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2 August 2022

Dr Jos Kusters
Ampol Australia Petroleum Pty Ltd
2 Solander St,
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Dear Jos

Proposal for a Pollutant Discharge Monitoring Program (PDMP) for the Wharf Drain, Kurnell

1. BACKGROUND AND PURPOSE

The New South Wales Environment Protection Authority (NSW EPA) requires a Pollutant Discharge Monitoring Program (PDMP) to be prepared and agreed for the purpose of investigating and monitoring water quality and odour emanating from a stormwater outfall known as the "Wharf drain" in Kurnell. The PDMP is a requirement of the Pollution Reduction Program (PRP) Notice 1619134 issued by the NSW EPA to Ampol Australia Petroleum Pty Ltd (Ampol). The PRP is included as a variation (dated 27 May 2022) to Ampol's existing Environment Protection Licence No. 837. The licence is applicable to the operation of the Ampol's fuel storage and distribution terminal at Kurnell. Ampol has engaged WSP Australia Pty Ltd (WSP) to prepare a proposal for the implementation of the PDMP.

The Wharf drain captures rainwater falling on areas within the terminal in a sub-area known as Catchment A. The Wharf drain discharges to Silver Beach located to the north of the Kurnell peninsula. As well as capturing surface water from within the terminal, Catchment A also receives stormwater in-flows from a national park to the east and reservation land to the north of the terminal. The requirement for a PDMP follows public complaints of a "sheen" and a "dark colour" in effluent water observed at the Wharf drain as well as hydrocarbon odours in the immediate vicinity of the Wharf drain.

2. REQUIREMENTS AS PER THE PRP

The PRP notice stipulates scope items required in the PDMP. Each of these scope items are summarised in Table 2.1 and a reference is made to the section within the proposal which addresses the scope item.

Table 2.1 Scope items prescribed in U1.2 of the issued PRP Notice (1619134)

ITEM #	SCOPE ITEM	SECTION OF PROPOSAL
4(a)	A clear delineation of the catchment basin and drainage network that feeds into the wharf drain using maps, plans and / or diagrams	3.1

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ITEM #	SCOPE ITEM	SECTION OF PROPOSAL
4(b)	A proposed assessment of drain / pipeline integrity using CCTV and other methods to assess the condition of the stormwater management network on site	3.2
4(c)	A proposed review of any existing information, including monitoring data and previous reports	3.3
4(d)	Proposed water sampling and analysis	3.4
d(i)	Monitored analytes must include, but may not be limited to, TRH, BTEX, and other appropriate compounds present in fuel products	3.4.2
d(ii)	Sampling of discharges at the wharf drain as well as the separators located within the Right of Way on the southern side of Prince Charles Parade, separators located within Ampol premises near Gate 5, and at any other significant points of inflow to the drain.	3.4.1
d(iii)	Specific equipment and / or methodology to undertake routine or continuous sampling over a 3 month period to capture a range of operating and natural scenarios. That is, varied operations as well as tides and rainfall events where practicable, that would materially impact discharge water quality	3.4.3
d(iv)	Sampling and analysis for each analyte in accordance with the 'Approved Methods for the Sampling and Analysis of Water Pollutants in NSW" (2004)	3.4
d(v)	The level of reporting for pollutant concentrations must be sensitive enough to detect pollutant at levels related to their environmental risk and the ANZG 2018 toxicant guideline value (where available) while having regard to the best available analytical practical quantification limits using available technology.	3.4.2
(e)	Incorporate proposed routine air monitoring of Volatile Organic Compounds into the program of water sampling such that sampling of air and water are concurrent. Assessment of odours will be achieved through the interpretation of the air sampling results.	3.5
(f)	The expert undertaking the air sampling will make a qualitative assessment of the odours at times of sampling. The qualitative assessment must be undertaken and recorded by an olfactory trained person.	3.7
(g)	Proposed stakeholder consultation with Sutherland Shire Council in development of the monitoring program	3.8
5	The licensee is to submit a final report on the approved program to the EPA 6 weeks after completion of the sampling component of the program. The report must include the items covered at 4 above and the following matters	3.9
5(h)	A presentation and discussion of results as well as recommendations for next steps in the program	3.9
5(i)	Details of stakeholder consultation with Sutherland Shire Council in development and implementation of the program	3.9

ITEM #	SCOPE ITEM	SECTION OF PROPOSAL
5(j)	Details of the consideration of any community complaints, observation, or relevant data provided to Ampol	3.9
6	Upon submission of the final report, the licensee must provide the EPA with its plans to update the Kurnell community on program outcomes and next steps	3.10

2.1 DEFINITION OF KEY TERMS USED IN THIS PROPOSAL

Specific terms are used in the proposal in reference to analytical suites and sampling frequencies. These terms are defined below to avoid confusion.

Analytical suites

Comprehensive – Comprehensive describes preliminary sampling events for surface water and ambient air where a broad list of compounds has been selected for analysis. The analysis includes critical compounds that make up TRH fractions, including speciated TRH. Two preliminary events comprising the comprehensive analytical suite are planned for surface water and ambient air , the findings of which will assist in refining the subsequent Phase 1 sampling program (refer *Sampling frequency* below).

Standard – Standard describes the analytical suites for Phase 1 and Phase 2 events for surface water and ambient air (refer *Sampling frequency* below). The standard analytical suite includes TRH and BTEXN compounds, however, TRH fractions analysed as part of the standard suite will be analysed in groups rather than as individual constituents making up those groups.

Sampling frequency

Continuous – continuous monitoring refers to specialist instruments that are to be used for measuring H_2S and VOCs at target locations to identify ongoing concentrations.

Phase 1 – Phase 1 sampling frequency is the initial sampling phase which is of a higher frequency than the later phase (Phase 2). For surface water and odour sampling Phase 1 sampling is to be undertaken daily for the first three weeks of the program. Phase 1 sampling will be undertaken following the preliminary comprehensive investigation.

Phase 2 – Phase 2 sampling frequency follows the initial sampling phase (Phase 1) and, at present, is set at the rate of one sample every sixth day. This frequency is intended for surface water, odour and ambient air. Note that ambient air monitoring will occur at the Phase 2 frequency from the commencement of the program.

3. SCOPE DETAILS

3.1 DELINEATION OF CATCHMENT

The catchment that feeds the Wharf drain outfall is to be reviewed by a specialised surface water and hydrology team. The study will review and assess the following key items:

- Review of network diagrams and maps provided by Ampol
- Review of previous reports and hydrology models
- Site inspection and interview with relevant site personnel

- Review of LiDAR data and available ground survey to check and update internal site drainage sub-catchment and external sub-catchments that drain to the site. Contour information from LiDAR will assist in the understanding of catchment areas that input into the Wharf drain outlet.
- Update of hydrology models with confirmed sub-catchment areas and analysis of sub-catchment flows, including sub-surface drainage network flows and overland flows, to establish flow behaviour within the site and outflows from the site to the receiving environment downstream. Specifically, drainage patterns contributing the Wharf drain will be examined through the modelling process
- Use of the hydrology model outputs and evaluation of contamination sampling data to identify areas of the terminal that contribute stormwater runoff to the outflows to the Wharf drain to assist with the investigation of potential sources of contaminated runoff

The hydrology team will work with contaminated land and odour specialists in conceptualising the problem and developing potential recommendations.

3.2 INTEGRITY ASSESSMENT OF THE STORMWATER PIPES

A specialist drain survey company will be engaged by Ampol to inspect the stormwater system in two specific sub-catchments within the terminal (catchment A and B). If repairs are required to be carried out as a result of the outcomes of that investigation, Ampol is responsible for engaging an appropriate contractor to carry out the necessary work.

CCTV footage from the investigations is to be shared with WSP. WSP will review the CCTV footage and incorporate critical findings to the sampling plan. Findings from the review of footage is anticipated to assist in understanding probable sources to the issue of odours at the Wharf drain.

The details of the CCTV investigation and findings will also be included in the report.

3.3 DATA REVIEW

Ampol is to provide WSP with all available monitoring data for the stormwater network leading to the Wharf drain. A preliminary data set comprising a sampling program undertaken by Ampol at Silver Beach and at the Wharf drain spanning from March to July 2022 has been reviewed by WSP and used in the design of the sampling plan outlined in section 3.4. In addition to historic sampling data of the Wharf drain network, WSP will review data specific to the north and north-western sections of the terminal in recent site-wide groundwater monitoring reports.

3.4 WATER SAMPLING RATIONALE

The PDMP requires sampling over a three-month period to capture variability over time due to operational factors and weather factors. The proposed strategy is to undertake a preliminary round of comprehensive analysis of chemicals in surface water to establish at commencement contaminant loads, and speciation of those contaminants at each of the discrete catchment inflows to the drain.

The results from the comprehensive analytical assessment will be used to implement sampling in Phase 1 and Phase 2 at targeted locations.

The primary function of the surface water testing will be to identify the contaminant types and to gather evidence to help establish the source of the contaminants found in the stormwater in the drain. The comprehensive analysis in the preliminary rounds of sampling will assist in establishing source types. The comprehensive suite of analytes will include various individual compounds that can identify the petroleum product type dissolved in the water. Thus, by matching the speciated water samples in down-gradient pits with speciated samples in catchment source areas or drain entry samples, it should be possible to identify the areas contributing most to the contaminants exiting the Wharf Drain.

The sampling plan is to follow guidance presented in Approved Methods for the Sampling and Analysis of Water Pollutants in NSW, January 2022. The document specifies approved methods for sample collection, handling, analysis as well as quality assurance (QA) and quality control (QC) procedures. Details of the methodology and QA/QC protocols used in the field and laboratory QC procedures are to be documented in the report that is to be submitted to the NSW EPA.

3.4.1 STORMWATER SAMPLING LOCATIONS

Thirteen locations have been selected for evaluation in the Wharf drain study. The locations were selected following multiple site inspections and were identified as critical points representing various sources within the Wharf drain catchment. These locations are described as follows and presented in Attachment A - Figure 1 and Attachment B:

1. Flow from the pipe entering the terminal from the National Park, under the middle section of Road 1.
2. Outflow of pipe carrying stormwater originating from the National Park. Pipe opens to an open drain along Road B, external to Tank 404 bund. Baring ingress to the pipe, this water should only have National Park stormwater.
3. Flow within a concrete pit located in the eastern portion of Road A. This pit collects water that flows into the site from the National Park to the north-east, and passes through an infiltration point (NP2) located to the south of the tank bund 105 on Road 1. Baring ingress to the pipe, this water should only have National Park stormwater that was collected from the open stormwater gutter located along the most northern portion of Road 1.
4. Seepage water (overland flow) on Road A. This water enters the terminal from overland flow from the reserve land to the north of Road A. The ephemeral puddle on Road A will be sampled whenever water is present, to identify possible contaminants which may infiltrate into the stormwater drainage pipe under Road A.
5. Pipe water from the pit located at the north-western corner of the tank bund 102 on Road A. This water should only contain inflow from off-site (from the National Park during rain events, and from ingress to the pipe from seepage originating from the off-site reserve on the northern side of Road A.
6. Pipe water from the pit at the corner (low point) of Road A and Road 7. This water should only contain inflow from sampling point 5. The purpose of sampling both 5 and 6 is to delineate the drain section which may be subject to the influence of groundwater infiltration from the northern tank farm.
7. Open drain along Road 3 (corner of Road G). This drain collects seepage from the base of the bund of the eastern tank farm, and roadway stormwater during rain events.
8. Seepage water flowing to the open main pipeway drain from the base of the bund of the former lower eastern tank farm. This seepage water shows prominent hydrocarbon sheen.
9. The water immediately after the joint section between the stormwater drain in the main pipeway and pipeway A. It was indicated that during flooding event, overflow will occur at this location.
10. Skimmer and interceptor at end of main pipeway open drain. This water is exclusively sourced from the terminal Catchment A (and possibly occasional overflow from Catchment B.
11. Gate 5 triple interceptor. This water is the confluence of the terminal's Catchment A drainage with the flows originating from the National Park and Road 1.
12. Final pit at down-stream end of Ampol's right-of-way near Prince Charles Parade gate. This is the point where the waters from the Wharf Drain exit the terminal.
13. Outlet of the Wharf Drain on the beach. WSP intends to make all reasonable attempts to sample this location at the frequencies prescribed in this proposal (see table 3.1) by avoiding high tide events and or when the outlet is blocked with sand.

3.4.2 SAMPLING FREQUENCY AND ANALYTICAL SUITE

The comprehensive analytical suite selected for surface water in the preliminary round of sampling will involve stormwater sampling at all thirteen locations listed in section 3.4.1.

Based on the outcomes of the comprehensive investigation, Phase 1 and Phase 2 sampling will occur at a selection of the 13 locations. The following locations are proposed (subject to amendment):

1. Flow from the pipe entering the terminal from the National Park, under the middle section of Road 1
5. Pipe water from the pit located at the north-western corner of the tank bund 102 on Road A. This water should only contain inflow from off-site (from the National Park during rain events), and from ingress to the pipe from seepage originating from the off-site reserve on the northern side of Road A.
6. Pipe water from the pit at the corner (low point) of Road A and Road 7. This water should only contain inflow from sampling point 5. The purpose of sampling both 5 and 6 is to delineate the drain section which may be subject to the influence of groundwater infiltration from the northern tank farm.
11. Gate 5 triple interceptor. This water is the confluence of the terminal's Catchment A drainage with the flows originating from the National Park and Road 1.
12. Final pit down-stream end of Ampol's right-of-way near Prince Charles Parade gate. This is the point where the waters from the Wharf Drain exit the terminal.
13. Outlet of the Wharf Drain on the beach. WSP intends to make all reasonable attempts to sample this location at the frequencies prescribed in this proposal (see table 3.1) by avoiding high tide events and or when the outlet is blocked with sand.

The locations suggested above are open to change following the review of comprehensive investigation results. The current proposed sampling frequencies for water sampling are presented in Table 3.1.

Table 3.1 Sampling frequency – water sampling

	FREQUENCY	TIME FRAME	NUMBER OF EVENTS[2]
Comprehensive investigation	2 Rounds	First round to occur prior to commencement of Phase 1. Date of second round to be decided upon review of data.	2
Phase 1	Daily	3 weeks following preliminary comprehensive investigation	15-18
Phase 2[1]	Every sixth day	2 months and 1 week following Phase 1	11-12

[1] Commencing from the 4th week of the sampling program

[2] Assuming 4 weeks in one month

Phase 1 will be conducted for at least three weeks. However, the data set will be evaluated after the 10th sampling event within the first three weeks to assess the variability and possible trending of the contaminant concentrations. The outcome of the data evaluation will determine the necessity of extending the duration of Phase 1.

WSP proposes a monitoring frequency of 1 in 6 days for Phase 2 as it allows sampling across a week capturing impacts that could result from operational variables. The frequency will be increased as necessary should outcomes from Phase 1 suggest the need for a higher rate of sampling.

The preliminary comprehensive sampling events will comprise an extended analytical suite which is designed to identify petroleum hydrocarbon products. It covers volatile (from C_5) to semi-volatile (C_{20}) compounds. A list of compounds is presented in Attachment C. Gas chromatographs will be examined to identify unknown peaks (peaks of compounds not included in the analytical suite). Subsequent analysis, of 'duplicate samples' collected during the investigation, will be used to positively identify and quantify the compounds of the unknown peaks. The analytical suite can be modified for Phase 1 and Phase 2 sampling to include those identified peaks. Samples collected during the Phase 1 and Phase 2 sampling events will be analysed for TRH (NEPM 2013), TPH (NEPM 1999) and BTEXN. Leeder Analytical laboratories will carry out the analyses.

In addition to hydrocarbons, water samples will be analysed for sulfite as an indicator of the presence of H_2S in air samples.

The level of detection by the laboratory will be sufficiently sensitive to identify compounds at levels related to their environmental risk and the ANZG 2018 toxicant guideline value (where available) while having regard to the best available analytical practical quantification limits using available technology. It should be noted that WSP uses NATA accredited laboratories for all sample analysis. The analytical plan is presented in Table 3.2.

Table 3.2 Analytical plan – water sampling

SAMPLING EVENT	TRH FRACTIONS	BTEXN	SPECIATED HYDROCARBON COMPOUNDS	SULFITE
Comprehensive investigation - Round 1 and Round 2	Yes	Yes	Yes	Yes
Phase 1 and Phase 2 sampling	Yes	Yes	-	Yes

3.4.3 CHANGES IN NATURAL AND OPERATIONAL SETTINGS

The assessment will evaluate whether contaminant concentrations at the Wharf drain is impacted by natural weather events and or terminal operations.

Prior to sampling, daily weather data will be recorded in an observation. In addition, the field scientist will evaluate weather predictions for the upcoming sampling dates and plan to undertake additional monitoring if an unusual weather event is predicted. For example, during Phase 2 sampling, if a heavy rain event is predicted between two weekly events, an additional monitoring event will be scheduled on the day of the unusual weather event. Sampling results tables will provide a description of natural settings relevant to each monitoring event.

WSP will request Ampol to provide an itinerary of planned operational activities at the terminal. Examples of significant operations include events such as importing from the wharf and exporting to the Banksmeadow Terminal. Additional sampling will be scheduled during Phase 2 work if out-of - routine operations are identified in the itinerary. Sampling results tables will provide a log of operational activities relevant to each monitoring event. In addition, the itinerary of operational activities will be included in the final report relevant to the Wharf drain catchment

3.4.4 MONITORING WELL GAUGING

Groundwater monitoring wells adjacent to at least 5 locations presented in section 3.4.1 will be gauged during Phase 1 and Phase 2 sampling of surface water. The gauging data will provide an indication of the fluctuations in groundwater elevation which could influence input to stormwater should there be locations within the catchment that interact with groundwater.

3.5 AIR MONITORING – PERIODIC SAMPLING

3.5.1 RATIONALE AND SELECTION OF LOCATIONS

Odours may be present from three types of contaminants which require three types of sampling:

- H_2S – from degradation of natural organic matter, or from petroleum hydrocarbons.
- VOCs – from petroleum hydrocarbons (some, but minor VOCs can originate from natural vegetation – e.g., terpines). These are the C_5 to C_{14} compounds.
- Semi-Volatiles (SVOCs) – mainly petroleum based but some originate from plants. These are C_{15} to C_{20} compounds.

As is the strategy for stormwater sampling, a comprehensive list of chemicals will be analysed in air sampled from pits and drain openings during the preliminary rounds (refer to Section 3.5.2). The air monitoring will be carried out simultaneously with the stormwater sampling (to the extent possible), but only at locations where a partial enclosure exists – such as in pits and pipe openings. Sampling air in an open atmosphere above a stormwater pit or drain is not an effective way of measuring what is arising from the stormwater because of the significant influence of dispersion which would mask what is arising from the stormwater versus what is in the ambient air.

The locations (with partial enclosures) for the comprehensive air sampling are listed below:

1. Flow from the pipe entering the terminal from the National Park, under the middle section of Road 1
2. Outflow of pipe carrying stormwater originating from the National Park. Pipe opens to an open drain along Road B, external to Tank 404 bund. Baring ingress to the pipe, this water should only have National Park stormwater
5. Pipe water from the pit located at the north-western corner of the tank bund 102 on Road A. This water should only contain inflow from off-site (from the National Park during rain events, and from ingress to the pipe from seepage originating from the off-site reserve on the northern side of Road A.
6. Pipe water from the pit at the corner (low point) of Road A and Road 7. This water should only contain inflow from sampling point 5. The purpose of sampling both 5 and 6 is to delineate the drain section which may be subject to the influence of groundwater infiltration from the northern tank farm.
10. Skimmer and interceptor at end of main pipeway open drain. This water is exclusively sourced from the terminal Catchment A (and possibly occasional overflow from Catchment B.
11. Gate 5 triple interceptor. This water is the confluence of the terminal's Catchment A drainage with the flows originating from the National Park and Road 1.
12. Final pit at down-stream end of Ampol's right-of-way near Prince Charles Parade gate. This is the point where the waters from the Wharf Drain exit the terminal.
13. Outlet of the Wharf Drain on the beach. WSP intends to make all reasonable attempts to sample this location at the frequencies prescribed in this proposal (see table 3.1) by avoiding high tide events and or when the outlet is blocked with sand.

The PRP specifies "*Incorporate routine air monitoring of VOCs into the program of water sampling such that sampling of air and water are concurrent.*" It is anticipated that all six locations selected for water sampling as described in Section 3.4.2 will be sampled for the Phase 2 ambient air monitoring.

The Wharf Drain outlet tends to be inundated with water during high tide or blocked with sand depending on tidal patterns. Tidal patterns will be reviewed and observed, and every effort made to sample ambient air within the outfall (location 13) whenever possible.

3.5.2 AIR SAMPLING FREQUENCY AND ANALYTICAL SUITE

Air sampling is to occur every sixth day following the preliminary comprehensive investigation for a period of three months. Each event will coincide with a water sampling event as described in section 3.4. WSP proposes a monitoring frequency of 1 in 6 days as it allows sampling across a week capturing impacts that could result from operational variables. Table 3.3 presents the frequency of air sampling over a 3-month investigation period. It should be noted that a daily sampling regime (Phase 1) has not been proposed for ambient air via the passive and active methods of analysis given that these methods are designed to provide an evaluation of concentrations at a point in time. Continuous sampling is presented in section 3.6 for H_2S and VOCs.

The comprehensive investigative round of air sampling will be undertaken using the active sampling method (active sampling onto sorption tubes). H_2S will be tested by passive sorption tubes (manufactured by Radiello for H_2S monitoring). Semi volatile hydrocarbons will also be analysed during the initial detailed round of sampling - actively sampled onto TENAX tubes.

Volatile hydrocarbons will be actively sampled onto Air Toxics tubes (thermal desorption tubes) and analysed by the TO-17 method. A list of VOCs nominated for analysis is presented in Attachment C. The analytical plan is presented in Table 3.4.

Following the comprehensive round of monitoring, sampling that is to be undertaken every sixth day will comprise VOCs and H_2S tested by passive sorption tubes. Without knowing the contaminant concentration in air, the deployment time is currently designed as 48h in order to achieve the desired quantity, which will facilitate a sensitive laboratory detection limit. High contaminant concentrations identified during the comprehensive investigation will lead to a shortened passive sampling durations (reduced from 48h to 24h).

A PID will be used to screen for levels of volatile hydrocarbons during each air sampling event. That information will assist in determining the appropriate sampling duration for active and passive sampling.

Table 3.3 Sampling frequency – air sampling

	FREQUENCY	TIME FRAME	NUMBER OF EVENTS
Comprehensive investigation	2 Rounds	Prior to, or during the initial and routine investigation	2
Phase 2 sampling	One sample every sixth day	3 months	15

Table 3.4 Analytical plan – air sampling

SAMPLING EVENT	TRH FRACTIONS	BTEXN	VOCs	SVOCs	H_2S
Comprehensive sampling – Round 1 and Round 2	Yes	Yes	Yes	Yes	Yes
Phase 2 sampling	Yes	Yes	Yes	-	Yes

3.6 AIR MONITORING – CONTINUOUS SAMPLING

Continuous monitoring instrumentation can provide monitoring of H_2S and volatile organic hydrocarbons (VOCs). The VOC concentration is that for all volatile hydrocarbons combined in one total concentration. The continuous VOC monitoring instrument therefore gives a measurement of the C_6-C_{10} hydrocarbon loading in the air. The value of the continuous monitoring is that it provides information on the timeframes over which variability in contaminant concentrations are occurring and therefore provides a line of evidence to causes and sources of contaminants causing odours.

It should be noted that continuous monitoring would give no indication of hydrocarbon fractions other than the C_6-C_{10} range and may also pick up natural VOCs such as cumene. In contrast, the periodic sampling described in section 3.5 analyses the speciated composition of a wide range of petroleum hydrocarbons covering volatile and semi volatile compounds (from C_5 to C_{20} hydrocarbons). Periodic sampling will allow quantification of concentrations of 'unknown' peaks to assist in the identification of causes of odours. Due to the continuous monitors not being certified as intrinsically safe, the number of locations where the equipment can operate within the terminal is limited. Continuous monitors are proposed for operation at the following locations:

6. Pipe water from the pit at the corner (low point) of Road A and Road 7. This water should only contain inflow from sampling point 5. The purpose of sampling both 5 and 6 is to delineate the drain section which may be subject to the influence of groundwater infiltration from the northern tank farm.
12. Final pit at down-stream end of Ampol's right-of-way near Prince Charles Parade gate. This is the point where the waters from the Wharf Drain exit the terminal.

3.6.1 CONTINUOUS MONITORING EQUIPMENT

H_2S is to be monitored using an AcruLog gas monitor. The AirMetER-AX is to be used for VOC monitoring. Both instruments are sensitive for detecting concentrations in the parts per billion (PPB) range.

3.7 OLFACTORY ODOUR ASSESSMENT

3.7.1 IDENTIFICATION OF LIKELY ODOUR CAUSING COMPOUNDS

At this stage (i.e., pre-investigations) it is considered probable that the dominant odours will arise from H_2S and a combination of multiple petroleum hydrocarbon odours. It is also considered probable that odours will be dominated by compounds and groups of compounds that are represented by the peaks on the chromatograph (i.e., compounds present at high concentrations). It will be necessary to match the qualitative assessment of odours at the time of sampling with the analytical results.

3.7.2 ODOUR ASSESSMENT METHODOLOGY

Odour intensity surveillance monitoring will be conducted to assess the potential for odour impacts at odour sources in and around the site.

Assessments will be undertaken by WSP trained and certified odour assessors who are screened in general accordance with AS/NZS 4323.3 "Determination of Odour Concentration by Dynamic Olfactometry". WSP is accredited by National Association of Testing Authorities (NATA) to perform this assessment. The staff members participate in annual screening sessions that assess their

responsiveness to a reference odour (n-butanol). All staff will be screened within the past 12 months to assess if their Individual Threshold Estimates (ITEs) are within the acceptable range.

Exact monitoring locations, selected by the trained staff member, will focus on potential odour sources, and depend on site specific factors such as localised weather conditions (wind strength and direction), site accessibility and site operations, as well as health and safety aspects.

Odour detected at the sampling location will be assessed for the following:

- Nature and setting of the location;
- Odour intensity (refer to Table 3.5);
- Character (for example the presence of H_2S and or petroleum compounds);
- Presence (classified as 'constant', 'frequent/repetitive' or transient); and
- Local meteorological conditions.

Odour intensity surveys are designed to qualify odour emissions from source and quantify the odour level as a perceived strength. Odour intensity is the perceived strength of an odour above its threshold. Odour intensity has a seven-point scale ranging from 0 to 6 and is based on German Standard VDI 3940:2010 "*Measurement of Odour Impact by Field Inspection. Determination of Odour Intensity and Hedonic Odour Tone*", as described in Table 3.5. An example of the field record sheet used during the odour monitoring process is provided in Attachment D.

Table 3.5 Odour intensity scale

INTENSITY	DESCRIPTION
0	Not detectable
1	Very weak
2	Weak
3	Distinct
4	Strong
5	Very strong
6	Extremely strong

3.7.3 ODOUR SAMPLING FREQUENCY

WSP's odour team will conduct air sampling (for odour identification) at each location proposed for surface water sampling (section 3.6). Table 3.6 presents the frequency of odour evaluation.

Table 3.6 Sampling frequency – odour evaluation

	FREQUENCY	TIME FRAME	NUMBER OF EVENTS
Phase 1 sampling	Daily	3 weeks	15-18
Phase 2 sampling	Every sixth day	2 months and 1 week	11-12

As per the surface water monitoring, data will be reviewed on the 10th day of Phase 1 sampling. If a requirement to extend the daily sampling beyond the three weeks is deemed necessary, this requirement will also include odour evaluation daily for a longer duration.

3.8 ENGAGEMENT WITH SUTHERLAND COUNCIL

Sutherland Council will be provided the monitoring program with the intention of engaging in discussions should Council have concerns regarding the monitoring program particularly within public areas. Information will be sent to Council prior to the commencement of the sampling program and a time frame provided for a response.

3.9 REPORT

Within 6 weeks of the completion of the sampling component of the program, a report will be submitted to the NSW EPA providing the findings and outcomes of the program. The report will comprise items 5(h) to 5(j) as per the PRP and presented in Table 2.1.

The report will include a collation of community complaints as required in scope item 5(j). These complaints and concerns will be included in a table format with a short analysis of probable causes that could be deduced from the PDMP. In addition, if logged observations from concerned citizens are received, those will be included in the report and considered in the assessment of data.

3.10 COMMUNITY CONSULTATION

Ampol has existing communication channels for the Kurnell community. It is proposed that these be used to meet the requirements of the licence. The communication approach for this requirement should also be aligned with Ampol's overarching communication and engagement strategy. The following approach is recommended:

- Update(s) provided to the Remediation, Operations and Monitoring Community Working Group (CWG) or alternative community group discussion forum that Ampol has established. This approach is recommended in the first instance as the CWG or a community discussion forum is based on two-way dialogue, round-table discussion with the community. A meeting style forum provides time for discussion of a technical issue inviting immediate feedback with a question-and-answer opportunity to address any issues or areas requiring clarification.
- Summary of the outcomes or next steps in regular community letter/newsletters letterbox dropped to all the Kurnell community.
- Posting of the CWG minutes and presentation on this agenda item on the Ampol website.
- Posting of the community newsletter(s) addressing this matter on Ampol website.
- Offer of 1800# and community@ampol.com.au email address for any queries from the community

A plan will be provided to the NSW EPA outlining the methods by which the Kurnell community will be updated on the outcomes and next steps of the assessment process. The plan will be provided following the finalisation of this proposal and will highlight modes and stages of communicating outcomes with the community.

4. CLOSING

WSP trusts that the details presented in section 3 adequately addresses the requirements of the PRP notice 1619134. Please contact the undersigned if you wish to discuss the work proposed for the requested pollutant discharge monitoring program.

Yours sincerely

Roderick Zhang
Environmental Engineer

Nivari Jayasinghe
Principal Environmental Scientist, Contaminated Land Management

Encl: Figure
Sampling location descriptions
Extended analytical suite for water
Odour assessment form

ATTACHMENT A
FIGURES

0.04m³/s INFILTRATION UNDER BASINS B1-B & B1-C

0.07m³/s RAINFALL ONTO B1 RETENTION BASINS

CURRENT FLOW FROM WEIR 4 TO QUIBRAY BAY - 0.45m³/s
LOWERING WEIR 4 - FLOW WOULD INCREASE TO 0.62m³/s

WEIR 4 - MODIFICATIONS:
LOWERING TO RL 33.140 FROM RL 33.500

0.03m³/s FLOW THROUGH SIPHON FROM B1-A BASIN TO DOWNSTREAM OF WEIR 4

CURRENT FLOW - 0.38m³/s FROM MH163 RUNNING DOWN ROAD O.
LOWERING WEIR 4 - FLOW WOULD INCREASE TO 0.55m³/s

CURRENT CROSSOVER FLOW - 0.12m³/s FROM MH163 TO ROAD L
LOWERING WEIR 4 - FLOW WOULD DECREASE TO 0.08m³/s

CURRENT FLOW FROM MH156 - 0.50m³/s
LOWERING WEIR 4 - FLOW WOULD INCREASE TO 0.64m³/s

P1 PUMPING STATION:
PUMP 15G-9 (INTER) 0.095m³/s
PUMP 15G-10 (STORM) 0.095m³/s
TEMPORARY SYKES PUMP (STORM) 0.174m³/s

P3 PUMPING STATION:
PUMP 15G-11 (STORM) 0.095m³/s
PUMP 15G-11A (STORM) 0.095m³/s
PUMP 15G-11B (STORM) 0.095m³/s

0.33m³/s FLOW FROM CATCHMENT D DOWN PIPE TRACK 3 TO P2 PUMPING STATION

P2 PUMPING STATION:
PUMP 15G-12 (INTER) 0.179m³/s
PUMP 15G-12A (STORM) 0.129m³/s

CATCHMENT C STORMWATER RUN-OFF 0.19m³/s (FROM THE CARPARK'S AREA - 20,950m²) WHICH CURRENTLY RUNS INTO CATCHMENT B. WILL BE DIRECTED OFFSITE WHERE THE REST OF CATCHMENT C STORMWATER DRAINS TOO.

CURRENT FLOW FROM MH137 - 1.52m³/s
AFTER MOD's - FLOW WOULD INCREASE TO 1.79m³/s

CURRENT FLOW FROM API SEPARATOR - 1.45m³/s
AFTER MOD's - FLOW WOULD INCREASE TO 1.72m³/s

CURRENT PEAK FLOW FROM MAIN PIPEWAY SIPHONS - 0.01m³/s
AFTER MOD's - PEAK FLOW WOULD INCREASE TO 0.34m³/s

MAIN PIPEWAY SIPHON - MODIFICATIONS:
LOWERING SIPHON PRIME LEVELS:

SIPHON	EXT'G RL	No. OFF	NEW RL	No. OFF
S1	33.290	ONE	34.290	ONE
S2	34.440	2	34.330	2
S3	34.540	2	34.370	3
S4	34.780	3	34.400	2
S5	34.790	2	34.450	2

0.16m³/s INFLOW FROM ROAD B CATCHMENTS.

1.35m³/s FLOW FROM A1 RETENTION BASIN SIPHONS, NP2 & ROAD B CATCHMENTS.

1.04m³/s FLOW FROM NATIONAL PARK (NP1)

0.69m³/s SIPHON RELEASE PEAK FLOW FROM A1 RETENTION BASIN

0.60m³/s FLOW FROM NATIONAL PARK (NP2)

CURRENT SPILL FROM MAIN PIPEWAY TO PIPEWAY A & PIPEWAY B = 0.90m³/s
AFTER MOD's OF INSTALLING RETAINING WALLS AT PIPEWAY A & PIPEWAY B, SPILL = 0.00m³/s

NOTE: IF NP2 RUN-OFF WAS RE-DIRECTED THROUGH CATCHMENT C (AS PREVIOUSLY), THE FLOW RUNNING THROUGH THE MAIN PIPEWAY UNDERGROUND LINE WOULD DECREASE BY 0.52m³/s.

CATCHMENT E
CATCHMENT B
CATCHMENT C
CATCHMENT F
CATCHMENT D
CATCHMENT A
CATCHMENT G

SIR JOSEPH BANKS DRIVE
CAPTAIN COOK DRIVE
COOK STREET
SALVADOR STREET
PUBLIC DIRT ROAD
MARTON PARK WETLANDS
A1 RETENTION BASIN

NOTES:

1. THE FLOW NUMBERS ARE BASED ON THE MAXIMUM FLOWS FOR A **3 HOUR - 20 YEAR ARI** (AVERAGE RECURRENCE INTERVAL) RAIN EVENT. SIPHON FLOWS ARE (INTENTIONALLY) DELAYED & ATTENUATED TO ACHIEVE RESIDENCE TIME FOR OIL SEPARATION.
2. THE ABOVE EVENT WILL GENERATE 100mm OF RAINFALL.
3. INFILTRATION & SURCHARGE FLOWS NOT QUANTIFIED.
4. 'CATCHMENT A' FLOW NUMBERS REPRESENT THE MODIFIED SIPHON PRIME LEVELS IN THE MAIN PIPEWAY.
5. PUMP FLOW CAPACITY NUMERALS ARE NOMINAL.

LEGEND:

CATCHMENT BOUNDARY:

STORMWATER SYSTEM:

STORMWATER FLOW DIRECTION:

OILY WATER - NO CONTRIBUTION TO STORMWATER SYSTEM

Comprehensive Sampling Locations 1

Comprehensive & Phase 1 and 2 Sampling Locations 1

DRAWING LIST:

1. STORMWATER TABLE — A1-148425 SHT.2

REV.	DESCRIPTION	DATE	DRN	CHK	APPROVALS
2	XREF PLOT PLAN ADDED & DRAWING CLEANED	22.10.19	BJ	PM	
1	ISSUED FOR INFORMATION PURPOSES ONLY	11.2.2013	PM	RPP	DT ER JK
0	ISSUED FOR REVIEW	4.2.2013	PM		

REVISIONS

CALTEX (A.B.N. 19 000 108 725)
Caltex Refineries (NSW) Pty. Ltd.

SCALE 1:2000	APPROVALS
DRN P.MOLLOY DATE 4-02-2013	
CHK JOB ENG.	

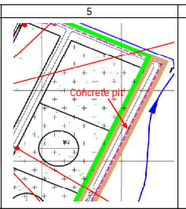
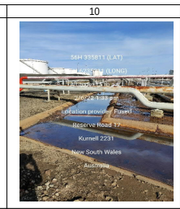
PLANT 15 — SEWERS AND SEPARATORS

STORMWATER MITIGATION
REFINERY CATCHMENT AREAS & FLOWS
PLAN

RFC No.	INDEX	SHT SIZE	DRAWING No.	SHT No.	REV.
X	S	AO	148425	1	2

ATTACHMENT B
SAMPLING LOCATION DESCRIPTIONS

Description of proposed sampling locations

ID	1	2	3	4	5	6	7	8	9	10	11	12	13
Sampling Location Photo													
Sampling Location Description (catchment)	national park drain conduit	Concrete drain next to tank 404	Concrete pit on Road A to the eastern portion of the road	Surface pooled water along boundary fence on Road A	Western section of Road A near the north-western corner of tank bund 102	Corner of Road A & Road 7	Corner of Road G and Road 3	Seepage coming out from eastern tank farm bund wall footing - directly from the tank bund wall + sheen sampling	Joint section between main pipeway and pipeway, where overflow previously occurred	Upstream of skimmer at the end of main pipeway	Outlet of the triple interceptor (gate 5)	Final pit before beach discharge point within Ampol ROW on Prince Charles Parade	Final discharge point

ATTACHMENT C
EXTENDED ANALYTICAL SUITES

Water (groundwater and surface water) Analytical Suite for Petroleum Hydrocarbons
Laboratory: Leeder Analytical
Suite prepared by WSP & to be used for Kurnell stormwater analyses

Note: The listed analytical suite is a starting point. Chromatograms will be interpreted and significant unknown peaks will be confirmed in a subsequent analysis

Benzene
Toluene
Ethylbenzene
m,p-Xylenes
o-Xylene
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
Propylbenzene
Isopropulbenzene (cumene)
sec-Butylbenzene
Naphthalene
1-Methyl naphthalene
2-Methyl naphthalene
C2-alkyl naphthalenes
C3-alkyl naphthalenes
Chloroform
2,2,4-Trimethylpentane
2,5-Dimethylhexane
2,4-Dimethylpentane
Methylcyclopentane
Cyclohexane
Methylcyclohexane
Ethylcyclohexane
Propylcyclohexane
Pentane
Hexane
Heptane
Octane
Nonane
Decane
Undecane
Dodecane
Tridecane
Tetradecane
2,6,10-Trimethylundecane (IP14)
2,6,10-Trimethyl dodecane (IP15)
2,6,10-Trimethyl tridecane (IP16)
Pentadecane (C15)
Hexadecane (C16)
Norpristane (IP18)
Heptadecane (C17)
Pristane (IP19)
Octadecane (C18)
Phytane (IP20)
Nonadecane (C19)
C20
C21
C22
C23
C24
C25
C6-C10
>C10-C14
C15-C28

Air Analytical Suite for VOCs
Analytical Laboratory: Leeder Analytical
Suite prepared by WSP & used as a base for air and soil vapour

Analyte	Chemical group
Benzene	Monoaromatic
Toluene	
Ethylbenzene	
m&p-Xylene	
o-Xylene	
1,2,4-Trimethylbenzene	
1,3,5-Trimethylbenzene	
Propylbenzene	
Isopropylbenzene	
sec-Butylbenzene	
Styrene	
p-Cymene	
Naphthalene	Naphthalenes
1-Methyl naphthalene	
2-Methyl naphthalene	
2-Methylbutane	Light branched &
3-Methylpentane	cyclic alkanes
2,2,4-Trimethyl pentane	
2,2-Dimethyl butane	
2,4-Dimethylpentane	
Ethylcyclopentane	
Cyclohexane	
Methylcyclohexane	
Ethylcyclohexane	
Propyl cyclohexane	
n-Pentane	Alkanes
n-Hexane	
n-Heptane	
n-Octane	
n-nonane	
n-Decane	
n-Undecane	
n-Dodecane	
n-Tridecane	
n-Tetradecane	
Chloromethane	Chlorinated
1,2-Dichloroethane	methanes &
1,2-Dibromoethane	ethanes
Chloroform	
Carbon tetrachloride	
1,1-Dichloroethane	
1,1,1-Trichloroethane	
1,1,2-Trichloroethane	
1,1,1,2-Tetrachloroethane	
1,1,2,2-Tetrachloroethane	
Vinyl Chloride	Chlorinated
1,1-Dichloroethene	ethenes
1,2-Dichloroethylene (cis)	
1,2-Dichloroethylene (trans)	
Trichloroethylene	
Tetrachloroethylene	
1,2-Dichloropropane	Additional
1,3-Dichloropropane	Chlorinateds
1,1-Dichloropropene	
Hexachlorobutadiene	
2-Chloro-1,3-butadiene	
Chlorobenzene	Chlorobenzenes
1,2-Dichlorobenzene	
1,3-Dichlorobenzene	
1,4-Dichlorobenzene	
MEK	Additionals
Isopropyl alcohol	
C6-C10	
>C10-C14	
Sum C6-C10 (less BTEX)	NEPM F1 fraction
Sum >C10-C14 (less naphthalene)	F2 fraction

ATTACHMENT D
ODOUR ASSESSMENT FORM

GOLDER

Consultant	
Date	
Start Time:	
End Time:	

Project No	
Project	
Location	

Odour Assessment - Site Monitoring

Location	GPS Coordinates	On-site Wind Conditions	Odour Intensity	Odour Presence	Odour Characteristics
				C - F - T - N/A	
				C - F - T - N/A	
				C - F - T - N/A	
				C - F - T - N/A	
				C - F - T - N/A	
				C - F - T - N/A	
				C - F - T - N/A	
				C - F - T - N/A	

Notes

Checked by

Odour Assessment Criteria

Odour Intensity	
Intensity	Description
0	Not detectable
1	Very Weak
2	Weak
3	Distinct
4	Strong
5	Very Strong
6	Extremely Strong

Odour Presence	
Presence	Description
Constant (C)	Can smell it constantly or almost constantly (> 80% of the time)
Frequent / Repetitive (F)	On and off extended periods with recognised odour (10–80% of the time).
Transient (T)	On and off with significant periods with no odour or no recognised odour (< 10% of the time)

Odour Characteristics	
Characteristics	Description
Refer to odour wheel, EPA Vic	

MET Conditions	
Descriptor	Note suggestions
Wind direction	Onsite conditions only. Label as the direction it is blowing from. Is it consistent/varying/swirling?
Wind speed	Characterise the strength of the wind. Is it strong, light or moderate winds ? Is it gusty, consistent, still?