

# APPENDIX 6. GROUNDWATER, SURFACE WATER AND PFAS

#### **Preliminary Documentation**

Cabbage Tree Road Sand Quarry - (EPBC 2016-7852)

The following background documents are included in this Appendix:

- 1. Umwelt, November 2015. Groundwater Impact Assessment.
- 2. Umwelt, October 2016. Potential for Sand Extraction to Increase Flooding Impacts in Surrounding Area.
- 3. RCA, June 2016. Groundwater Assessment.
- 4. Umwelt, November 2016. Response to Hydro Simulation Peer Review 1.
- 5. Umwelt, January 2017. Response to Hydro Simulation Peer Review 2.
- 6. Kleinfelder, February 2017. Soil Sampling Assessment.
- 7. Kleinfelder, June 2017. Water Sampling Assessment.
- 8. Kleinfelder, June 2017. Contingency Management Plan for Potential PFAS Disturbance during Construction Activities.
- 9. Contamination Water Working Group Comments on the EIS; and Correspondence with Hunter Water Corporation: consultation to develop specific controls and management practices for the site operations.
- 10. Williamtown Contamination Expert Panel Letter.





# **Contingency Management Plan for Potential PFAS Disturbance during Construction Activities**





Williamtown Sand Syndicate Pty Limited

Cabbage Tree Road Sand Quarry (SSD 13\_6125) 398 Cabbage Tree Road, Williamtown, NSW

Report Date: 29 June 2017



# Contingency Management Plan for Potential PFAS Disturbance during Construction Activities

Cabbage Tree Road Sand Quarry (SSD 13\_6125)

398 Cabbage Tree Road, Williamtown, NSWW

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- Appendix B: Williamtown RAAF Contamination Investigation Area



# **ABBREVIATIONS**

mAHD	Metres Australian Height Datum
СМР	Contingency Management Plan
DPE	NSW Department of Planning and Environment
EMP	Environmental Management Plan
EPA	NSW Environment Protection Agency
Kleinfelder	Kleinfelder Australia Pty Ltd
km	Kilometres
m	Metres
mbgl	Metres Below Ground Level
NSW	New South Wales
PFAS	Polyfluoroalkyl substances
PFC	Perfluorinated compounds
PFOS	Perfluorooctane Sulfonate
PPE	Personal Protective Equipment
RAAF	Royal Australian Air Force
WSS	Williamtown Sand Syndicate



# **1. INTRODUCTION**

Kleinfelder Australia Pty Ltd (Kleinfelder) was commissioned by Williamtown Sand Syndicate Pty Ltd (WSS) to provide management procedures for per- and polyfluoroalkyl substances (PFASs) in the unlikely event they are present within the soil and water disturbed during construction activities for the proposed sand quarry on Cabbage Tree Road, Williamtown, New South Wales (the site). The location of the site is shown in **Figure 1**.

This Contingency Management Plan for Potential PFAS Disturbance during Construction Activities (CMP) addresses the requirements of the NSW Government, Office of the Chief Scientist & Engineer's Williamtown Contamination Water Working Group (WWG) to provide "a mechanism to communicate the contamination risks and specify requirements for control measures" with respect to PFAS.

This CMP has been structured with regard to the following guidance documents:

- ISO 14001, 2015, Environmental Management Systems.
- Department of Environment and Conservation NSW, 2006, A resource guide for local councils: erosion and sediment controls.
- Landcom, 2004, Managing Urban Stormwater: Soils and Construction.

## 1.1 BACKGROUND

## 1.1.1 The Project

WSS are proposing to construct and operate a sand quarry for the extraction of approximately 3.25 Million tonnes (Mt) of sand over a period of approximately 15 years from the subject land. The project has been modified during the application process and includes the following key elements relevant to soil and groundwater management:

- Progressive clearing of vegetation and extraction of sand for sale as a raw fill sand or processed sand product.
- Extraction of sand down to a level no lower than 0.7m above the highest predicted groundwater level, with a final landform of 1.0m above that level.



- Offices, workshops and weighbridges to support the operation, where all structural footings
   / excavation limits for those facilities are limited to 1.0m above the predicted maximum
   groundwater level.
- Connection of water and electrical utilities to the office and workshop. Utilities will be conveyed above ground where feasible, or kept below ground but above the highest predicted groundwater level where possible (e.g. outside the immediate connection with the existing utility).
- Construction of an access road into the site from Cabbage Tree Road for the transport of sand from the quarry. The access road is required to be constructed such that trucks leaving the site can reach appropriate merging speeds before the eastern boundary of the subject land. The final design of the road works for the intersection is required to meet the NSW Roads and Maritime Services (RMS) requirements under a Works Authorisation Deed (WAD) issued prior to construction. The construction of the intersection will necessitate the management of utilities within that area.
- No extraction of groundwater from the site for use in the operations, all water will be sourced from the Hunter Water potable mains network.
- Rehabilitation of the final landform to a native ecosystem.

Refer to Figure 2 and Figure 4.

## **1.1.2 PFAS Contamination**

The site lies within the Williamtown Royal Australian Air Force (RAAF) base contamination investigation area as defined by the NSW Environment Protection Agency (EPA) (**Appendix 1**). The site is situated within an area undergoing long-term assessment for potential soil and groundwater contamination of per- and polyfluoroalkyl substances (PFASs) that includes perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). Current knowledge of PFAS fate transport identifies water as the most common medium for the spread of PFAS contamination. Stage 2 and 2B investigations targeting the Williamtown PFAS Investigation Area (URS, 2014 and AECOM, 2016), has included sampling of soil, groundwater, surface water and a series of residential water samples (both bore and tank water) surrounding the site. Of the samples collected all reported <u>below</u> the level of laboratory reporting, with the exception of two isolated residential water samples that returned levels <u>at</u> the level of reporting.



Soil, surface water and groundwater sampling has been undertaken on behalf of WSS that has demonstrated PFASs were not detected in soil or water at the site. The soil results are presented in report *Per- and poly-fluorinated alkyl substances assessment* (Kleinfelder, 2017a) and groundwater results in *Groundwater Assessment, Cabbage Tree Road, Williamtown* (RCA, 2016) and groundwater and surface water in *Groundwater sampling for Per- and poly-fluorinated alkyl substances assessment* (Kleinfelder, 2017b).

A summary of the results of PFAS testing on the site and adjoining lands is provided in **Figure 4**.

A high level of community interest is associated with the Williamtown RAAF base contamination investigation area and activities within the area, including the proposed sand quarry.

## **1.2 SITE DESCRIPTION**

The site is situated approximately 9 kilometres (km) north of Newcastle, with the RAAF base Williamtown located approximately 2.5 km to the north east of the site entry and Fullerton Cove and the Hunter River estuary approximately 600 m to the south.

The proposed construction activities are situated in the southern portion of the site. Within the construction and project area there is effectively three landscape features (refer to **Figure 5**):

- The undulating sand dunes proposed for sand extraction ranging from approximately 4 m AHD up to 23.5 m Australian Height Datum (m AHD). Within the construction area the dunes reach approximately 10.5 m AHD.
- 2. The adjoining sand flats encompassing the land that ranges from 2.2 m to 4 m AHD. The area below 4 m AHD in the construction area is restricted to the area of the proposed intersection to Cabbage Tree Road.
- 3. Cabbage Tree Road at approximately 3.2 m AHD forms the southern extent of the project and construction area, effectively providing a barrier to surface water flows to the south.

South of Cabbage Tree Road the surface elevation progressively decreases to 0 m AHD at Fullerton Cove, with most of this area being subject to drainage control works with the installation of various drains connecting to Fullerton Cove.



The construction area is predominantly vegetated, with exception to a gravel road, exposed sand extraction areas and the verge of Cabbage Tree Road. Key environmental attributes relevant to the proposed construction are outlined below:

- The subject land does not contain any defined natural drainage lines, suggesting vertical infiltration into the sand is dominant over runoff and horizontal movement of water.
- Low lying areas adjoining the site are frequently water logged during high rainfall, due to increasing and shallow groundwater levels and a shallow groundwater gradient that slows the percolation of surface water. Within the construction area this is limited to the area predominantly within the Roads and Maritime Service (RMS) controlled road reserve adjoining Cabbage Tree Road.
- Cabbage Tree Road has been built up during construction, with shallow table drains constructed partially along the northern side of the road and deeper drains constructed partially along the southern side. The nearest culvert is located at the eastern extent of the subject land, approximately 80 m beyond the proposed road construction area.
- Groundwater when at its highest is visible at or near the surface for land below 3 m AHD.
- Groundwater has a low hydraulic gradient moving generally in a north-south direction.

Residential dwellings are located to the east, south and west of the site. Most are small properties utilised as hobby farms (e.g. keeping horses and chickens), some are larger and graze livestock as well. Potable water for dwellings is available to all dwellings from the Hunter Water network.

## **1.3 SCOPE AND OBJECTIVE**

This CMP applies to the construction activities associated with the proposed sand quarry on Cabbage Tree Road by Williamtown Sand Syndicate Pty Ltd.

The objective of the CMP is to outline practical and achievable management controls to ensure construction activities have minimal impact on human health and the environment specifically relating to PFASs (in event it is detected on site).

The broader management of the impacts of site activities on the environment and human health is detailed in the *Draft Environmental Management Plan* (Kleinfelder, 2016), as amended prior to construction.



# 2. SITE OPERATIONAL ACTIVITIES

The construction phase will occur over a relatively short period of approximately 12-18 weeks and include:

- Clearing of vegetation and removal of sand to sufficient depth to establish the access road, intersection and the office and workshop area.
- Extraction of sand down to a level no lower than 0.7m above the highest predicted groundwater level, with a final landform of 1.0m above that level.
- Offices, workshops and weighbridges to support the operation, where all structural footings
   / excavation limits for those facilities maintained at 1.0m above the predicted maximum
   groundwater level
- Excavation of road pavement and shallow soils to a nominal depth of 0.5 mbgl adjacent to Cabbage Tree Road within the road reserve and adjoining lands for the construction of the intersection.
- Connection of water and electrical utilities to the office and workshop. Utilities will be conveyed above ground where feasible, or kept below ground but above the highest predicted groundwater level where possible (e.g. outside the immediate connection with the existing utility).
- Relocation and management of existing utilities in the road reserve.
- Placement, levelling and compaction of gravel material and sealing with bitumen in the road reserve and adjoining land for the construction of the intersection and road through to the office and workshop area.



# **3. POTENTIAL ENVIRONMENTAL IMPACTS**

As noted in Section 1.1.2 above there has been **no** PFAS identified in samples taken from the soil, surface or ground water on the subject site, as such there is **no demonstrated potential** for a risk of PFAS contamination to adjoining properties due to the proposed construction activities.

## 3.1 HUMAN HEALTH RISK ASSESSMENT

To assist in the evaluation of potential risks relating to the project the RAAF Base Williamtown document dated 04 April 2017, titled Addendum to Off-Site Human Health Risk Assessment - July 2016 – Sensitivity Assessment of Outcomes of Food Standards Australia New Zealand Tolerable Daily Intakes was reviewed. The document provides an evaluation of potential risks to residents (including recreational and commercial fishers and beef farmers, non-resident commercial fishers, non-resident council workers and visitors) from exposure to PFAS impacts under both typical and upper exposure scenarios. Typical exposure scenarios are applicable for those who undertake activities at higher frequency or ingest more than the average person ingests and are therefore applicable to a small percentage of the population.

The assessment determined **elevated exposure risks** within the "Offsite Stage 2B Investigation Area" (that is applicable to the Project area) are attributed to the following exposure pathways:

- Ingestion of groundwater, applicable to all residents (upper and typical scenarios) recommends no drinking of groundwater.
- Incidental ingestion of surface water, applicable to some people (upper exposure scenarios) – recommends avoiding or minimising incidental ingestion when swimming in surface water bodies.
- **Consumption of locally sourced seafood**, applicable to some people (upper exposure scenarios) recommends avoiding or minimising high consumption of finfish by a child.
- **Consumption of locally grown fruit and vegetables**, applicable to some people (upper exposure scenarios) recommends avoiding or minimising consumption.
- Consumption of beef from locally grown cattle, eggs from locally grown back yard chickens and milk from locally grown cows where the animals were exposed to



**surface water as their primary drinking water supply**, applicable to some people (upper exposure scenarios) – recommends restriction of consumption.

**Low and acceptable exposure risks** for the typical and upper exposure scenarios, where no suggested precautions are recommended were identified for the following exposure pathways:

- **Dermal contact or incidental ingestion of groundwater** as a result of indoor use (excluding drinking water), outdoor use (including swimming pools, dams and surface water bodies) and irrigation.
- **Dermal contact with surface water** as a result of outdoor use (including swimming pools, dams and surface water bodies) and irrigation.
- Incidental ingestion or dermal contact with soil and sediment as a result of outdoor activities.
- Inhalation of dust as a result of indoor and outdoor activities (from soil irrigated by PFAS impacted groundwater or flooded by PFAS impacted surface water).
- Consumption of honey.

For the detailed background and basis of assumptions, refer to the actual document available at <u>http://www.defence.gov.au/ID/Williamtown/Documents.asp</u> and the associated Human Health Risk Assessment (HHRA).

## 3.2 CONSTRUCTION RISK ASSESMENT

Based on the above analysis, the management of surface water appears to be of the highest sensitivity for PFAS exposure that the proposed construction activity has ability to control. Risks associated with contaminated groundwater (other than consumption) or dust exposure under the scenarios evaluated were considered low and acceptable.

Not-withstanding the above, and given the sand quarry was not directly considered in the HHRA, as the subject land is located within the RAAF Investigation Zone, there is a <u>perceived</u> risk relating to the dispersion of PFAS during construction. The perceived risks may relate to:

• Air quality. If soil or water was contaminated with PFAS, then construction activities, particularly those that may intercept contaminated groundwater or surface water, are perceived to have the potential to increase PFAS exposure to adjoining receptors or result in the spread of PFAS. It should be noted that the NSW EPA have noted the risks of PFAS



exposure due to dust generation are considered very low, which is confirmed by the HHRA. In addition, management controls applicable to all typical construction projects and monitoring proposed by this project mean the potential for dust impacts are reduced.

- Water Quality. <u>If</u> water (surface or groundwater) was contaminated with PFAS, then construction activities could result in increased exposure to PFAS or contamination of previously uncontaminated soils if water left the construction area or were utilised during construction. Surface water on site (where present) is derived from one of three sources, ponded rainfall, a high groundwater table, or flooding, all of these sources are likely to be located in only the low lying areas that occupy a very small portion of the site. It should be noted that as the construction area is located within an area of high soil permeability the likelihood of substantial runoff from the site is very limited, and the drainage and flow directions within the site limit the potential for offsite movement.
- Land contamination. <u>If</u> soil was contaminated with PFAS, then construction activities are
  perceived to have the potential to spread the extent of PFAS contamination within the site
  or to surrounding public areas (e.g. through wheel traffic or spills of soil), or result in the
  contamination of groundwater or surface waters that were previously uncontaminated.
  Importantly given the low detection levels for PFAS, imported materials for road
  construction should also be subject to some testing to avoid incidental contamination on
  the site.



# 4. ENVIRONMENTAL MANAGEMENT PROCEDURES

The CMP is designed to outline practical and achievable management controls to ensure construction activities have minimal impact on human health and the environment specifically relating to PFASs. An occupier of a site has a duty to prevent dispersal of potential contamination of the land and waters upon which they occupy, and to responsibly manage their activities to prevent pollution. The control measures in the following tables are intended provide these management controls.

## **4.1 GENERAL**

General controls are detailed within Table 4.1.

Table 4.1:	General controls

Item	Action	Trigger/Timing	Responsibility	Reporting
A	The CMP should be revised as required based on updated information from Department of Defence (or associated consultants) regarding the extent and concentrations of PFASs in the vicinity of the site.	Ongoing	Quarry Manager	Nil
В	All personnel will be inducted prior to commencing works onsite and informed of the controls in this management plan. This information will be updated at daily toolbox meetings should PFAS be detected during construction. If detected, advice will then concentrate on the need to minimise contact, avoid ingestion of waters, and the need to track the location of movements of soil and water from identified areas.	Ongoing	Quarry Manager	Induction Records and toolbox meeting details if PFAS detected.



## 4.2 AIR QUALITY

As noted in Section 3 above, exposure to PFAS through dust is not considered to be a significant pathway for exposure, further given there has been no PFAS detected onsite the risks of exposure are highly unlikely. It is proposed to regulate air quality emissions from the project using a real-time continuous air quality monitoring system that will allow the quarry to suspend activities onsite to ensure the project does not cause additional exceedances of the air quality criteria. Accordingly, should any PFAS be unexpectedly identified in the material its transmission from the site will be also minimised.

The continuous air quality monitoring and meteorological system proposed for the quarry includes trigger levels that will ensure the project does not cause an exceedance of the cumulative 24-hour average  $PM_{10}$  criterion of 50 µg/m<sup>3</sup>. Where winds are blowing directly toward receptors this may include the temporary suspension of quarrying activities. The project alone is unlikely to result in an exceedance of the 24 hour  $PM_{10}$  criterion at any residence.

## 4.2.1 Management Controls

Air Quality controls are detailed within **Table 4.2**. Note, these controls would be subject to update with any subsequent approved management plan.

#### Table 4.2: Air Quality Management

Item	Action Trigger/Timing Responsibility Re					
4.2.1.1	4.2.1.1 Dust suppression measures					
А	Bitumen seal access road through to the boundary for the southern boundary of the northern resource area.	During Construction	Quarry Manager	Nil		



Item	Action	Trigger/Timing	Responsibility	Reporting
в	Utilise water carts or a sprinkler system for dust suppression of exposed areas and haul roads.	Ongoing	Quarry Manager	Record water volume used and publish in AEMR.
с	Water sprays will be incorporated into transfer points where higher levels of moisture are acceptable, such as conveyer transfers to product and reject stockpiles.	Ongoing	Quarry Manager	Record water volume used and publish in AEMR.
4.2.1.2	2 Monitoring			
_	Install a suitable continuous air quality monitoring network	Ongoing		Updated to website monthly.
		Chigoling	Quality Manager	Results published in AEMR.
в	WSS will install a meteorological station to allow quarry personnel to access instantaneous wind speed and direction data and also generate site specific meteorological data records.	Ongoing	Quarry Manager	Summary in AEMR.
4.2.1.3	B Trigger Response Framework			
A	Quarry operations will be subject to a staged shutdown of equipment based on rolling 24 hour average PM <sub>10</sub> concentrations, PM <sub>10</sub> concentration spikes and adverse background air quality and meteorological conditions. Indicative completion criteria are set out below, it important to note that these triggers will be adapted and refined as the project progresses based on actual monitoring data. The proposed draft triggers include: Where the wind is directed toward surrounding residences, that is the weather station indicates winds are blowing from the quadrants west (270 degrees), through North (0 degrees) to East (90 degrees) the quarry should review dust controls (e.g. stockpile sprays and need for dust suppression on trafficked areas). In addition, based on the real-time air quality monitoring network, the following controls should be implemented:	Continuous	Quarry Manager	Summary of the effectiveness of trigger response mechanisms provided in the AEMR.



ltem	Action	I		Trigger/Timing	Responsibility	Reporting
	1.	No top a) AND	soil stripping or dozer push to occur where: Wind is directed toward surrounding residences;			
		b)	Rolling $PM_{10}24$ hour average exceeds 35 $\mu g/m^3OR$			
		C)	Rolling PM <sub>10</sub> 1-hour average exceeds 50 $\mu$ g/m <sup>3</sup> .			
	2.	lf levels extract a)	s continue to increase after two hours, suspend sand ion and processing (loading trucks only) where: Wind is directed toward surrounding residences;			
		b) OR	Rolling PM <sub>10</sub> 24 hour average exceeds 42.5 $\mu$ g/m3			
		c)	Rolling PM <sub>10</sub> 1-hour average exceeds 50 $\mu$ g/m3.			
	3.	If leve loading a) AND	Is continue to increase after two hours, suspend g trucks (no machinery operating) where: Wind is directed toward surrounding residences;			
		b) OR	Rolling $PM_{10}$ 24 hour average exceeds 45 µg/m3.			
	a)	c)	Rolling PM <sub>10</sub> 1-hour average exceeds 50 $\mu$ g/m3.			
4.2.1.4	4.2.1.4 Compliance Evaluation					
	In the e below o using t	event the criteria, he follov	Trigger Response Framework fails to maintain levels monitoring results are to be assessed for compliance ving protocol:	When exceedance of air quality criteria measured.		Results included
<ul> <li>A</li> <li>1. Results above 24 hour average PM<sub>10</sub> criteria of 50 μg/m<sup>3</sup>.</li> <li>2. Is wind direction in the preceding three hours toward receptors and the monitoring location? If <u>No</u>, unlikely to be due to project, suspend extraction activities until levels drop below 48 μg/m<sup>3</sup>. Sales can continue. If <u>Yes</u> continue to Step 3.</li> </ul>		DPE notified within 24 hours where non-compliance identified.	Quarry Manager	Incident Notification		



ltem	Action	Trigger/Timing	Responsibility	Reporting
	<ol> <li>Are regional levels also elevated as per the OEH monitoring network?</li> <li>Does the quarry monitoring network show upstream and downstream air quality levels are above criteria? If <u>Yes</u>, unlikely to be due to project, suspend extraction activities until levels drop below 48 µg/m<sup>3</sup>. If <u>No</u> continue to Step 5.</li> <li>Exceedance directly related to activities onsite. Non-compliance has occurred.</li> <li>Review activities onsite and develop actions to mitigate future non-compliance.</li> </ol>			
В	<ul> <li>Non-conformance includes failure to implement above controls.</li> <li>Control measures to be implemented or rectified in the event of a non-conformance.</li> <li>Investigate incidents and their causes, and retain records of investigation.</li> <li>If noncompliance is demonstrated, additional monitoring will be undertaken within one week following implementation of additional mitigation controls.</li> </ul>	Following non- compliance.	Quarry Manager	Results included within AEMR DPE notified where non- compliance identified.



## **4.3 WATER QUALITY MANAGEMENT**

As noted in Sections 1.1.2 there has been **no** PFAS measured onsite in surface water or groundwater.

Testing by AECOM 2016 detected PFAS at the limit of detection of 0.2µg/L in one residential water sample opposite the construction area, Other samples on adjoining properties measured below detection, and the sample represents the highest recorded level on that property regardless of other samples taken then may have been below detection.

Assessments of exposure risks as noted in Section 3.1 show that incidental ingestion of surface waters within the investigation area may present risks of elevated PFAS exposure, dermal contact with surface or groundwater, or incidental ingestion of groundwater was not found to present an elevated risk of PFAS exposure.

## **4.3.1 Management Controls**

Water quality management controls are detailed within **Table 4.3**.

Item	Action	Trigger/Timing	Responsibility	Reporting			
4.3.1.1 Intersecting Groundwater							
A	• Prior to excavation, review of groundwater levels in that specific area should be undertaken via measuring the nearest groundwater monitoring well to understand the potential for intersection of groundwater. Should there be a high likelihood for intersecting groundwater, the following procedures should be followed:	During Construction	Quarry Manager	Location were groundwater intercepted. Sample locations, laboratory results and volumes disposed offsite.			

#### Table 4.3: Management controls relating to water



ltem	Actio	n	Trigger/Timing	Responsibility	Reporting		
	1.	Review latest PFAS modelling data (Department of Defence supplied data) to understand if the excavation area is within an area of likely PFAS contamination.			including disposal location.		
	2.	Intersected groundwater must be contained within close proximity to the excavation area with erosion control features situated down-gradient of any excavation point.					
	3.	Collect representative sample/s of exposed groundwater or surface water and submit for laboratory analysis for PFAS constituents.					
	4.	If PFAS is not identified, the water should be pumped and disposed to an adjacent area where infiltration can occur (i.e. a compensation basin or area with sufficient bunding to prevent runoff).					
	5.	If PFAS is identified, the water should be pumped and disposed off-site to an approved waste facility.					
	6.	Areas with detected PFAS concentrations are to be delineated and pegged to avoid incidental disturbance.					
	7.	Should excavations in the same spatial area be required to be undertaken within 1 month of previous sampling at the same location, sampling is not required.					
	<ul> <li>In re ac of dis</li> </ul>	completing the control measure outlined above, it is commended the Quarry Manager schedule excavation ctivities such that monitoring groundwater levels and sampling water is undertaken with sufficient pre-planning to avoid sruption to construction activities.					
4.3.1.2	4.3.1.2 Ponded surface waters						
A	<ul> <li>Su via int</li> <li>If</li> </ul>	urface water will be contained adjacent to construction areas a bunds aligned perpendicular to construction areas to enable filtration.	Ongoing	Quarry Manager	Sample locations, laboratory results and volumes disposed offsite,		
	pr im	ovisions outlined above in controls #3-6 should be aplemented.			including disposal location.		



Item	Action	Trigger/Timing	Responsibility	Reporting	
	<ul> <li>Roads will include a trafficable mound that ensures all surface water or intersected groundwater will percolate vertically into the groundwater.</li> <li>All impervious areas will be shaped such that water sheds to infiltration areas constructed in areas adjoining rehabilitated sections.</li> <li>Maintain erosion and sediment controls consistent with the Erosion and Sediment Control Guide (Department of Environment and Conservation NSW, 2006) and the Code of Practice for Managing Urban Stormwater: Soils and Construction (Landcom, 2004).</li> </ul>				
4.3.1.3	Water Use				
A	<ul> <li>Water for dust suppression is to be drawn from the Hunter Water's reticulated water supply at Cabbage Tree Road or from rainwater tanks situated adjacent to workshop and office.</li> <li>No groundwater will be extracted or utilised.</li> </ul>	Ongoing	Quarry Manager	Record water volume used and publish in AEMR.	
4.3.1.4	4.3.1.4 Monitoring				
A	<ul> <li>Weekly inspections of construction site and erosion and sediment control features for integrity.</li> <li>Inspection of controls following major rainfall event.</li> </ul>	As specified	Quarry Manager	Evidence of inspections to be kept.	
4.3.1.5 Performance Evaluation					
A	<ul> <li>No release of untested groundwater or surface water off-site.</li> <li>Water disposal documentation available for all water removed from site.</li> <li>No increase in water pooling on adjoining properties or lands outside the construction area.</li> </ul>	Reviewed following high rainfall and detection of PFAS.	Quarry Manager	Results included within AEMR	



ltem	Action	Trigger/Timing	Responsibility	Reporting
4.3.1.6 Corrective Actions and Improvement				
A	<ul> <li>Non-conformance includes failure to implement above controls.</li> <li>Control measures to be implemented or rectified in the event of a non-conformance.</li> <li>Investigate incidents and their causes, and retain records of investigation.</li> </ul>	Ongoing	Quarry Manager	Results included within AEMR



## 4.4 LAND CONTAMINATION MANAGEMENT

As noted in Section 1.1.2 there has been **no** PFAS detected onsite in any soil samples, nearby testing of soils by AECOM 2016 also recorded no PFAS. It is also noted that with respect to the HHRA and associated assessments dermal contact with soils in the area are not considered to present an elevated exposure pathway. These controls provide for improved controls of soils onsite and will reduce potential for spread of PFAS if detected during construction.

## **4.4.1 Management Controls**

Land management controls are detailed within Table 4.4.

ltem	Action	Trigger/Timing	Responsibility	Reporting
4.4.1.1	Movement of soils			
A	<ul> <li>Prior to excavation in a certain area, review of groundwater levels in that specific area should be undertaken via measuring groundwater monitoring wells to understand the potential for intersection of groundwater. Should there be a high likelihood for intersecting groundwater, the procedures outlined in Table 4.3 should be followed.</li> <li>Soils excavated from at or below the highest predicted groundwater level will be tested for the presence of PFAS. If detected, those soils will be segregated and disposed offsite at a licenced facility or contained onsite (if concentrations are below applicable screening criteria at time of analysis), revegetated and excluded from future extraction. Health screening criteria at the time of writing under the CRC Care Technical Report no. 38 (January 2017) proposed levels for residential soils of:</li> </ul>	During Construction	Quarry Manager	Sample locations, laboratory results and volumes disposed offsite, including disposal location.

#### Table 4.4: Management controls relating to land contamination



Item	Action	Trigger/Timing	Responsibility	Reporting
	<ul> <li>PFOS (+PFHxS) - 22 mg/kg</li> <li>PFOA - 220 mg/kg.</li> <li>Soils with detected PFAS concentrations are to be delineated and pegged to avoid incidental disturbance.</li> </ul>			
4.4.1.2	Imported materials			
A	<ul> <li>Gravels imported for use onsite will be virgin excavated materials (VENM).</li> <li>Random testing of imported bulk products (e.g. gravels and bitumen) for PFAS.</li> </ul>	Materials to be supplied onsite with appropriate certificates of VENM and PFAS testing.	Quarry Manager	VENM certificates, and/or sample locations and laboratory results.
4.4.1.3	Incidental soil transfer			
A	<ul> <li>Bare soils to be minimised to reduce erosion.</li> <li>Maintain erosion and sediment controls around works areas consistent with the Erosion and Sediment Control Guide (Department of Environment and Conservation NSW, 2006) and the Code of Practice for Managing Urban Stormwater: Soils and Construction (Landcom, 2004).</li> <li>All vehicles leaving site to be cleaned of excess loose material prior to leaving site.</li> <li>In the event PFAS is detected onsite, vehicle access to those areas is to be limited to only essential traffic.</li> <li>In the event of PFAS detection onsite, controls relating to wheel trafficked soil from contaminated areas to be reviewed and modified to further reduce incidental transfer of soils.</li> </ul>	Ongoing	Quarry Manager	Record water volume used and publish in AEMR.
4.4.1.4	4.4.1.4 Monitoring			
A	<ul> <li>Weekly inspections of construction site and erosion and sediment control features for integrity.</li> </ul>	As specified.	Quarry Manager	Evidence of inspections to be kept.



ltem	Action	Trigger/Timing	Responsibility	Reporting
	<ul> <li>Random daily inspection of vehicles prior to leaving site for loose soils where PFAS has been detected onsite.</li> </ul>			
4.4.1.5	Performance Evaluation			
A	<ul> <li>No visible evidence of soils from construction off-site (i.e. on Cabbage Tree Road or neighbouring properties).</li> <li>Where soil spills from construction area are located outside construction area, spills are removed within 24 hours – if PFAS has been detected onsite, these soils will be tested for PFAS.</li> <li>All soils with PFAS detected has record of its current location (onsite or offsite).</li> <li>Water disposal documentation available for all soils removed from site.</li> </ul>	Reviewed weekly.	Quarry Manager	Results included within AEMR
4.4.1.6 Corrective Actions and Improvement				
A	<ul> <li>Non-conformance includes failure to implement above controls.</li> <li>Control measures to be implemented or rectified in the event of a non-conformance.</li> <li>Investigate incidents and their causes, and retain records of investigation</li> </ul>	Ongoing	Quarry Manager	Results included within AEMR



# 5. MANAGEMENT RESPONSIBILITIES AND ACCOUNTABILITIES

Assignment of roles, responsibility and accountability ensures resources are appropriately used to implement, maintain and improve the project CMP. Environment, health and safety outcomes are a line management responsibility (a person or group of people who direct and control the organisation with direct responsibility and accountability for all aspects, operations, products and services). Specific responsibilities and accountabilities for the project will be assigned to personnel as defined in **Table 5.1**.

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Table 5.1:	Project roles and responsibilities

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Role	Responsibilities		
Board level management	Responsible for ensuring the required resources (monetary and people) are invested to implement this plan.		
Quarry Manager	Reports directly to the Board.		
	To authorise this plan.		
	To provide the final authorised distribution of this management plan.		
	Organise revisions of this CMP as required (Section 6).		
Quarry Manager	Reports directly to the Board.		
(or delegate)	Implement the management actions contained in this plan.		
	Inclusion of all relevant records and monitoring results within the Annual Review.		
	Ensure that all operations on site are undertaken in compliance with this management plan.		
	Ensure all site personnel have received the appropriate training for their responsibilities.		
	Provide feedback on the adequacy and effectiveness of this plan.		
Staff and	Reports to the Quarry Manager or their delegate.		
Contractors	Report any incidences or complaints immediately to the Quarry Manager or delegate.		
	Ensure the implementation of this CMP with respect to their specific work practices.		
	Act in accordance with the management procedures or protocols outlined in this plan.		
	Ensure any potential or actual issues, including environmental incidents, are reported to the Quarry Manager or delegate in a timely manner.		



# 6. COMMUNITY RELATIONS

WSS recognise the importance of open and constructive community relationships to ensure the public and in particular adjoining land owners are aware of the activities proposed on the site and contact details for WSS in the event of complaint or inquiry.

The mechanisms for communication and consultation between WSS and the community are summarised below:

#### • Community Consultative Committee:

- Establishment of a community consultative committee (CCC) to facilitate meetings with representatives of the local community.
- o Document CCC meeting agendas, issues raised, action items and close-out.

#### • Feedback and Complaints:

- o A dedicated information contact phone number will be established prior to the commencement of construction and maintained throughout the life of the project.
- Feedback, enquiries and complaints received will be recorded in a consultation register that will be established prior to the commencement of construction and maintained throughout the life of the project.
- Complaints recorded in the consultation register will include details of complainant,
   WSS response and commitments to follow-up by whom and when will be detailed.

#### • Consultation and Information Dissemination:

- o Community information newsletters providing awareness of:
  - Project progress.
  - Operating hours, contact information and details of how to provide feedback.
  - Ways in which further information can be sought.
  - Details of breaches of any development approval and licence conditions and WSS response and corrective actions.



#### • Website:

- o Contact numbers.
- o Copies of management plans.
- o Copies of community newsletters.
- o Details of annual open days.
- o Copies of minutes from Community Consultative Committee.
- o Copies of approvals.
- o Copies of licences.



# 7. REFERENCES

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CRC CARE 2017, Assessment, management and remediation guidance for perfluorooctanesulfonate (PFOS) and perfluorooctanoic acid (PFOA) – Part 4: application of HSLs and ESLs, CRC CARE Technical Report no. 38, CRC for Contamination Assessment and Remediation of the Environment, Newcastle, Australia.



# 8. LIMITATIONS

The findings and conclusions contained within this Environmental Management Plan are made following a review of information, reports, correspondence and data previously reported by third parties. Kleinfelder does not provide guarantees or assurances regarding the accuracy and validity of information and data obtained by third parties in previously commissioned investigations. The recommendations presented in this report are relevant to the conditions of the site and the state of legislation currently enacted as at the date of this report.

Kleinfelder has used a degree of skill and care ordinarily exercised by reputable members of our profession practicing in the same or similar locality.

Kleinfelder does not make any representation or warranty that the conclusions in this report will be applicable in the future as there may be changes in the condition of the site, applicable legislation or other factors that would affect the conclusions contained in this report.

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# FIGURES

- Figure 1: Location of proposed quarry on Cabbage Tree Road, Williamtown
- Figure 2: Quarry Project Plan
- Figure 3: Office, workshop and intersection area for construction
- Figure 4: PFAS soil and water monitoring locations
- Figure 5: Topography of the Project Area



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	CABRAETRERD CICRACES	<complex-block></complex-block>
<ul> <li>Subject Land Boundary</li> <li>Proposed Road</li> <li>Office and Workshop Compound</li> <li>Project Area Boundary</li> </ul>	Metres         PROJECT REFERENCE: 20170448           0         50         100         200         300         400         500         Image: Constraint of the second se	Project Plan     FIGURE:       Williamtown Sand Syndicate Proposed Sand Quarry Cabbage Tree Road, Williamtown     2



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# APPENDIX A:

# ENVIRONMENT INSPECTION CHECKLIST

## **Environmental Inspection Checklist**

Date:....

Facility:....

Inspector:....

Environmental Aspect	Management Aspect	Comments and Required Actions (Items requiring attention highlighted in bold)
Operations General		
	СМР	
	EMP	
	Training	
Environmental	Incident Management	
Management	Review e.g. meetings	
	Defence Updates?	
	Toolbox meeting update if PFAS found	
	Air monitoring network	
Air pollution	Dust	
	Dust suppression systems	
	Soil movement tracking	
	Validation of imported soil	
Soil	1m excavation buffer between groundwater	
	Vehicle wheel cleaning	
	Revegetation of disturbed soils	

## **Environmental Inspection Checklist**

Date:....

Facility:....

Inspector:.....

Environmental Aspect	Management Aspect	Comments and Required Actions (Items requiring attention highlighted in bold)
	Containment of intersected groundwater when exposed	
	Bunding integrity	
Stormwater / Sediment /	Spill prevention	
Erosion Management	Spill response and waste disposal	
	Traffic mound integrity	
	Dust suppression water sourced from reticulated supply	
	Inspect Cabbage Tree Road for soil/water	
Waste management	Storage of soil on-site	
	Compliance with waste disposal regulations if required	



# APPENDIX B: WILLIAMTOWN RAAF CONTAMINATION INVESTIGATION AREA





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