

Our Ref: CTS 08594/20
Your Ref: DM9101795

30 April 2020

Brian Pidgeon
Chief Executive Officer
Toowoomba Regional Council
PO Box 3021
TOOWOOMBА Qld 4350

CC: Matt Torr, Manager Waste Services
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Dear Mr Pidgeon

Thank you for your letter dated 18 March 2020 regarding dealing with contaminated soil in the Oakey per and poly-fluoroalkyl (PFAS) management zones.

I acknowledge Toowoomba Regional Council's (Council's) concerns and agree that it is important that Council is able to continue to undertake its ordinary functions in an efficient and cost effective manner while still protecting environmental values. I trust that the information provided herein is of assistance to you and staff.

When considering matters relating to managing PFAS and its impacts on the environment, the principles and guidance in the PFAS National Environmental Management Plan (NEMP) should be followed. A second version of the PFAS NEMP (referred to as NEMP 2.0), is due for release in the coming weeks and includes expanded guidance on reusing soil. This document will be published on the Australian Government Department of Agriculture, Water and the Environment website at www.environment.gov.au.

In your correspondence, advice was sought on the following matters:

- a) ***Whether Council will be required to test all soil within the PMAP area that is excavated as part of Council's ordinary operations.***

Management areas identified in the Department of Defence PFAS Management Area Plan (PMAP) have been determined considering PFAS contaminants in groundwater (refer to section 1.5 of the PMAP) and is not necessarily reflective of the presence of PFAS in soils.

As a result, it is not necessary that all soils within the PMAP area be tested when undertaking operations. Soils should only be tested where there is a likelihood of PFAS being present, for example, where irrigation has occurred using groundwater

known to be contaminated with PFAS or where there is potential for overland surface water flows containing PFAS. Underground infrastructure such as pipes may also provide a preferential pathway for PFAS migration through adjacent soils as this is where water often travels. Previous investigations that have been conducted by the Department of Defence may be useful in this regard and can be accessed online at <https://www.defence.gov.au/environment/pfas/oakey/>.

b) If testing has to be conducted, the criterion for such testing and where such testing can be conducted.

A number of laboratory methods may be used to test for PFAS in soils. These are detailed in section 19 of the NEMP. A summary of the common analyses used on soil matrices is provided in Table 1 below. The type of analysis conducted and appropriate laboratory limit of reporting is dependent on the purpose for which testing is occurring and any desired comparison against human health screening and ecological guideline values in section 8 of the NEMP. There are a number of laboratories within Australia that are able to provide analytical services. It is noted that the costs of these analysis vary with the most expensive being associated with TOP-A. DES does not endorse the use of any particular laboratory.

Table 1. Common PFAS analysis

Method	Comments
Standard PFAS analyses US EPA Method 537 (modified) using LC/MS/MS	Measures the presence of 28-40 individual PFAS compounds. Can only detect a limited range of PFAS and will not show more complex PFAS. Only considers fluorinated chain lengths C4 to C14. Results shown as full molecular weight. Useful for initial screening where there is potential to reuse soils.
Total Oxidisable Precursor Assay (TOP-A) Reference method Houtz <i>et al.</i> 2012	Involves pre-treating a sample which is then analysed using a standard analysis to estimate total PFAS in a sample. Pre-treatment converts complex PFAS (not detectable by a standard analysis alone) to a simpler end point compound which can be detected. Comparison of this methods results to standard analysis results provides information about precursor presence and approximate fluorinated chain length. Only considers fluorinated chain lengths C4 to C14. Results shown as full molecular weight for each compound.
Total Organic Fluorine (TOF) by combustion ion chromatography (CIC)	Measures the organic fluorine content only. Considers all PFAS present, not just C4 to C14 carbon chain lengths. Provides a single result for total fluorine content. Does not provide information on the identity, fluorinated chain-length or type of the original PFAS in the sample. May be useful in initial screening on a presence/absence basis.

Landfills in Queensland that are licenced to receive PFAS contaminated soil have acceptance criteria for leachable contaminant levels of total fluorinated organic compounds. In this instance, a total organic fluorine analysis (also known as Total Organic Fluorine Assay) should be used for the leachable component in order to enable a comparison against the criteria. It would not be necessary to conduct analyses such as TOP-A or a standard suite.

Soils being assessed for potential reuse must be fully characterised. Consideration needs to be given to determining the soils total and leachable concentrations. When testing leaching potential of soils, the Australian Standard Leaching Procedure should be used in order to replicate leaching conditions in the environment. Further information on characterising soils and conducting risks assessments for potential reuse is provided in the response to g) *b) Whether a site specific risk assessment would be required* of this letter.

When collecting samples, it is important to minimise the potential for cross contamination. The NEMP provides guidance on sampling procedures and equipment for PFAS. Cross contamination will result in reported PFAS concentrations higher than that actually present in the sample. It is also recommended that Council discuss proposed sampling with the chosen laboratory to ensure that the correct sample collection containers are used, some facilities may provide these free of charge.

- c) *Whether there is a threshold PFAS limit below which any tested soil can be treated as clean fill and not constitute regulated waste.***

There is currently no specified threshold in Queensland under which soil containing PFAS is considered clean fill. This however does not preclude the potential for soil to be reused for a number of purposes either at the same site or different sites.

- d) *Whether there will be differential treatment between soil from the different Management Zones within the PMAP area.***

There is no differential treatment between soils of different management zones within the PMAP area. As previously stated, the identified management zones are not necessarily reflective of the presence of PFAS in soils and site specific considerations on the potential for PFAS to be present should be given.

- e) *Whether there will be differential treatment between soil encountered at different depths.***

Consistent with previous statements regarding when to test for PFAS and differentiation between management zones, site specific consideration needs to be given to the likelihood of PFAS being present throughout the soil profile. In order to determine appropriate management actions it is necessary to appropriately characterise the soil. This includes considering any changes in PFAS concentrations at varying depths. A number of factors may influence the presence and vertical migration of PFAS through soils. This is due to their high water solubility. For

example vertical migration of contaminants may be seen in areas that are regularly subject to rainfall or irrigation. Changes may also be seen in areas where soil is located below groundwater level.

If a hotspot is encountered (either vertically or laterally), a common practice is to segregate soils with higher concentrations from that with lower concentrations. This allows lower cost management options to be adopted for soils with low levels of PFAS. It is not acceptable to be purposely diluting concentrations by mixing high and low concentration soils.

f) *The criteria for any replacement fill that has to be used and where it can be sourced.*

Any replacement fill must be suitable for reuse in that area and not result in an increase in the risk of environmental harm. If the proposed replacement fill contains PFAS, considerations relating to soil reuse as described in the NEMP must be made. These considerations are discussed in the responses provided below.

g) *Whether there is a process which Council must follow in order to seek to reuse PFAS-contaminated soil encountered during Council's operations, including:*

a. *Whether there are any particular criteria which Council must meet;*

Queensland does not have any specific soil reuse criteria for PFAS. In the absence of this, the management principles and guidance in the NEMP regarding reuse of soils is to be adopted.

A soil disposal permit must be obtained under the *Environmental Protection Act 1994* if contaminated soil is to be removed from a site listed on the Environmental Management or Contaminated Land Registers. In assessing an application for a soil disposal permit, the department will consider guidance provided in the NEMP regarding soil reuse.

The following factors should be considered when determining the potential for reuse of PFAS-contaminated materials:

- potential for pre-existing 'background' PFAS impacts at the destination site and potential to add to the overall mass of PFAS in the receiving area
- if the receiving environment already contains PFAS, whether the addition of more PFAS to that system increases the potential for harm
- current and likely future land uses at the destination site
- hydrogeology at the destination site, including erosion, runoff and infiltration rates, nature of the aquifer systems, the potential for these to be impacted and the actual and potential beneficial uses of groundwater
- proximity of the destination site to pathways such as open drains, storm water systems, water bodies, including groundwater, and to sensitive

environmental receptors, groundwater dependent ecosystems and sensitive animals

- potential for the receiving environmental conditions to accelerate mobilisation of PFAS in the contaminated material or in existing PFAS at that site.

b. Whether a site specific risk assessment would be required;

Site specific considerations should always be given however the degree of assessing risk will vary depending on the concentrations of PFAS present.

The second version of the PFAS NEMP (referred to as NEMP 2.0), which is due for release in the coming weeks, includes further guidance around reusing soil. A decision tree outlining the process for a screening risk assessment will be included in NEMP 2.0.

In summary, proposed reuse at a destination site may be acceptable without further risk assessment where the following requirements are met:

1. Soil concentrations are below human health based and ecological guideline values for indirect exposure (as stated in section 8 of the NEMP).
2. Leachable concentrations do not exceed any of the Australian Drinking Water Guideline Values (as stated in section 8 of the NEMP).
3. Leachable concentrations do not exceed corresponding concentrations in any groundwater/surface water receptors relevant to the destination site and there is no likely adverse impact on any receptor.

Sampling for the purpose of characterising PFAS impacted soils should comply with the methodology in Section 7.5 of Schedule B2 (Guideline on Site Characterisation) of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM) and the PFAS-specific sampling and analysis guidance in the NEMP. Specific advice on leaching tests is provided in Sections 2.7 and 12 of Schedule B3 of ASC NEPM and Section 14 of PFAS NEMP. Sampling design should ensure that limits of reporting are appropriate for comparison of results with relevant environmental guideline values and water quality at the reuse site.

It is recommended that Council contact the department prior to undertaking any proposed reuse of soil containing PFAS.

c. How Council may seek authorisation from the Department to reuse PFAS-contaminated material; and

Any enquiries relating to reusing PFAS contaminated material should be initially directed to the Permit and Licence Management Team either by

telephone 1300 130 372 (select option 4) or by emailing palm@des.qld.gov.au.

If contaminated material is being sourced from a site listed on the Environmental Management or Contaminated Land Register, a soil disposal permit will be required to remove soil from the land. Further information on soil disposal permits and how to apply is available at <https://www.qld.gov.au/environment/pollution/management/contaminated-land/permits/disposal-permit>.

d. *Whether there are any particular reuse scenarios which the Department would be inclined to endorse as appropriate (for example, utilisation of PFAS impacted material below a certain threshold as capping for Council's existing waste facilities, or use as fill beneath sealed surfaces such as carparks/roads/paving*

Section 12 of the NEMP provides information on scenarios where reuse may be appropriate subject to considering site specifics in a risk assessment.

These include:

- use as fill material in commercial/industrial developments with minimal access to soil
- use as fill beneath sealed surfaces, including but not limited to, car parks/roads/paving/runways
- use as construction fill on road embankments, noting that risks should be assessed for stormwater runoff that may mobilise PFAS
- use as fill material in areas where background PFAS levels present a similar or higher contamination risk profile, providing that the volume of contaminant in the soil to be added is substantially less than the total mass of the contamination already present in that area
- reuse as construction material, e.g. bricks, rammed earth and gabions, noting the need to consider PFAS leachability.

Soil containing PFAS may also be used for day cover at landfill facilities that are licenced to receive PFAS contaminated soils, subject to any relevant conditions of the landfill's Environmental Authority under the *Environmental Protection Act 1994*.

Reuse of soils containing PFAS should be avoided in the following scenarios due the high likelihood of exposure pathways to potentially sensitive receptors (human and ecological):

- fill or burial less than 2.0 metres above the seasonal maximum groundwater level
- reuse within 200 metres of a surface water body or wetland area
- reuse in (or in the vicinity of and able to be transported to) areas which can be identified with any of the nine matters of national

environmental significance protected under the EPBC Act, and areas of environmental significance

- fill, burial or reuse in locations potentially affected by reasonably foreseeable future rises in groundwater or sea level, or near stormwater drains
- reuse on agricultural land
- reuse as fill in residential developments
- reuse as fill on public open space/parkland/recreational land
- inclusion in compost, fertilisers or soil conditioners.

If Council proposes to reuse PFAS contaminated soil in any of the above listed sites to be avoided due to other management options not being viable, it is recommended that Council first contact the department to discuss the proposal.

The reuse of PFAS-contaminated material above the Stockholm Convention low content limit of 50 mg/kg will not be considered.

h) Any additional criteria which would apply relating to the disposal of PFAS-contaminated soil.

The preferred hierarchy for treatment and remediation of PFAS described in section 13 of the NEMP should be considered when deciding on a management strategy for PFAS contaminated soil.

1. Separation, treatment and destruction: on-site or off-site treatment of the contamination so that it is destroyed, removed or the associated risk is reduced to an acceptable level.
2. Onsite encapsulation in engineered facilities with/without immobilisation: if the source site is hydrogeologically appropriate, onsite encapsulation will acceptably manage risk to the on- and offsite beneficial uses (direct and indirect) for soils, surface water and groundwater.
3. Offsite removal to a specific landfill cell: leachate should be captured, treated and the removed PFAS destroyed. This may or may not include immobilisation prior to landfill disposal, noting that the conditions in the landfill may reverse or diminish the immobilisation chemistry in ways that are difficult to predict. Immobilisation prior to landfill disposal may require environmental regulator approval.

Reuse of low level PFAS-contaminated soil off-site should only occur after all options for on-site use, waste avoidance, waste treatment and volume reduction have been considered and implemented where reasonable and practicable, consistent with the NEMP. It is not desirable to be reusing soil containing PFAS in areas where the receiving environment has lower or no PFAS, nor should affected soils be mixed with clean soils in order to dilute overall concentrations.

i) Whether specific training is required for personnel attending to the disposal and/or testing of contaminated soil.

Where soil is to be reused, it is recommended that a contaminated land or environmental consultant is engaged to ensure that all of the appropriate processes are followed in determining and undertaking necessary sampling to adequately characterise the soil, and any subsequent risk assessment.

Should your officers require any further information, they may contact Josh Brown, Principal Environmental Officer, PFAS Project Team of the Department of Environment and Science on telephone (07) 3330 5576 or by email at PFASProjectTeam@des.qld.gov.au.

Yours sincerely

s.73 Irrelevant information

Chris Hill
Executive Director
Waste, Development and Southeast Compliance

Our Reference: DM9101795
Contact Officer: Matt Torr
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18 March 2020

Mr Chris Hill
Executive Director
Water, Development and South-West Compliance
Department of Environment and Science
GPO Box 2454
Brisbane QLD 4001

CC: PFASProjectTeam@des.qld.gov.au.

Dear Mr Hill,

Dealing with contaminated soil in the Oakey PFAS Management zone

We refer to the Department of Defence's PFAS Management Area Plan (**PMAP**) which relates to land in the vicinity of the Army Aviation Centre at Oakey, and depicts three zones of land (**Management Zones**) which are subject to an elevated risk of contamination with per-and-poly-fluoroalkyl substances (**PFAS**).

Given that there is an expectation that soil within the PMAP area will be contaminated with PFAS, Toowoomba Regional Council (**Council**) has undertaken investigations to consider any impacts which the presence of PFAS in the PMAP area is likely to have upon Council's services.

Council's investigations have determined that Council is likely to encounter (and will therefore be required to manage) PFAS impacted soil in the course of carrying out its services in various respects, including:

- PFAS-contaminated spoil associated with the excavation and renewal or replacement of water and wastewater infrastructure within the PMAP area;
- PFAS-contaminated soil that will need to be removed as part of future Council road, footpath and stormwater drainage works or other Council services, e.g., cemetery plots; and
- PFAS-contaminated soil encountered during earthworks to be carried out at Council controlled parks and open space to improve existing services, provide new services and renewals when assets reach end of life.

Council's investigations have been undertaken on the basis that currently, PFAS is listed as a waste type which defaults to category 1 regulated waste under Schedule 9 of the *Environmental Protection Regulation 2019* (Qld).

It is understood that regulated waste containing PFAS can only be transported by a licensed transporter under the waste tracking system, using the code M270 - PFAS contaminated materials. It must also be delivered to a facility which is licensed to manage and dispose of PFAS containing materials.

The PFAS National Environmental Management Plan (**PFAS NEMP**) lists landfill acceptance criteria for PFAS impacted material at Table 6, identifying varying threshold limits for disposal of solid PFAS-contaminated material at unlined, clay/single composite lined and double composite lined landfills. Part 12 of the PFAS NEMP also lists general factors to be considered when assessing the potential for reuse of PFAS-contaminated materials. It also notes that "*regulators are considering reuse thresholds below which no further management is required.*"

However, it is presently unclear how Council will be required to deal with PFAS-contaminated soil encountered within the PMAP area on a regular basis as part of its ordinary operations.

For example, if Council were to undertake a tree planting program on land within the PMAP area, it is unclear whether the soil dug out for the trees could be used as backfill, or whether it would be considered regulated waste.

Given the uncertainty surrounding this issue, Council requests that the Department provide confirmation of the following:

- a) whether Council will be required to test all soil within the PMAP area that is excavated as part of Council's ordinary operations;
- b) if testing has to be conducted, the criterion for such testing and where such testing can be conducted;
- c) whether there is a threshold PFAS limit below which any tested soil can be treated as clean fill and not constitute regulated waste;
- d) whether there will be differential treatment between soil from the different Management Zones within the PMAP area;
- e) whether there will be differential treatment between soil encountered at different depths;
- f) the criteria for any replacement fill that has to be used and where it can be sourced;
- g) whether there is a process which Council must follow in order to seek to reuse PFAS-contaminated soil encountered during Council's operations, including:
 - i. whether there are any particular criteria which Council must meet;
 - ii. whether a site specific risk assessment would be required;
 - iii. how Council may seek authorisation from the Department to reuse PFAS-contaminated material; and

- iv. whether there are any particular reuse scenarios which the Department would be inclined to endorse as appropriate (for example, utilisation of PFAS impacted material below a certain threshold as capping for Council's existing waste facilities, or use as fill beneath sealed surfaces such as carparks / roads / paving);
- h) any additional criteria which would apply relating to the disposal of PFAS-contaminated soil; and
- i) whether specific training is required for personnel attending to the disposal and/or testing of contaminated soil.

Council would appreciate the Department's response on the above matters, to allow it to continue to carry out its ordinary local government functions in the most efficient and cost-effective manner possible.

Should your department have any enquiries please contact Matt Torr, Manager Waste Services on (07) 4688 8613 or via email Matt.Torr@tr.qld.gov.au

We look forward to hearing from you in due course.

Yours faithfully,

s.73 Irrelevant information

Brian Pidgeon

Chief Executive Officer

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