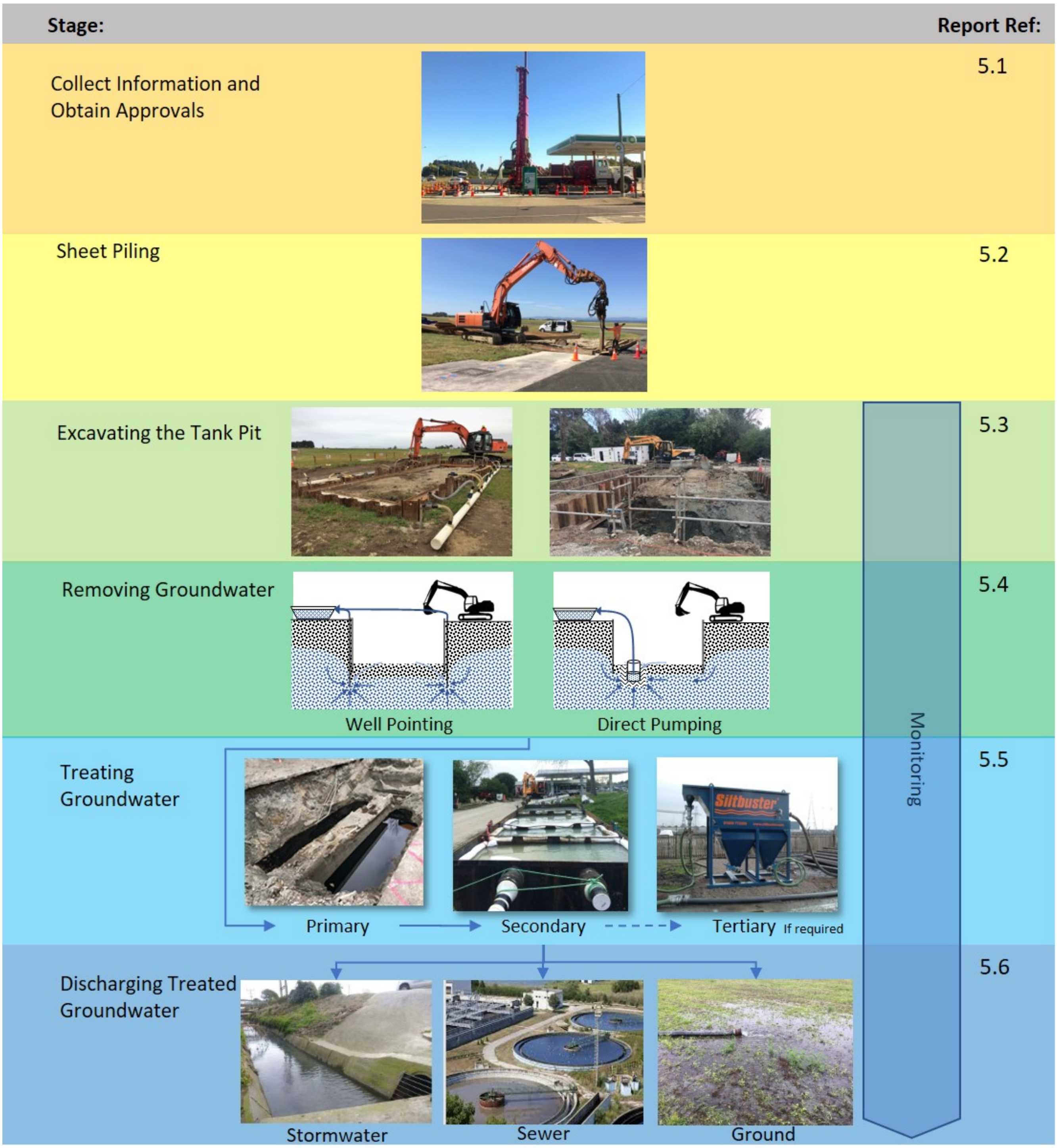
Any other **BP Staff and Site Contactors** are responsible for:

- complying with consent conditions, and
- complying with this procedure, and
- raising any issues with the *Principal Contractor* immediately.

5 Methodology

An overview of the dewatering methodology is shown in Figure 1 below.

Figure 1: Dewatering Process Stages



5.1 Collect Information and Obtain Approvals

Before the project commences the following information shall be collected to determine if dewatering is required, and to plan and consent the dewatering activity. This information is typically collected through a specific geotechnical / environmental investigation. However, occasionally adequate information can be compiled from previous environmental / geotechnical reports on the site.

- *Groundwater level and rate of recharge* – Knowing the groundwater level and rate of recharge informs the design of the dewatering system. If groundwater is determined to be significantly lower than the base of the tank pit dewatering is unlikely to be needed.
- *Geology / soil types* – Understanding the type of geology present helps to: assess the likely rate of groundwater seepage into the pit or well points; identify any potential barriers to sheet piling e.g. hard rock; and, determine the suitability of the land for soakage disposal of pumped groundwater.
- *Geotechnical assessment* – Engineering assessments of the geology provide information that will assist the project lead and contractors to decide which excavation and dewatering method to use. The assessments also help to determine the safe slope of the pit sides (where the tank pit walls are battered or benched) and the tank pit floor foundation requirements.
- *Underground service locations* – Identifying the locations of underground services (Gas, stormwater, wastewater, electrical water supply) from site plans, council files service location surveys will assist to ensure that the tank pit is located appropriately, and the services are not damaged or pose a risk to site workers during site works.
- *Soil and groundwater quality* – Determine the likelihood of any contaminants (including hydrocarbons) being present in soils and inform water treatment and soil and water disposal options.
- *Groundwater disposal options* – an assessment of the viability of using of the sewer network, the stormwater network (both piped and natural), or any land available for soakage. The capacity of each of the systems will need to be determined in consultation with (and the approval of) the network owners.
- *Receiving Environment* – Identify the likely receiving environment and assess its sensitivity (e.g. size, quality, uses, values, etc.).
- *Applicable regulatory requirements* – Obtain advice from the *planning consultant* on what consents and approvals are needed from the regulators to authorise the take, diversion, and discharge of groundwater. These requirements will vary depending on which region the site is located in.

5.2 Sheet Piling

Where dewatering of the tank pit is required, sheet piling will be used to retain the walls of the tank pit and restrict water flow into the pit. Sheet piles are installed with the use of 6 and/or 8 metre sheets so suitable 'toe' or imbedding of the sheets beneath the bottom of the excavations is achieved. The use of overlapping sheet piles will minimise groundwater flow into the tank pit excavation through the tank pit walls and speed up the dewatering process.

Benched or battering of tank pit excavations should be avoided for sites where groundwater intercepts the pit. However, exceptions may need to be made where sheet piling is not physically possible, for example where hard rock or other underground obstructions prevent the installation of the sheet piles.

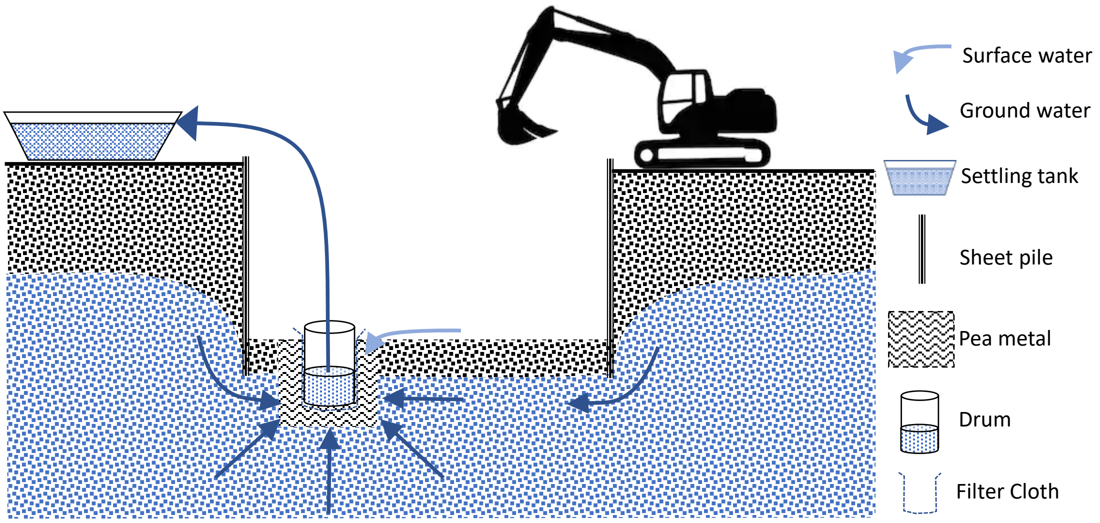
5.3 Excavating the Tank Pit

Upon completion of sheet piling, soils within the footprint of the proposed tank pit will be removed by an excavator. During these excavations any visibly hydrocarbon-impacted soils or liquids encountered will be removed and disposed of at an *appropriately authorised facility* and in accordance with the BP waste management protocol (AM-PP-0018).

5.4 Removing Groundwater

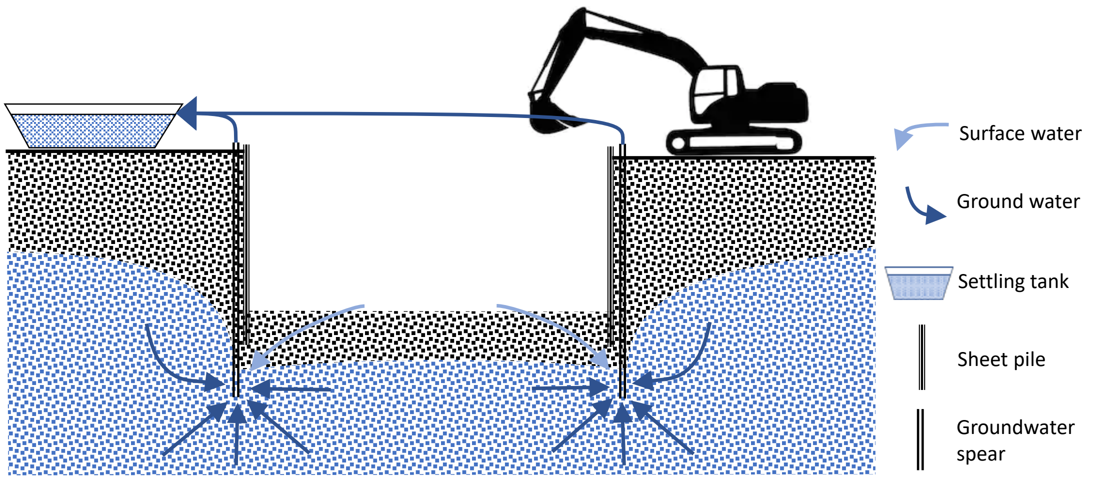
Groundwater is removed from the proposed tank pit area by one or both of the following methods:

Figure 2: Direct pumping from a sheet piled tank pit



Direct Pumping involves the use of the lowest point in the pit to collect groundwater. A hole (the pump well) is excavated into one corner of the tank pit to create a low point, into which a drum or drums are placed to remove groundwater. These drums have slots cut into the sides to allow for the flow of groundwater, wrapped in a filter cloth and surrounded in pea metal. A submersible pump is placed in the open void inside the drum. This arrangement produces cleaner discharge water by providing primary filtration of pit water (filter and pea metal); reducing resuspension of fine sediment by the pump intake; and, prevents the collapse of pit walls into the sump.

Figure 3: Well pointing from a sheet piled tank pit



Well pointing involves pumping groundwater from below the groundwater table (generally a minimum of 1.5m below the deepest excavation point) using many groundwater spears (small diameter PVC tubes) inserted into the ground around the outside of the tank pit. The groundwater table is maintained just below the tank pit bottom and above the spear intake to avoid the water picking up disturbed sediment and any hydrocarbons that may be in the excavation. If well managed, groundwater from well pointing should remain relatively free of elevated levels of suspended sediment and hydrocarbons.

Photo 1: A sheet piled and well pointed site ready for excavation.

There are typically two phases to dewatering:

- The **initial drawdown and stabilisation phase** may last up to 24 hours from the start of dewatering. Pumping rates of up to 40 litres per second are required to remove the groundwater from the pit and lower the groundwater table. The start of dewatering should be timed to avoid wet weather especially if there are flow capacity restriction on the stormwater or wastewater infrastructure receiving the discharge.
- The **maintenance phase** may last between 5- 10 days. Continuous pumping is required at a reduced rate of 10 and 20 litres per second to maintain the lowered groundwater level and keep the base of the tank pit dry during the tank install. Groundwater discharged over the maintenance period is typically clearer with lower suspended sediment levels.

During any period of heavy or persistent rain, the discharge rates will be monitored closely to prevent a flooding situation.

Pumping rates required to dewater the excavations will vary significantly between sites and may need to be higher than the rates stated above. When determining the required rate, the contractor will need to consider the following:

- capacity of the pump(s),
- capacity of infrastructure being discharged to (stormwater, wastewater, soakage),
- groundwater recharge rate, and
- capacity of the treatment system and the quality of the discharge (noting that the rate may need to be slowed to ensure effective treatment).

5.5 Treating Groundwater

The main contaminants of concern that may be present in the groundwater are:

- **Suspended Sediment.** Elevated levels of sediment may be suspended in water because of ground disturbances associated with the tank pit excavation, installation of groundwater spears and surface runoff over exposed soils. Elevated levels of suspended sediment can have significant adverse environmental and aesthetic effects on receiving surface waters including smothering of aquatic plants and animals, and significant changes in water colour and clarity.
- **Hydrocarbons** (dissolved and free phase) – Tank pits being excavated on sites that have a history of storing bulk fuels have the potential for soils and groundwater to be impacted by hydrocarbons. Elevated levels of hydrocarbons in the water being pumped and discharged to surface water can result in oil sheens and can be toxic to people and aquatic life. The potential for a site to generate hydrocarbon impacted groundwaters should be assessed when collecting the *Preliminary Information*.

The controls and treatment methods described in this procedure have been designed to optimise the treatment of the above contaminants, meet the discharge standards (see section 6.1) and ensure that there are no more than minor adverse effects on the environment.

5.5.1 Primary Treatment

The following controls will reduce the amount of contaminants that get into the water before it reaches the dewatering system. By minimising the amount of contaminant going into the treatment system, the load and reliance on the treatment system is reduced.

- **Use well pointing and sheet piling** where possible. Well pointing minimises the exposure of disturbed soils to groundwater and can significantly reduce or even avoid reliance on secondary and tertiary treatment stages. The use of sheet piling significantly reduces the surface water catchment area and area of disturbed soil surfaces exposed to surface water runoff when compared to benched excavations.
- **Construct a pump well** when direct pumping. The pea metal and filter cloth (see Figure 2) used in a pump well will help remove sediment before the groundwater is pumped out of the pit and into the rest of the treatment system.
- **Reduce site runoff velocities and protect exposed soils.** Fast flowing surface runoff water can collect a lot of sediment. Using sediment traps, cut off drains, and sumps to slow down and collect surface runoff will significantly reduce sediment loads. Auckland Council Guideline Document GD2016/005 Section E (Auckland Council 2018) has a range of good practice sediment control methods that can be used.
- **Reduce the amount of exposed areas** draining into the tank pit. Reducing the amount of disturbed areas in the tank pit catchment will reduce the amount of sediment that can be picked up by surface water runoff that is collected in the tank pit excavation.
- **Remove visible hydrocarbons** (sheens and floating free product). During excavations of impacted soil and groundwater hydrocarbons may collect on standing water surfaces in a form of a sheen or brown scum. These floating hydrocarbons should not be allowed to enter the dewatering system and can be collected by use of absorbent socks (for minor sheens) or a vacuum truck (for more significant thicknesses) and then disposed of at an *appropriately authorised facility* and in accordance with the BP waste management protocol (AM-PP-0018).

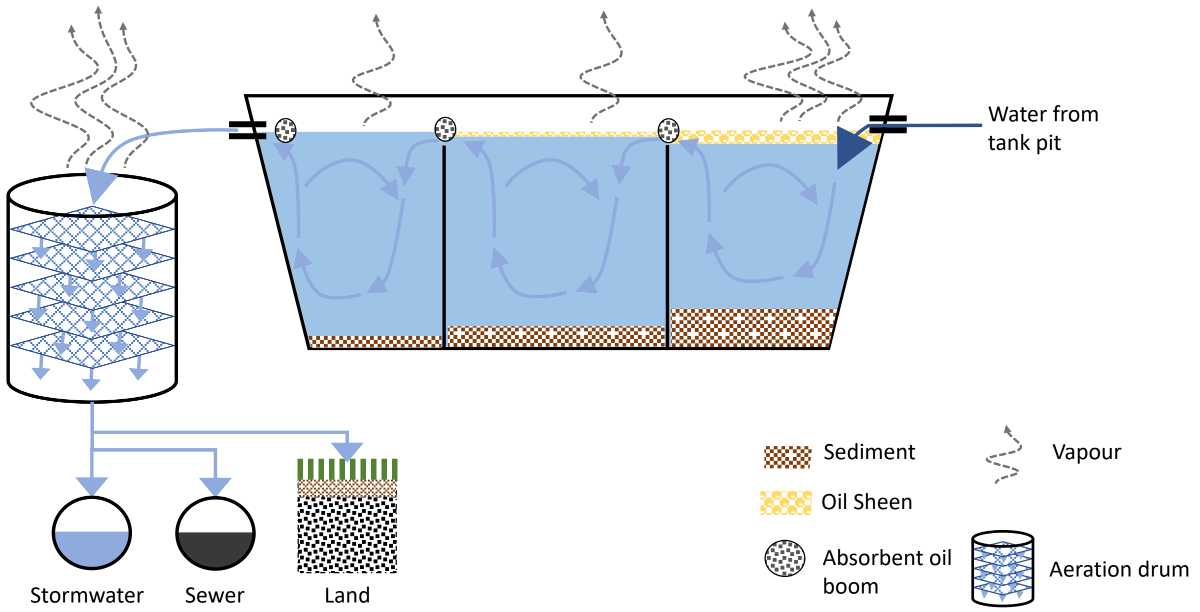
5.5.2 Secondary Treatment

Water removed from the tank pit is pumped to a treatment system designed to remove sediment and hydrocarbons (if present). A schematic of a typical treatment system is shown in Figure 4 below:

All liquids generated during dewatering activities are pumped to a settling tank to remove **suspended solids**. The settling tank is typically a transportable steel open top basin separated into 3 or 4 compartments by internal steel walls (baffles). The baffles slow the movement of water through the tank allowing sediment to drop out of suspension into the bottom of the tank. The size of the tank will be dependent on the pumping rate (and vice versa) and the particles size of the suspended sediment (smaller particles take longer to drop out).

If required, additional treatment can be included at the outlet by fitting a pipe sock or bag to the settling tank outlet and passing the discharge water through filter socks before releasing to the environment. The fine mesh and filter materials (compost, sawdust, straw) of the socks collects provides additional sediment treatment. The Auckland Council Best Management Practices - Dewatering and Catchpit Protection (Auckland Council, 2015a & 2015b) has further guidance on the use of filter and pipe socks for treating groundwater from dewatering activities.

Figure 4: Cross section of a boom and baffled settling tank (with additional aeration drum)



All

Sediment captured in the settling tank is removed from the tank in a wet truck or vacuum truck and disposed of at an *appropriately authorised facility*.

The settling tank baffles and the slow movement of water through the tank also allows **hydrocarbons** to float to the water surface. Absorbent oil booms strung across the top of the baffles will absorb and collect any floating hydrocarbons present. Hydrocarbons can then be skimmed from the surface and be disposed of at an *appropriately authorised facility*.

The aeration created by the open top of the settling tank and the drops into and out of the tank will further reduce concentrations of dissolved hydrocarbons in the water through volatilisation. If required, additional aeration can be included at the outlet by dropping the water through a drum filled with bread crates or similar.

After secondary treatment the treated groundwater can be discharged to the receiving environment unless observational monitoring of the discharge from the tanks shows elevated sediment or hydrocarbon concentrations (see section 6 Monitoring).

Photo 2: Settling tank with baffles and booms

Photo 3: Aeration Drum

5.5.3 Tertiary Treatment

If observational monitoring of the discharge from the settling tanks shows elevated sediment or hydrocarbon concentrations following secondary treatment, additional treatment can be added to the treatment system. Tertiary treatment should only be added to the system after an assessment of options by the *Environmental Consultant*, review by the *Subject Matter Expert,* and approval from the *BP Project Lead.*

The following common tertiary treatments are

- **Flocculation.** Some fine clays can be especially hard to settle out of water to an acceptable concentration using physical settlement methods. A coagulant or a flocculent, such as poly aluminium chloride solution may be added to the settling tank to accelerate the settling process. It is important that when using an aluminium based flocculent that it is added at the correct concentration as overdosing the water may result in elevated dissolved aluminium in the discharge water. Auckland Council Guideline Documents GD2016/005 Section F2.3 and Technical Publication # 227 has further guidance on using flocculant.

- **Specialised sediment/hydrocarbon treatment plants:** In special cases where there are difficult to settle clays, site constraints, significant levels of hydrocarbons, or sensitive receiving environments a specialised mobile plant should be considered. These specialised plants include lamella, or inclined plate clarifiers that use sets of inclined plates to increase residence time and maximise the surface area sediment can settle onto (Photo 4).

Photo 4: Lamella, or inclined plate, clarifier

5.6 Discharging Treated Groundwater

Once treated to an acceptable standard the water can be discharged via one, or in some situations a combination, of the following pathways:

- **Stormwater** - This is generally the preferred method of discharge. Prior to discharge to stormwater systems, regional discharge consents and the written approval of the network utility operator may need to be obtained. Written approval from the network operator will likely be conditional on not exceeding specified rates of discharge and/or avoiding discharging during significant rainfall events.
- **Land** - This method is generally adopted where there is no ability to discharge to the reticulated system. The discharge will typically be to soakage pits or irrigation where there is enough land and not too much water. Particular care must be taken to ensure the discharge does not result in surface flooding of the site or surrounding properties. Prior to discharge, regional discharge consent and approval of the landowner may need to be obtained.
- **Sewer** - This option is generally adopted where there is a potential for elevated levels of contaminants (e.g. suspended sediment, hydrocarbons) in the discharged water. It is useful to have this option as a backup especially during the start-up of dewatering when contaminant concentrations are likely to be at their highest. Prior to discharge, the written approval of the network utility operator must be obtained. Written approval from the network operator may be conditional on not exceeding specified rates of discharge and water quality parameters.

6 Monitoring

The purpose of monitoring is to ensure:

- that the treatment and site controls are working as expected,
- discharge standards and consent conditions are being met, and
- the receiving environment is not adversely affected.

Monitoring shall be undertaken by the *site contractor* and the *environmental consultant*. Monitoring will occur throughout the works, and observations will be recorded in a log sheet.

There may also be specific monitoring requirements imposed as conditions of consent and / or written approval. If these requirements are different to our standard monitoring approach or discharge guidance, they should be incorporated into a site-specific monitoring schedule.

6.1 Discharge Quality Standards

For each contaminant of concern, Table 1 describes the measurement, the discharge standard, and the observational indicators of compliance for each discharge standard. The discharge standard applies to the protection of aquatic life in surface water. These are not applicable to discharges to sewer (where higher contaminant loadings are accepted by the trade waste authority) or land (where higher sediment loads are likely to be acceptable).

Table 1: Discharge standards

Contaminant of concern	Measurement	Discharge pathway	Discharge guidance [1]	Observational indicators of compliance
Suspended sediment	Total suspended sediment	Stormwater / Surface water Sewer Land	100 mg/litre (After stabilisation) As agreed with Council No limit providing no potential for overland runoff to surface water	Clarity comparable or better than *laboratory prepared standard*.
Hydrocarbons	Total petroleum hydrocarbons and BTEX	Stormwater / Surface water & land Sewer	TPH - 15 mg/litre BTEX - ANZG 2018 - 80% level of protection As agreed with Council	No presence of sheen and odour.
Heavy metals	(As, B, Cd, Cr, Cu, Ni, Pb, Zn, Hg)[1]	Stormwater / Surface water & land Sewer	ANZG 2018 - 80% level of protection As agreed with Council.	NA

1 Heavy metals may be excluded from the analysis if the PSI or DSI demonstrate that groundwater elevated heavy metal concentrations are highly unlikely.

The rationale behind the use of the observational indicators of compliance with the discharge standard is discussed below:

- *Clarity comparable or better than laboratory prepared standard.* This visual indicator requires the environmental consultant to compare water quality sampled at the discharge point with a sample of water containing 100 mg/litre of soil from the site (typically prepared in the laboratory). If the water clarity looks the same, or is clearer than the standard, the discharge water is highly likely to be compliant.
- *No presence of sheen and odour.* This combination of visual and odour observations provides a strong indicator of the acceptability of the discharge.

  The light or volatile components of hydrocarbons have odour detection thresholds that range from being the same as, to significantly lower than drinking water standards and ANZECC guidelines. Therefore, if there is no odour the discharge is highly likely to be acceptable. If minor odour is present, concentrations may still be acceptable however, a laboratory analysis would need to confirm concentrations before discharging into a sensitive receiving environment.

  Based on interceptor testing the presence of sheen on water is roughly equivalent to a TPH concentration of 15 mg/litre (Ministry for the Environment, 1998). Therefore, if there is no sheen, hydrocarbon concentrations are highly likely to be lower than the 15 mg/litre discharge standard. Any sheen is unacceptable on discharge water or receiving waters. If sheen is present on the discharge water the discharge shall be stopped or diverted to sewer.

6.2 Observational Monitoring and Reporting

Monitoring of the performance of the system will be reliant on regular observational monitoring of the tank pit excavations and the treatment system using the visual indicators in Table 1. Monitoring locations, frequency and actions are shown in Table 2.

[1] Discharge standards are from The Ministry for the Environment's Environmental Guidelines for Water Discharges from Petroleum Industry sites in NZ, 1998.

Table 2: Dewatering monitoring schedule

Location	Monitoring	Frequency	Action
Tank pit excavations and prior to pumping from the tank pit.	Inspect soils for odorous or visibly impacted soils. Inspect pit water for sheen and free product.	Regularly during tank pit excavation.	Soils: excavate and appropriately dispose of soils. Water: skim product from surface with sucker truck.
Inflow to the settling tank/treatment system.	Collect **Inflow** and **discharge** samples for visual comparison. • Inspect water for sheen and odour. • Compare colour and clarity against lab prepared sediment standard.	1, 2, 4, 8, and 12 hours after pumping has started. Daily thereafter and if there is a change to the treatment system.	Compare with discharge and use to review and optimize effectiveness of treatment if necessary.
Discharge out of the settling tank/treatment system and prior to discharging to the environment			**STOP** the discharge if: - colour, clarity exceeds the laboratory prepared standard - sheen is present. - Lab results show exceedance of discharge guidance (Table 1) **Before recommencing:** Review and add further treatment, controls if required.
	Collect **discharge** samples for lab analysis.	At least one sample daily that is considered representative of the discharge.	Submit samples to an accredited laboratory for analysis of: • TSS, TPH, BTEX • Heavy metals (As, B, Cd, Cr, Cu, Ni, Pb, Zn, Hg)[2]
Receiving environment - where stormwater enters the surface water body e.g. Stream, river, lake, sea.	<u>If practical</u> collect samples for visual comparison and lab analysis. Inspect receiving environment comparing upstream and downstream water quality.	1, 2, 4, 8, and 12 hours after pumping has started. Daily thereafter and if there is a change to the treatment system.	**STOP** the discharge if significant adverse effect observed downstream compared to upstream. **Before recommencing:** Review and add further treatment, controls if required.

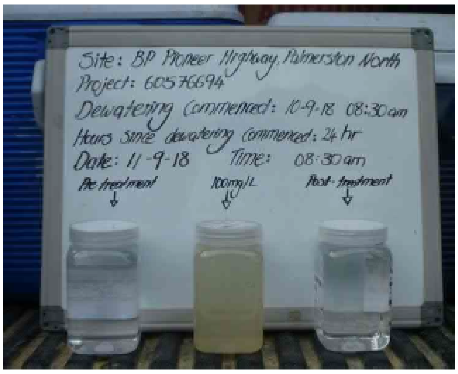
[2] Heavy metals may be excluded from the analysis if the PSI or DSI demonstrate that groundwater elevated heavy metal concentrations are highly unlikely.

Reporting: To show compliance with the discharge standards and show that the receiving environment has not been adversely affected the *environmental consultant* shall keep a log of all observations. Details of each check required in Table 2 shall be recorded by the *environmental consultant* in a log (see log excerpt example below) and include the following details as a minimum:

- *Date & time (including time from when pumping started)*
- *Weather*
- *Description of treatment system configuration*
- *Any field measurements taken E.g. PID, turbidity*
- *Photos of water samples compared to sediment standards*

- *Sample ID*
- *Description of water colour, clarity, odour and presence of surface sheens scums*
- *Any other relevant observation relating to the operation of the treatment system and site works and controls*

Figure 5: Example of an observational monitoring log entry

11/09/2018	08:30 *'24 hr sample - 12hr sample not collected as monitoring interval occurred overnight'*	Dewatering configuration: PSL and sub-contractors have installed well pointing ('spears'); water is abstracted from approximately 6 m below ground level (m bgl) into PSL's sediment settling tank(with four baffles, three of which have absorbent socks on surface) and discharged <u>**via aerators to wastewater**</u>. Sampling: • <u>Pre-treatment</u>: sample ('*PH-24-Pre*') collected from discharge / first baffle within settling tank. Clear, colourless, no odour or sheen. Discharge pipe PID reading 2.1ppm; sample headspace PID reading 0.9ppm. • <u>Post-treatment</u>: sample ('*PH-24-Post*) collected from final discharge from settling tank, but prior to aerators and wastewater. Clear, colourless, no sheen or film, slight hydrocarbon odour. Discharge pipe PID reading 60.6ppm; sample headspace PID reading 0.5ppm. Sample observed to comply with the 100mg/L suspended solid standard. Stormwater receiving environment: not assessed. Weather: Overcast.	

A full observational monitoring report example is provided in Attachment 1.

6.3 Observational Monitoring Versus Laboratory Analysis

Monitoring of the performance of the system will be reliant on observational monitoring to ensure compliance with the target discharge standards. While samples will be collected for laboratory analysis to confirm the observations and provide assurance that the discharge is compliant, it is not practicable to wait for laboratory sample testing to determine the levels of TSS, TPH and BTEX present in the discharge.

Visual and olfactory observation is a proven and effective means of checking water quality, and importantly enables a rapid response to any discharge changes. If observational monitoring identifies a problem, (such as the clarity of water not improving), then measures can be taken immediately to stop/divert the discharge and improve water treatment. In contrast laboratory analysis typically takes up to three days on fast turnaround, and by the time results are returned will not be representative of the current discharge quality.

7 Associated Documents

7.1 BP Associated Documents

- AM-PP-0018 Waste Management Protocol
- PRO-A-3.6.2-01 Construction Environmental Management Plan
- PRO-A-7.1-0-01 Environmental compliance: Obtain and maintain licence to operate.

7.2 NZ Legislation and Regulation

- Resource Management Act 1991
- Regional and District Policies and Plans

8 Key Performance Indicator (KPI) Reporting

The following is guidance only, please delete and replace with business specific KPI reporting detail, alternatively if KPI's are not relevant for this Procedure please delete and write Not Applicable.

This information should focus on lead KPIs and should define the exact measure, the source of data and which area of the business will be conducting the reporting.

Note: Lead KPIs should only be those measures that provide an effective insight into the ongoing (i.e. not be about implementation) health of the system. Consideration needs to be given to the time and effort involved in reporting, including:

- *Utilizing existing MS&L performance measures reported to the Risk & Compliance Committee;*
- *Whether verification will provide an adequate insight into performance; If a new additional performance measure is required, please consult with the SME for OMS 8.1 prior to creating new KPIs*

9 External References

Auckland Council, (2015a). Best Management Practice – Catchpit Protection. Auckland Council, July 2015. Retrieved from Auckland Council: https://www.aucklandcouncil.govt.nz/environment/looking-after-aucklands-water/stormwater/Pages/stormwater-forms-and-guides.aspx

Auckland Council, (2015b). Best Management Practice – Dewatering, Auckland Council, July 2015. Retrieved from Auckland Council: https://www.aucklandcouncil.govt.nz/environment/looking-after-aucklands-water/stormwater/Pages/stormwater-forms-and-guides.aspx

Auckland Regional Council (2004). The Use of Flocculants and Coagulants to Aid the Settlement of Suspended Sediment in Earthworks Runoff: Trials, Methodology and Design, Technical Publication 227. Auckland Regional Council, June 2004.
Retrieved from Auckland Council:
http://www.aucklandcity.govt.nz/council/documents/technicalpublications/TP227%20The%20use%20of%20flocculants%20and%20coagulants%20to%20aid%20the%20settlement%20of%20suspended%20sediment%20in%20earthworks%20runoff%20trials%20methodology%20and%20design.pdf

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018).
Retrieved from Department of Agriculture and Water Resources on the 12 June 2020:
https://www.waterquality.gov.au/anz-guidelines

Leersnyder, H., Bunting, K., Parsonson, M., and Stewart, C. (2018). *Erosion and sediment control guide for land disturbing activities in the Auckland region.* Auckland Council Guideline Document GD2016/005. Incorporating amendment 1. Prepared by Beca Ltd and SouthernSkies Environmental for Auckland Council. Retrieved from Auckland Council: http://content.aucklanddesignmanual.co.nz/regulations/technical-guidance/Documents/GD05%20Erosion%20and%20Sediment%20Control.pdf

Ministry for the Environment (1998). *Environmental Guidelines for Water Discharges from Petroleum Industry sites in NZ*, The Ministry for the Environment, December 1998.
Retrieved from Ministry for the Environment:
https://www.mfe.govt.nz/sites/default/files/media/Hazards/water-discharges-guidelines-dec98_0.pdf

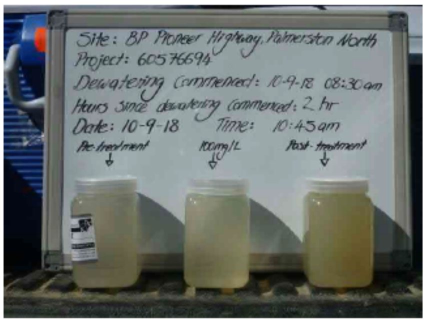
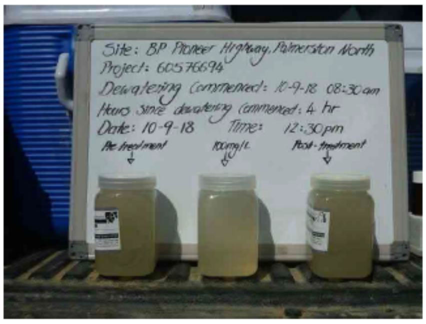
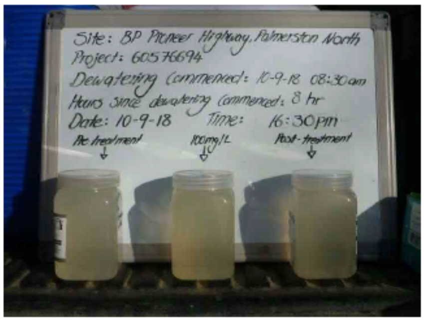
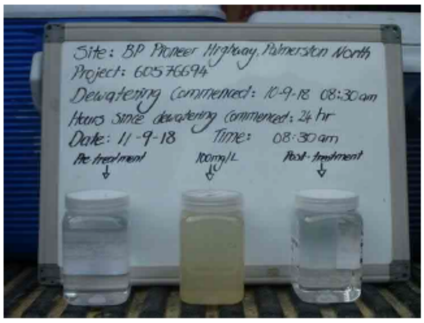
This Document was drafted *with reference to relevant legislation at the date of drafting, including but not limited to, relevant Acts, Regulations, New Zealand Standards and industry codes and practices. Details of current legislation can be provided by the S&OR team on request.*

10 Revision Summary

Revision	Prepared by	Description of Change	Date
1	S Holroyd		
2	J Court	Review and provision of additional details	06-04-2020
3	J Court	Addition of analytical sampling details (heavy metals)	17-06-2020

End of Document

Attachment 1: Dewatering treatment system observational monitoring log record

10/09/2018	10:30 *'2hr sample'*	Dewatering configuration: PSL and sub-contractors have installed well pointing ('spears'); water is abstracted from approximately 6 m below ground level (m bgl) into PSL's sediment settling tank(with four baffles, three of which have absorbent socks on surface) and discharged <u>**via aerators to wastewater**</u>. Sampling: • <u>Pre-treatment</u>: sample (**'*PH-2-Pre*'**) collected from discharge / first baffle within settling tank. Grey, turbid, slight hydrocarbon odour, no sheen, slight film. • <u>Post-treatment</u>: sample (**'*PH-2-Post*'**) collected from final discharge from settling tank, but prior to aerators and wastewater. Brown, turbid, slight hydrocarbon odour, no sheen. Sample was observed to exceed the 100mg/L suspended solid standard. Stormwater receiving environment: not assessed. Weather: Overcast to fine, light cool breeze.	
10/09/2018	12:30 *'4hr sample'*	Dewatering configuration: PSL and sub-contractors have installed well pointing ('spears'); water is abstracted from approximately 6 m below ground level (m bgl) into PSL's sediment settling tank (with four baffles, three of which have absorbent socks on surface) and discharged <u>**via aerators to wastewater**</u>. Sampling: • <u>Pre-treatment</u>: sample (**'*PH-4-Pre*'**) collected from discharge / first baffle within settling tank. Grey, turbid, slight hydrocarbon odour, no sheen, slight film. • <u>Post-treatment</u>: sample (**'*PH-4-Post*'**) collected from final discharge from settling tank, but prior to aerators and wastewater. Brown, turbid, slight hydrocarbon odour, no sheen. PID headspace reading from sample 13.1ppm. Sample was observed to exceed the 100mg/L suspended solid standard. Stormwater receiving environment: not assessed. Weather: Overcast to fine, light cool breeze.	
10/09/2018	16:30 *'8hr sample'*	Dewatering configuration: PSL and sub-contractors have installed well pointing ('spears'); water is abstracted from approximately 6 m below ground level (m bgl) into PSL's sediment settling tank(with four baffles, three of which have absorbent socks on surface) and discharged <u>**via aerators to wastewater**</u>. Sampling: • <u>Pre-treatment</u>: sample (**'*PH-8-Pre*'**) collected from discharge / first baffle within settling tank. Light brown, slightly turbid, slight hydrocarbon odour, no sheen. Sample headspace PID reading 2.3ppm. • <u>Post-treatment</u>: sample (**'*PH-8-Post*'**) collected from final discharge from settling tank, but prior to aerators and wastewater. Light brown, slightly turbid, slight to moderate hydrocarbon odour, no sheen. Discharge pipe PID reading 60.5ppm; sample headspace PID reading 2.9ppm. Sample observed to comply with the 100mg/L suspended solid standard. Stormwater receiving environment: not assessed. Weather: Overcast to fine, light cool breeze.	
11/09/2018	08:30 *'24 hr sample - 12hr sample not collected as monitoring interval occurred overnight'*	Dewatering configuration: PSL and sub-contractors have installed well pointing ('spears'); water is abstracted from approximately 6 m below ground level (m bgl) into PSL's sediment settling tank(with four baffles, three of which have absorbent socks on surface) and discharged <u>**via aerators to wastewater**</u>. Sampling: • <u>Pre-treatment</u>: sample (**'*PH-24-Pre*'**) collected from discharge / first baffle within settling tank. Clear, colourless, no odour or sheen. Discharge pipe PID reading 2.1ppm; sample headspace PID reading 0.9ppm. • <u>Post-treatment</u>: sample (**'*PH-24-Post*'**) collected from final discharge from settling tank, but prior to aerators and wastewater. Clear, colourless, no sheen or film, slight hydrocarbon odour. Discharge pipe PID reading 60.6ppm; sample headspace PID reading 0.5ppm. Sample observed to comply with the 100mg/L suspended solid standard. Stormwater receiving environment: not assessed. Weather: Overcast.	
Two parallel treatment trains were operating on site. Dewatering from well pointing('spears') diverted to stormwater following 24hr monitoring period. Perched or water infiltrating into the pit was diverted to the suppliers settling tank and discharged via aerators to wastewater, owing to elevated sediment load and hydrocarbon odours.			
11/09/2018	15:45	Stormwater receiving environment sampling: sample (**'*PH-Stormwater-2*'**) collected from the outlet at the stormwater culvert (accessed from Mariner Street carpark, adjacent to the reserve). Clear, colourless, no odour or sheen, moderate flow. Final dewatering configuration onsite: PSL and sub-contractors have installed well pointing ('spears'); water is abstracted from approximately 6 m below ground level (m bgl) into PSL's sediment settling tank(with four baffles, three of which have absorbent socks on surface) and discharged to <u>**stormwater**</u>. PSL have also deployed a submersible pump in south-west corner of tank pit; water is abstracted into sub-contractors sediment settling tank and discharged <u>**via aerators to wastewater**</u>. Weather: Overcast.