NSW GOVERNMENT | Planning & Environment

# *STATE SIGNIFICANT DEVELOPMENT ASSESSMENT*

# *CABBAGE TREE ROAD SAND QUARRY (SSD 6125)*

Environmental Assessment Report
Section 89E of the *Environmental Planning and Assessment Act 1979*
February 2018

Cover Photo: The Cabbage Tree Road Sand Quarry's Southern Resource Area, overlooking Aboriginal cultural heritage Site 38-4-1-1381. Photograph: P McCardle, 2015, used with permission.


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# EXECUTIVE SUMMARY

Williamtown Sand Syndicate Pty Ltd (WSS) proposes to develop a sand quarry on land immediately to the north of Cabbage Tree Road, Williamtown, approximately 3 kilometres southwest of the combined Newcastle Airport and Williamtown RAAF Base, in the Port Stephens local government area.

The project would involve clearing 42.25 hectares (ha) of land in order to establish an extraction area, site facilities, processing and stockpile areas and a quarry entry and deceleration and acceleration lanes on Cabbage Tree Road. The project proposes to extract up to 530,000 tonnes of material per annum over 8-9 years from a total resource of 3.25 million tonnes. This would involve up to 10 laden trucks leaving the site each hour. The project intends to supply building and construction sand for the Sydney (40%) and Hunter markets (60%).

The development application and Environmental Impact Statement (EIS) were exhibited from 4 December 2015 to 15 February 2016. A total of 135 submissions were received including 10 submissions from public authorities. All but one of the 125 submissions from the general public and special interest groups objected to the project.

Key issues raised in these submissions were primarily concerned with Koalas, water contamination, disruption to the Tomago Sandbeds, traffic and safety, air quality and associated health issues, flora and fauna and noise.

WSS submitted its Response to Submissions (RTS) on 9 November 2016. The RTS advised that, following the wide range of concerns expressed concerning the EIS, WSS had decided to refine the scope of the project. The key changes were a reduction in the project's footprint by 23% to 42.25 ha, shortening of the weekday working day to cease at 5 pm instead of 6 pm, reducing maximum annual sand production from 600,000 to 530,000 tonnes and providing a larger buffer distance between sand extraction operations and the nearest residences.

Currently, there are continuing investigations into contamination by fire-fighting foam chemicals (referred to as 'PFAS' in this report) that were used at the RAAF Base prior to 2008 and which have migrated via groundwater into surrounding areas. The proposed quarry site is located within the NSW Government's Broader Management Zone for PFAS contamination of groundwater adjacent to the RAAF Base.

At a meeting with community representatives on 20 July 2017, the Department invited community members to provide additional submissions on the RTS. The Department received 20 additional submissions which concentrated on the impacts of living within, or close to, the various PFAS contamination zones as described by the Commonwealth Department of Defence and/or the NSW Environment Protection Authority (EPA). Other matters raised were truck movements, road safety, destruction of natural habitat, noise and air quality impacts, as well as whether there was a need for another sand quarry to be established in the Port Stephens area.

The Department of Planning & Environment has given careful consideration to all matters raised by the local community, including in particular the risks posed by the existing PFAS contamination and any risks of disturbance to this contamination by proposed quarrying activities.

The Williamtown Contamination Expert Panel's assessment of the potential risks of the development of the proposed quarry in relation to waterborne PFAS exposure is that "*as long as the operations* (of the quarry) *remain above the water table the sand mine presents a low risk with regards to PFAS exposure or contribution to the spread of PFAS*".

The EPA advised that, after applying worst-case soil contamination levels, the risk from inhalation and/or ingestion of PFAS chemicals for humans is extremely low. The Department is therefore satisfied that the operation of the proposed quarry would not elevate risks of PFAS contamination for neighbouring residents and has recommended conditions of consent which clearly set out how the quarry must be operated in order to avoid interactions with PFAS contamination.

On the basis of all available evidence, the Department has concluded that the proposed quarry can be operated in a manner that does not cause any increase in risk to the community's health and safety. Nonetheless, the Department recommends a precautionary approach, in particular through the application of both primary and secondary systems of management and regulatory control. These include:

- stringent surface and groundwater monitoring requirements;

- a program to regularly review and report on the effectiveness of management and monitoring systems; and
- an annual independent expert review of PFAS exposure pathways to establish whether or not quarrying operations are increasing the risk of PFAS exposure.

Amenity issues such as noise, air quality and visual impacts have been carefully considered. The overall outcome is that the quarry is predicted to meet all relevant environmental amenity criteria, subject only to a small exceedance of noise criteria during short-term vegetation clearing activities.

Traffic impacts are considered to be acceptable in terms of traffic volumes, noise and safety. However, the Department and the EPA have concerns about the amenity impacts caused by sand trucks arriving and leaving the quarry between 5 and 6 am. Consequently, the Department's recommendation is that trucking operations not commence until 6 am, in line with many other quarry operations in the State which have a need to supply sand to concrete batching plants, which in turn, typically make deliveries to the construction industry early in the working day.

However, should WSS be able to gain the written agreement of each and every landowner located immediately to the south of the quarry's proposed acceleration and deceleration lanes on Cabbage Tree Road to commence trucking operations at 5 am, the Department considers that truck despatches could be permitted from that time. Sand extraction operations are recommended to remain restricted to between 7 am and 5 pm, in line with WSS's proposal.

The Department and the Office of Environment and Heritage are also satisfied that the proposed offset proposal is consistent with the Biodiversity Offsets Policy and would provide an important link for Koalas, consistent with the *Port Stephens Comprehensive Koala Plan of Management.*

The cumulative impact of four other State significant sand quarries operating within 5 kilometres of the proposed Cabbage Tree Road Sand quarry have been considered in the specialist studies provided in the EIS and RTS. The cumulative impacts are considered, for instance, in background regional air quality levels or existing road traffic counts together with projected project contributions.

Considering the traffic assessment for the period of 7 am to 10 pm, when 7,560 vehicles use Cabbage Tree Road, the quarry would add no more than an extra 2% to existing traffic volumes on this road. This increased traffic is predicted to produce increased average delays by just 1 or 2 seconds at key intersections. Average traffic speeds on Cabbage Tree Road are predicted to decrease by approximately 2%, or about 1 km per hour.

The Department is satisfied that the traffic generated by the proposed quarry would not cause more than minor impacts to other road users and that the road network and intersections have sufficient capacity to accommodate the proposed additional road use.

Overall, the Department considers that the proposed quarry should be required to be operated in accordance with the recommended conditions of consent and best practice measures. With these conditions in place, the impacts of the quarry would be low and are acceptable.

The Department believes the project would deliver positive socio-economic benefits by providing employment and a significant financial contribution to Port Stephens Council through combined sand royalty and site rental payments of about $17 million. The Port Stephens area is an important supplier of construction sand to local, regional and Sydney markets. The proposed Cabbage Tree Sand Quarry has the ability to supply these important markets and help supply a key raw material that is needed for the State's construction industry.

The Department's view is that the proposal is in the public interest and is approvable.

# 1. BACKGROUND

Williamtown Sand Syndicate Pty Ltd (WSS) proposes to develop a sand quarry on land immediately to the north of Cabbage Tree Road, Williamtown, approximately 3 kilometres (km) southwest of the combined Newcastle Airport and Williamtown RAAF Base, in the Port Stephens local government area (see **Figure 1**).

In 2002, Port Stephens Council (Council) purchased four allotments from Rutile and Zircon Mines. These allotments (Lot 1 DP 224587, Lot 121 DP 556403, Lot 11 DP 629503 and Lot 1012 DP 814078) were formerly mined for heavy mineral sands. The combined allotments (referred to as the 'site') have an area of 176.2 hectares (ha) and consist of predominantly native vegetation, with some previously cleared areas in the eastern part of the site.

In 2012, Council sought tenders from interested parties for the extraction of sand from the site. WSS was selected as the preferred tenderer and has entered into a 15-year lease agreement with Council to develop and operate a sand quarry.

The site is situated on the northern side of Cabbage Tree Road, Williamtown, approximately mid-way between Nelson Bay Road and Masonite Road. It is bound to the south by Cabbage Tree Road and rural residential land holdings; to the north by Tilligerry State Conservation Area (SCA) and land owned by Hunter Water Corporation (HWC); to the east by rural residential land holdings; and to the west by Tilligerry SCA, HWC land and rural-residential land holdings (see **Figure 1**). The Williamtown RAAF Base is located approximately 3 km northeast of the site.

Currently there are investigations into contamination by per- and poly-fluorinated alkyl substances (PFAS) migrating from the RAAF Base into surrounding areas, and the potential impacts on down-gradient surface and groundwater quality. PFAS is a group of chemicals that include perfluorooctane sulfonate (PFOS), perfluorooctanic acid (PFOA) and perfluorohexane sulfonate (PFHxS). PFOS and PFOA, were used in fire-fighting foams at the RAAF Base prior to 2008. In October 2015, the NSW Government established an Investigation Area for the assessment of groundwater contamination adjacent to the RAAF Base. The site is located within this Investigation Area, which is commonly known as the 'Red Zone'.

## 1.1 Regional Context

The site is situated in the Coastal Zone sub-region of the Hunter Valley, approximately 1 km north of Fullerton Cove and 6 km from the coast. It is situated within the wider Hunter River catchment, which covers approximately 22,000 km². The majority of the site consists of undulating land with elevations between 3 to 24 metres (m) AHD. Two sand ridgelines extend generally east-west within the southern and central parts of the site. There are no defined watercourses within the site, but much of the land (other than the two ridgelines) is low-lying and swampy. The majority of the proposed extraction area is located in the Tomago Sandbeds Catchment Area which is designated as a 'Special Area' under the *Hunter Water Regulation 2015*.

The site is located in the Newcastle Bight complex of beach ridges and sand dunes formed in response to sea level changes throughout the Quaternary period. It contains sands of the Pleistocene inner barrier which consist of well-sorted, rounded to sub-rounded, medium-fine to fine-grained quartz sands.

The Port Stephens area is a key source of industrial and construction sand for the Hunter and Sydney regions. There are four existing sand quarries in the vicinity of the site. These are Boral Resources' Stockton Quarry and Fullerton Cove Sand Quarry to the southeast, and Mackas Sand Quarry and Salt Ash Quarry to the northeast.

# 2. PROJECT

## 2.1 Description of the Project

On 13 November 2015, WSS lodged a development application and accompanying Environmental Impact Statement (EIS, see **Appendix A**) to develop and operate the Cabbage Tree Road Sand Quarry. Following the exhibition of the project and the receipt of agency and public submissions (see **Appendix B**), WSS provided a Response to Submissions (RTS) report (see **Appendix C**).


FIGURE 1.1

***Figure 1*** *– Location of the proposed Cabbage Tree Road Sand Quarry*

The RTS containing a revised project scope to address several of the issues identified in submissions. Key changes are a reduction in the project's footprint by 23 % to 42.25 ha, shortening of the weekday working day to cease at 5 pm and a reduction in maximum annual sand production from 600,000 tonnes to 530,000 tonnes. The revised project scope involves:

- constructing and operating a sand quarry to extract up to 530,000 tonnes per annum (tpa), from a total resource of 3.25 million tonnes (Mt);
- clearing 42.25 ha of vegetation;
- mobile screening and a dry processing plant;
- constructing associated infrastructure including site access, office, amenity buildings, weighbridge, staff and visitor parking, and a maintenance shed;
- constructing an access road intersection with Cabbage Tree Road and associated deceleration and acceleration lanes to allow laden trucks to exit the site at 60 kilometres per hour (kph);
- transporting processed materials off-site via public roads;
- providing a Biodiversity Offset by the use of a Biobanking Agreement; and
- progressive rehabilitation of the site.

Sand from the proposed quarry would be extracted to meet the demand for building and construction sand for the Sydney, Central Coast, Maitland and Newcastle markets.

A comparison of the key components of the original and revised development proposals are provided in **Table 1**. The proposed site layout and sequence of extraction is shown in **Figure 2**.

***Table 1:*** *Key components of the project*

| ***Component*** | ***EIS Proposal (original)*** | ***RTS Proposal (revised)*** |
|---|---|---|
| *Quarry Life* | • 15 years from date of consent. | • No change. |
| *Resource* | • 3.32 million tonnes | • 3.25 million tonnes |
| *Extraction Rate* | • Up to 600,000 tpa. | • Up to 530,000 tpa. |
| *Employees* | • 6 full time equivalent (FTE) employees.<br>• Up to 20 road transport drivers. | • No change. |
| *Hours of Operation* | • 7 am to 6 pm Monday to Friday.<br>• 7 am to 4 pm Saturdays. | • 7 am to 5 pm Monday to Friday.<br>• 7 am to 4 pm Saturdays |
| *Hours of Transport and Loading* | • 5 am to 6 pm Monday to Friday.<br>• 7 am to 4 pm Saturdays. | • No change. |
| *Quarrying Methods* | • Extraction using a bulldozer to push sand to a stockpile.<br>• Transfer of stockpiled sand to the processing plant by front end loader and dump trucks. | • No change to method of sand extraction.<br>• Transfer of sand to processing plant by portable electric conveyors fed by front end loaders and sometimes dump trucks.<br>• Use of previous method, if required. |
| *Processing Methods* | • Electric screen – to separate coarse organic matter.<br>• Dry separation – use of an air separator to separate the silts, clays and fine organic matter from the sands. | • No change. |
| *Transport* | • Up to 600,000 tpa of processed sand to be transported by public roads.<br>• Annual average daily truck movements of 63 laden trucks per day or 126 truck movements.<br>• No more than 20 truck movements per hour (combined total of laden and empty). | • Up to 530,000 tpa of processed sand to be transported by public roads.<br>• No change to truck movements. |
| *Capital Investment* | • $4.7 million. | • No change. |
| *Equipment and Infrastructure* | • **Site Office:** office, maintenance shed, weighbridge, fuel storage and bunded refuelling area, light vehicle parking and hardstand area.<br>• **Mobile Plant:** dry screening plant, radial stacker, yard conveyor, air separator, bagging plant, diesel generators.<br>• **General:** D10 dozer, 30 t excavator, tub grinder, 2 x front-end loaders, 2 x articulated trucks, grader, drum roller, water cart, site utility vehicles and off-road haulage trucks. | • **Site Office:** No change except the addition of a perimeter security fence.<br>• **Mobile Plant:** No change except for additional radial stacker, provision of mains power supply and back-up diesel generator.<br>• **General:** Only changes are smaller dozer proposed D9 (or lower) and removal of tub-grinder. |

| Component | EIS Proposal (original) | RTS Proposal (revised) |
|---|---|---|
| *Site Access* | • Bitumen sealed road from Cabbage Tree Road through to the site office. 'Left in, left out' intersection including acceleration and deceleration lanes. | • No change except to the design of the intersection to enable a 60 kph exit speed to enable more efficient traffic merge to Cabbage Tree Road. |
| *Surface Disturbance and Biodiversity Offsets* | • Disturbance of 53.9 ha including native vegetation (52.3 ha) and disturbed land (1.6 ha).<br>• Identification of pathways to develop an offset strategy. | • Disturbance of 42.25 ha including native vegetation (40.38 ha) and disturbed land (1.88 ha).<br>• On-site Biodiversity Offset Area of 131.12 ha under Biobanking Agreement.<br>• Off-site Biodiversity Offset Area to provide required Koala species credits. |
| *Rehabilitation and Final Landform* | • Progressive rehabilitation of disturbed areas during operation.<br>• Site stabilisation, re-spreading topsoil, establish a sustainable native ecosystem, and weed control.<br>• Site returned to a condition consistent with its existing characteristics.<br>• Final landform would involve a finished elevation of 4 to 5.5 m AHD with a minimum of 1 m above the highest predicted groundwater level. | • No change. |

### 2.2 Justification for the Project

WSS estimates that the quarry could produce up to 3.25 Mt of sand which could supply a range of fine-medium and medium-grained sand products to Hunter and Sydney construction and industrial markets. The site is strategically located to supply these markets due to its proximity to the Pacific Highway, providing good access to major population centres and major road networks.

The key economic benefits outlined in the EIS include:

- facilitating a supply of construction and industrial grade sand into the greater Sydney and Hunter region markets to meet identified demands;
- supporting the population growth in the area through the efficient supply of construction materials;
- employment of six quarry personnel and up to 20 road transport drivers, with positive flow-on effects to the local and regional communities; and
- contributing an estimated $16.25 million in royalties to Council in addition to site rental payments.

# 3. STATUTORY CONTEXT

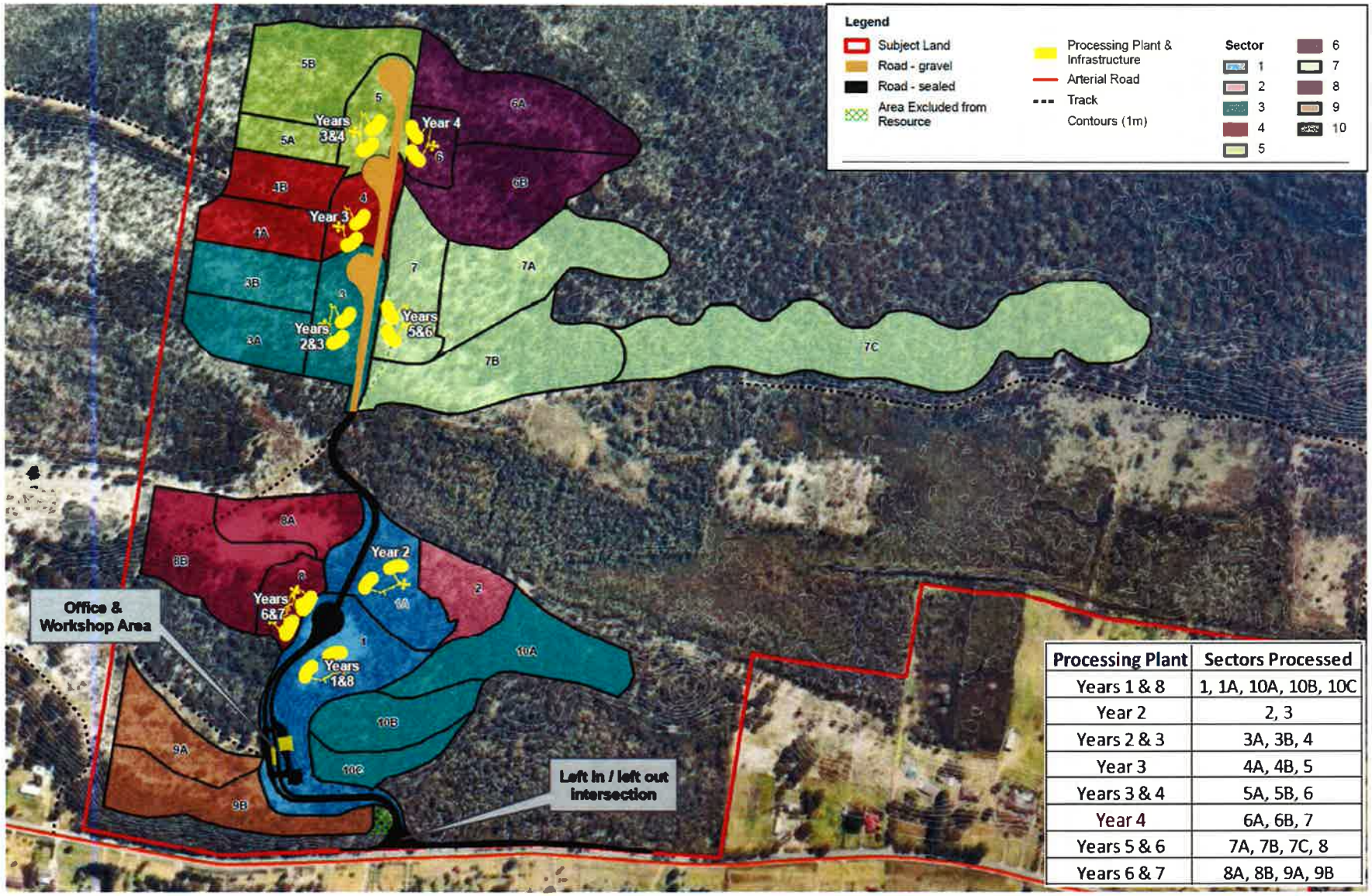
The Department has considered statutory requirements for the assessment of the project under the *Environmental Planning and Assessment Act 1979* (EP&A Act) and other relevant legislation. In regard to the EP&A Act, this has included consideration of the:

- objects found in section 5 of the EP&A Act;
- matters relating to threatened species found in sections 5A-5D of the EP&A Act;
- the matters listed under section 79C of the EP&A Act;
- applicable environmental planning instruments (EPIs) and draft EPIs; and
- various other requirements of the EP&A Act and the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), including public exhibition.

The Department has considered these matters in its merit assessment of the project and has provided a summary of this assessment below. Further consideration of the relevant provisions of the EP&A Act and EPIs is found below and in more detail in **Appendix D**.

### 3.1. State Significant Development

The proposed development falls within the definition of State significant development (SSD) under Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2011* (*State and Regional Development SEPP*) as it would extract more than 500,000 tonnes of material per annum. Development declared to be SSD requires the consent of the Minister for Planning under section 89E of the EP&A Act.




| Processing Plant | Sectors Processed |
|---|---|
| Years 1 & 8 | 1, 1A, 10A, 10B, 10C |
| Year 2 | 2, 3 |
| Years 2 & 3 | 3A, 3B, 4 |
| Year 3 | 4A, 4B, 5 |
| Years 3 & 4 | 5A, 5B, 6 |
| Year 4 | 6A, 6B, 7 |
| Years 5 & 6 | 7A, 7B, 7C, 8 |
| Years 6 & 7 | 8A, 8B, 9A, 9B |

***Figure 2** – Proposed site layout and sequence of sand extraction*

However, the development application falls outside the Minister's delegation to the Department dated 11 October 2017, as there were more than 25 public submissions in the nature of objections, and therefore must be determined in accordance with the Minister's delegation to the Planning Assessment Commission (the Commission) dated 14 September 2011.

### 3.2. Permissibility

The site is zoned RU2 – Rural Landscape under the *Port Stephens Local Environmental Plan 2013*. Development for the purpose of extractive industries is a permissible land use in this zone with consent.

The project is also a permissible land use under clause 7(3) of the Mining SEPP, which allows extractive industry development to be carried out with development consent in land use zones where agriculture is a permitted land use.

### 3.3. Requirements of the EP&A Act

#### *3.3.1 Objects of the Act*

The consent authority must consider the objects of the EP&A Act when making decisions under the Act. The objects of most relevance to the decision on whether or not to approve the project are:

a) *To encourage:*
   - (i) *the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment;*
   - (ii) *the promotion and co-ordination of the orderly and economic use and development of land;*
   - (vi) *the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats; and*
   - (vii) *ecologically sustainable development.*

The Department is satisfied that the project encourages the proper use of resources (Object 5(a)(i)) and the promotion and co-ordination of orderly and economic use of the land (Object 5(a)(ii)). However, the Department also recognises the potential conflict with other land uses in the area (particularly rural residential), and has assessed the potential impacts on these land uses in detail in **Section 5** of this report. The encouragement of environmental protection (Object 5(a)(vi)) is also considered in **Section 5** of this report.

The Department has carefully considered the encouragement of ecologically sustainable development (ESD) (Object 5(a)(vii)) in its assessment of the development application. The EP&A Act adopts the definition of ESD found in the *Protection of the Environment Administration Act 1991*, as follows:

> *"ecological sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:*
>
> *a) the precautionary principle;*
> *b) inter-generational equity;*
> *c) conservation of biological diversity and ecological integrity; and*
> *d) improved valuation, pricing and incentive mechanisms."*

The Department's assessment has sought to integrate all significant environmental, social and economic considerations and to avoid any serious or irreversible damage to the environment. In doing so, the Department has considered the encouragement of ESD in the assessment of the proposal.

#### *3.3.2 Significant Effect on Threatened Species*

Sections 5A to 5D of the EP&A Act relate to the consideration, assessment and management of threatened species. In deciding whether the project is likely to have a significant adverse effect on threatened species, populations or ecological communities, or their habitats, the consent authority is required to take into consideration:

- the factors listed in section 5A(2) of the EP&A Act (the '7 part test'); and
- any assessment guidelines issued and in force under the *Threatened Species Conservation Act 1995* (TSC Act) or *Fisheries Management Act 1994*.

The Department has considered the 7-part tests presented in Appendix 8 of the EIS, and the *Threatened Species Assessment Guidelines* (DECC 2007). This consideration has informed the Department's

assessment of impacts to threatened species, populations or ecological communities and their habitats which is presented in **Section 5.5**.

Special consideration has been given to Mahony's Toadlet, a newly described species which was listed as an endangered species under the emergency provisions of the TSC Act on 10 March 2017, during the preparation of this report (see **Section 5.5**).

### *3.3.3 Matters for Consideration under Section 79C*

Section 79C (1) of the EP&A Act outlines the matters that the consent authority must take into consideration when determining a development application. These matters have been considered throughout the Department's assessment report, in particular the provisions of any EPIs or draft EPIs (see **Appendix D**), the likely impacts of the development (see **Section 5**), the suitability of the site (see **Section 5**), submissions (see **Sections 4** and **5**) and the public interest (**Section 7**).

A review of the relevant provisions of EPIs that apply to the proposed development has been undertaken by WSS (see Section 3 of the EIS), including:

- *State and Regional Development SEPP;*
- *SEPP (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP);
- *SEPP (Infrastructure) 2007* (Infrastructure SEPP);
- *SEPP No. 33 – Hazardous and Offensive Development*;
- *SEPP No. 44 – Koala Habitat Protection*;
- *SEPP No. 55 – Remediation of Land*;
- *Port Stephens Local Environmental Plan 2013*; and
- *Hunter Regional Environmental Plan 1989 (Heritage).*

The Department has considered this review and has also undertaken its own assessment (see **Section 5** and **Appendix D**).

### *3.3.4 Other Matters*

The Department has undertaken its assessment of the project in accordance with all relevant matters as prescribed by the EP&A Regulation.

Development control plans do not apply to SSD under clause 11 of the *State and Regional Development SEPP*.

## 3.4. Integrated & Other Approvals

Under section 89J of the EP&A Act, a number of approvals are not required to be separately obtained for the proposed development. These include certain approvals, permits and authorisations under the *Heritage Act 1977*, *National Parks and Wildlife Act 1974*, *Native Vegetation Act 2003*, *Rural Fires Act 1997* and the *Water Management Act 2000*.

An Environment Protection Licence (EPL) would be required for the project and, under section 89K of the EP&A Act, this cannot be refused if it is necessary for the carrying out of an SSD project. It must also be substantially consistent with any development consent granted.

The Department has consulted relevant government authorities and considered their comments in its assessment (see **Sections 4** and **5**).

## 3.5. Commonwealth Approval

An assessment by WSS indicated that the project is likely to have a significant impact on two threatened species listed under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Earp's Gum (Drooping Red Gum) and Koala. On 29 March 2017, WSS referred the project to the Commonwealth Department of Environment and Energy.

The Commonwealth Government has previously accredited the State's environmental assessment processes under Part 4 of the EP&A Act, via a Bilateral Agreement between the Commonwealth and the NSW Governments. However, during the preparation of the EIS, WSS did not refer the project to the Commonwealth, and consequently the Department is unable to assess the project for the Commonwealth Government under the Bilateral Agreement.

On 29 May 2017, the Minister for the Environment and Energy determined the project to be a 'controlled action' under the EPBC Act. The actions proposed by WSS was determined as likely to have a significant impact on matters protected under the EPBC Act being:

- listed threatened species and communities (under sections 18 & 18A of the Act), including Camfield's Stringybark, Earp's Gum, Koala and Grey-headed Flying fox.

Consequently, approval from the Commonwealth Minister for the Environment is required for the project.

# 4. CONSULTATION

## 4.1 Exhibition and Notification

The Department made the development application and accompanying EIS publicly available from 4 December 2015 until 15 February 2016:

- on the Department's website;
- at the Department's Information Centre in Sydney;
- at Council's office; and
- at the Nature Conservation Council's office.

Copies of the EIS were also distributed to relevant government authorities and to the Williamtown and Surrounds Residents Action Group (WSRAG). The notice of exhibition was advertised in the *Newcastle Herald* and the *Port Stephens Examiner*.

In addition, the Department conducted a community consultation meeting on 1 February 2016, at the Tomago Bowling Club. The purpose of this meeting was to provide an overview of the assessment process for SSD, and listen to the community's views about the proposed quarry.

The Department also made all relevant documents available on its website.

In undertaking these processes, the Department has satisfied the notification requirements of section 89F of the EP&A Act, the EP&A Regulation and relevant EPIs.

The Department received 135 submissions in response to the exhibition:

- 10 from public authorities, including 7 NSW Government agencies; and
- 125 public and special interest group submissions, all but one of which objected to the project;

A summary of the issues raised in submissions is provided below. A full copy of these submissions is provided in **Appendix B**. A copy of WSS's Response to Submissions (RTS), together with additional information provided by WSS following further requests by the Department, is provided in **Appendix C**.

In order to update representatives of the local community, and at the request of the WSRAG, the Executive Director, Resource Assessments and Compliance and other Departmental officers met with members of WSRAG on 20 July 2017. The meeting addressed the personal circumstances of local residents affected by PFAS contamination from the RAAF Base. The group also expressed concerns about the impacts of the quarry, both in regard to the risks of disturbing and/or spreading the existing PFAS contamination and other local impacts.

The Department indicated that it had not received many submissions following making WSS's RTS publicly available in November 2016. The Department encouraged WSRAG to contact its wider membership with an invitation to provide additional submissions to the Department. Twenty submissions were received concentrating on the impact of the PFAS contamination, while also including comment on truck movements, road safety, destruction of natural habitat, noise and air quality impacts, as well as whether there was a need for another sand quarry to be established in the Port Stephens area.

All submissions received were carefully considered by the Department in its assessment of the proposal.

## 4.2 Agency Submissions

The **NSW Environment Protection Authority** (EPA) considered the EIS inadequate in assessing PFAS contamination in the area, and the potential impacts that the proposed development could have on down-gradient surface and groundwater quality. The EPA also sought additional information about

the potential impacts of mineral sand processing activities that had previously occurred on the site. The EPA advised that the then-Division of Resources and Energy within the Department of Industry (now the Division of Resources and Geoscience (DRG) within the Department) is the regulating authority for radioactive ore on mine and quarry sites. EPA advised that it was unable to provide recommended conditions of consent until the above issues were addressed.

WSS provided additional information to address the information gaps and shortcomings identified by the EPA, including in its RTS (November 2016), a revised Noise Impact Assessment (December 2016), a sampling report for PFAS chemicals in soils on the site (February 2017), and a revised Air Quality Impact Assessment (March 2017).

The EPA provided a comprehensive suite of recommended conditions in February 2017. It suggested that, as the most affected residences for both noise and air impacts were located near the southern-most extraction area, consideration be given to amending the proposal to reduce or remove operations from this area, reflecting on the precautionary principle. The Department has considered this advice in **Sections 5.2** and **5.3.** WSS's amendments in its RTS to forego a previously-proposed area of extraction close to Cabbage Tree Road and to stop sand extraction operations at 5 pm instead of 6 pm have reduced the potential air and noise impacts compared with the proposal placed on exhibition.

The EPA also addressed PFAS exposure pathways and NSW Health's request for airborne monitoring for PFAS chemicals. The EPA advised that, after applying worst-case soil contamination levels, the risk from inhalation and/or ingestion of PFAS chemicals for humans is extremely low. The EPA also advised that there is no accredited method for airborne sampling of PFAS chemicals available in Australia or overseas.

The EPA also recommended that radiation surveys are incorporated into the operational regime of the proposed quarry, and which are included in the Department's recommended conditions of consent.

The **Office of Environment and Heritage** (OEH) considered the EIS inadequate in relation to biodiversity, Aboriginal cultural heritage and flooding, and raised concerns over the proximity of the disturbance area to the Tilligerry SCA. OEH considered that there was insufficient justification for anticipated impacts to threatened species, no provision of a Biodiversity Offset Strategy and results of the Koala Spot Analysis Technique had not been provided in the EIS. OEH also identified the assessment of surface water impacts as inadequate, and that it was not possible to assess the proposal's flood impacts without further information.

OEH identified that the EIS did not reference OEH's input into the Director-General's Requirements in relation to Aboriginal heritage and incorrect advice had been provided regarding the Aboriginal Heritage Impact Permit process. Further clarification was sought in relation to the assessment of areas with a high potential for Aboriginal objects and for areas obscured by vegetation, consultation with registered Aboriginal Parties (RAPs) and the cumulative impact of the project in the context of intergenerational equity.

WSS addressed each of these matters in its RTS and consulted with OEH and the Department during a site visit that focused on biodiversity issues. Ultimately, WSS has proposed a biodiversity package of on-site and offsite offsets that is to OEH's satisfaction, provided the necessary information to enable assessment of Aboriginal heritage impacts, agreed to provide a 50-m buffer to the Tilligerry SCA and established that flooding impacts in the area would be unaffected by the proposed quarry. The matters raised by OEH are addressed in more detail in **Section 5.5**.

**Port Stephens Council** (Council) provided comments on biodiversity, traffic and road works, drainage, noise and air quality. Council acknowledged that the proposal is not consistent with the *Port Stephens Comprehensive Koala Plan of Management* (CKPM) and requested that concurrence be obtained from OEH regarding ecological impacts, including the development of a comprehensive offset package. Further information was requested about the location and density of hollow bearing trees on the site.

Council also requested that concurrence is obtained from the Road and Maritime Services (RMS) regarding proposed traffic movements and the left-in/left-out intersection proposed for the entry to the quarry's access road. However, as Council is the road authority for the road shoulders and verges on Cabbage Tree Road, it requested further clarification on shoulder width and parking controls over the length of the acceleration and deceleration lanes. Council also considered that the microsimulation traffic model underestimated potential peak hour traffic generation from the site.

As the acceleration and deceleration lanes would prevent buses stopping in these lengths of road, Council requested that WSS engage with bus service providers to determine potential impacts and mitigation measures.

Council also raised the need to adequately address stormwater runoff resulting from impermeable site areas, use tonal reversing alarms and set $PM_{10}$ particulate concentration levels to instigate staged shutdown procedures for quarry operations in times of elevated dust levels.

All matters raised by Council were addressed in WSS's RTS. The Department has recommended conditions of consent for biodiversity conservation and management measures on the site and biodiversity offset areas (see **Section 5.5**). The Department's assessment of road and traffic issues is in **Section 5.4** and air quality issues is in **Section 5.2**.

**NSW Health** also considered the EIS inadequate in assessing PFAS contamination in the area and requested that the assessment consider down-gradient surface and groundwater quality in relation to the contamination area, previous mineral processing activities, acid sulfate soils and other contaminated materials on site. NSW Health identified air quality as a key community concern and recommended conditions for comprehensive and ongoing monitoring for $PM_{10}$ and $PM_{2.5}$, as well as the regular monitoring of the silica content of particulate matter generated by the project. Other matters raised included the need for community consultation and the identification of measures to monitor and reduce the generation of particulate matter and noise.

The issues raised by NSW Health were also raised by other agencies. PFAS contamination and exposure pathways are addressed in **Sections 5.1.1** to **5.1.5**, while concerns about silica content in particulate matter are considered in **Section 5.1.8** and radiation issues in **Section 5.1.7**. The Department has recommended conditions of consent for the matters identified by NSW Health.

The **Division of Resources & Energy** (now DRG) was satisfied with the EIS's description of the extent and quality of the sand resource. Following the EPA's identification of radiation issues on the site, a radiometric survey requested by DRG was conducted by WSS. The Department has recommended that radiation be routinely monitored throughout the proposed quarry's operations.

**Hunter Water Corporation** (HWC) noted that the site is located within the Tomago Sandbeds Catchment Area which is regulated under the *Hunter Water Regulation 2015.* Consequently, the proposed activities must be appropriately managed to protect the Tomago Aquifer drinking water source. Its recommended management conditions include:

- not extracting below a level of 0.7 m above the predicted maximum groundwater level;
- removing all machinery used in extractive operations at the end of each day;
- surveying the elevation of the extraction area during extraction operations;
- ensuring the final landform of the extraction area is at least one metre above predicted maximum groundwater level; and
- preparing appropriate management and monitoring plans.

WSS has consulted with HWC on these matters and included the requested actions within its Statement of Commitments on how it proposes to operate the quarry. The Department's consideration of these matters is detailed in **Section 5.1.9**.

**Department of Primary Industry's (DPI's) Office of Water**, now the Department of Industry's Crown Lands and Water Division, recommended certain conditions of consent for the project, should it be approved. These include; utilising existing or additional bores to monitor areas immediately up-gradient and down-gradient from extraction areas; installing data loggers in representative monitoring wells; updating groundwater modelling within 12 months of commencing extraction operations; and preparing appropriate management and monitoring plans.

The Department has considered these recommendations in **Section 5** and in draft conditions of consent.

**Roads and Maritime Services** (RMS) did not object to the project, subject to the application of its recommended conditions. These include: restrictions on heavy vehicle truck movements to and from the quarry; design specifications for the access road intersection with Cabbage Tree Road; management of stormwater from the haulage road; preparation of a Construction Traffic Management Plan (subject to review by RMS); and the establishment of a Works Authorisation Deed with RMS.

WSS's design of the access road intersection with Cabbage Tree Road and its associated deceleration and acceleration lanes has been a lengthy process that was not resolved with RMS until April 2017. This resulted in an amended intersection design that would allow exiting laden trucks to reach a speed of 60 kph before entering the acceleration lane. This would allow trucks to reach the through traffic speed of 90 kph using a shorter acceleration lane. Traffic merges would be more efficient and therefore safer. The amended design would also ensure that the acceleration lane would only be constructed within the road reserve fronting lands controlled by WSS (and not its adjoining neighbours).

Further consideration the road and traffic issues raised by RMS is provided in **Section 5.1.7.**

The **Department of Defence** (DoD) raised no concerns over the project and advised that it is unlikely to impact on operations at the Williamtown RAAF Base. It noted that, should any lighting or reflective objects at the quarry be considered a danger to the safety of aircraft operations, then DoD may require lights to be extinguished or modified and reflective objects to be removed or modified. WSS has committed to managing lighting on the site in accordance with Australian Standards and to use non-reflective materials.

The **Heritage Council of NSW** noted there are no statutory listed heritage items within or adjacent to the site and acknowledged that the EIS had addressed the intent of the Director-General's Requirements. It requested that the heritage mitigation measures outlined in the EIS be adopted.

**DPI Fisheries**, **Lands** and **Agriculture** had no comment on the proposal.

### 4.3 Public Submissions

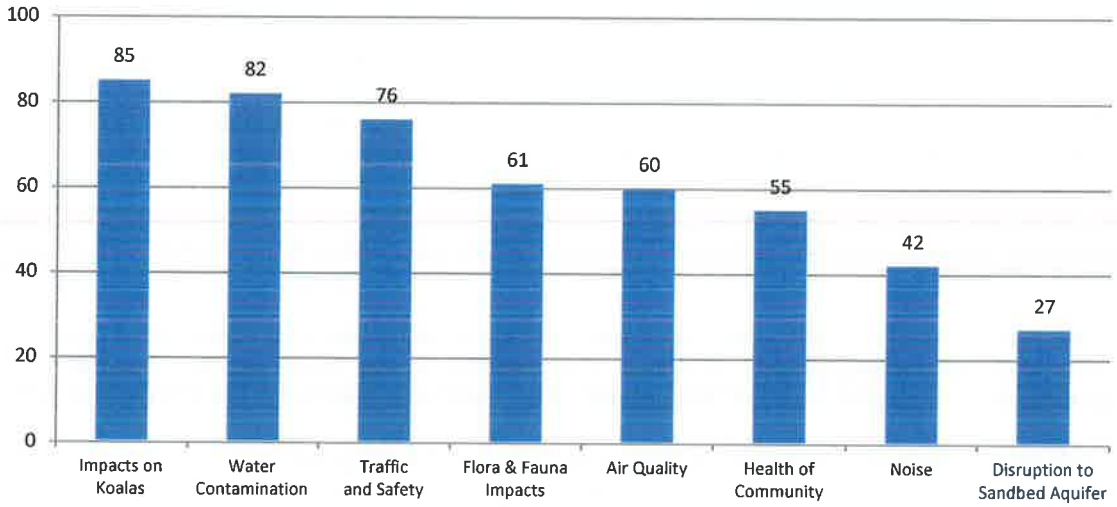
The public exhibition of the EIS attracted strong interest from the local and regional community, with the Department receiving 125 public submissions. Of these:

- 124 were objections to the project; and
- one provided comment on the project.

Submitters' addresses were analysed to determine any patterns associated with locality (see **Figure 3**). This figure shows that objectors are dispersed across the Hunter region, with concentrations in Newcastle, Port Stephens and along Cabbage Tree Road.


***Figure 3** – Location of submitters*

Of the 124 objections, 53 were from local residents (within 10 km of the site), 50 were from residents in the Hunter region, including Newcastle. Key concerns raised were impacts to Koalas, water contamination, disruption to the Tomago Sandbeds, traffic and safety impacts, air quality impacts and associated health impacts, flora and fauna impacts and noise impacts. These issues are discussed below. **Graph 1** depicts the number of times each of these issues was raised in submissions.




***Graph 1** – Frequency of issues raised in public submissions*

*Ecology* – a majority of submitters raised concerns over potential ecological impacts of the proposed quarry. These include disturbance to Koala populations and destruction of preferred Koala habitat, inadequacies in the Koala Management Plan, impacts on groundwater dependent ecosystems, lack of assessment of cumulative impacts and lack of a specific Biodiversity Offset Strategy.

The Wilderness Society of Newcastle (WSN) objected to the proposed quarry on the basis that it would significantly impact threatened species, including the Koala, Earp's Gum and the Wallum Froglet. Particular attention was drawn to the project's expected impacts on Koalas being contradictory to requirements of *SEPP 44 – Koala Habitat Protection* and to Council's CKPM. WSN further commented that the EIS's impact assessments for threatened species were inadequate, including the quality of survey work undertaken for Koala habitat. WSN and many other submitters also noted the absence of a specific Biodiversity Offset Strategy in the EIS.

*Surface and groundwater* – over 80 submissions raised concerns regarding the project's potential to damage surface and groundwater resources, predominantly via the project's potential to further spread PFAS contamination that has leaked from the RAAF Base.

Objectors also raised concerns regarding the potential for land clearing to increase water table levels and decrease evapotranspiration. A peer review of the groundwater impact assessment coordinated by WSN argued that the groundwater modelling did not account for changes in vegetation from land clearing.

*Traffic* – 76 submissions raised concerns over traffic and road and pedestrian safety along Cabbage Tree Road. These concerns included the road's existing poor condition and the potential increased traffic and safety hazards associated with increased truck movements. Local residents noted the existing hazard of turning into their driveways from Cabbage Tree Road, given the existing heavy truck traffic and a speed limit of 90 kph.

A resident of Cabbage Tree Road raised the issue of access to the local bus stop, stating, "*I currently have a daughter who attends Raymond Terrace Primary School who catches a school bus home. Her bus drops her off out the front of our property across the road at the entrance to the proposed development. My question is - where is she going to be getting off if the development goes ahead?*"

*Air Quality* – many local residents expressed concern over air quality impacts associated with quarrying operations and increased truck movements. Over 50 submissions raised concerns over fugitive dust health impacts, such as silicosis.

One submission raised the issue of $PM_{2.5}$ emissions in the following terms "*Insufficient data has been submitted regarding the $PM_{2.5}$ levels. The focus has been on $PM_{10}$ and TSP but not. The submission states that there will be 63 truck movements per day. This will increase $PM_{2.5}$ levels and this will have an effect on the local community.*"

*Noise* – many local residents also raised concern over potential noise impacts associated with increased truck movements, as well as operational noise from the proposed quarry.

Excerpts of typical submissions about noise are:

"*There will be an increase of everyday noise for the surrounding residents, there will be the noise of the everyday operation of the sand mine, including the times of operation including and not limited to transportation and loading 5.00 am – 6.00 pm Monday to Friday and 7.00 am to 4.00 pm Saturdays.*"

"*The hours of operation of the sand mine are NOT limited to business hours, with commencement of activities from 5.00 am to 7.00 pm Monday to Friday, and 7.00 am to 5.00 pm on Saturdays. This includes the peak hours of travel, times when we will be transporting our child to school, and traveling to and from work. This will also be times when our child will be sleeping and likely to be disturbed by the additional noise.*"

Some submitters also expressed concern that there would be increased noise from the RAAF Base due to the removal of sand dunes between their homes and the runway.

*Social* – some submissions were concerned over direct and indirect disturbance to social amenity, particularly regarding noise, visual, air quality and traffic impacts. Many local residents felt the quarry would negatively affect their property values, health and environmental amenity.

A peer review coordinated by WSN considered that the EIS's social impact assessment to be lacking description and analysis of specific social impacts on the local community.

*Economic* – some submitters argued that the project would provide little economic prosperity as only six jobs would be created at the quarry. It was also argued that the local community would bear costs associated with lower property values, traffic and adverse health effects. A report commissioned by WSRAG noted that the combined royalty and site rental payments to Council (approximately $17 million) is unlikely to cover the direct and indirect costs that the quarry would impose on the local community.

One of the conclusions of this submission was "*as the compensation will be paid into general revenue, it is unlikely to benefit the community members most affected by the mine.*"

The Department has carefully considered all issues raised in public submissions in **Section 5** below. The issues raised have been grouped by topic, commencing with Public Health and Safety (**Section 5.1**). The issue of PFAS contamination and its potential exposure pathways is considered within the Public Health and Safety section (**Sections 5.1.1** to **5.1.6**) along with radiation (**Section 5.1.7**), silicosis (**Section 5.1.8**), protection of drinking water supplies (**Section 5.1.9**) and the safety of the proposed intersection of the quarry access road and Cabbage Tree Road (**Section 5.1.10**). Later sections address Air Quality (**Section 5.2**), Noise (**Section 5.3**), Traffic (**Section 5.4**), Biodiversity (**Section 5.5**), Social Issues (**Section 5.6**), Economic Issues (**Section 5.7**) with a briefer consideration of other matters (**Section 5.8**).

### 4.4 Williamtown Contamination Expert Panel (WCEP)

Following the Department's presentation of the proposed quarry project to the February 2016 meeting of the WCEP, its technical sub-group (the Water Working Group (WWG)), reviewed the project's EIS with a focus on PFAS contamination from the RAAF Base. The WWG concluded that "*as long as the operations* (of the quarry) *remain above the water table the sand mine presents a low risk with regards to PFAS exposure or contribution to the spread of PFAS".*

However, WWG suggested that WSS should clarify whether any aspect of the site establishment or operation would involve interfering with the water table (ie pipework connections to water mains, construction activities, etc). WSS acknowledged that some construction activities may intersect the water table and committed to implementing appropriate workplace procedures during construction activities that may intersect the groundwater. Should the project be approved by the Commission, the Department has recommended a condition of consent requiring the preparation of a Construction Environmental Management Plan.

The WWG also provided advice in relation to airborne PFAS as a contamination pathway. The WWG undertook a risk assessment including local dust monitoring data and absolute worst-case scenarios for PFAS exposure through inhalation of dust in air associated with the RAAF Base and Williamtown Investigation Area. The results presented a low risk to human health in the Williamtown area and the WWG advised that air quality monitoring of particulate PFAS would not be required to further inform their understanding. Based on the soil sampling data provided by WSS, WWG concluded that PFAS exposure from the quarry operation is unlikely.

The WCEP completed its activities in June 2017, but then transitioned into the NSW PFAS Expert Panel.

### 4.5 Response to Submissions and Additional Information

WSS submitted its RTS on 9 November 2016. The RTS advised that, following the wide range of concerns expressed concerning the EIS, WSS decided to refine the scope of the project. These changes have been summarised in **Table 1**. Key changes are a reduction in the project's footprint by 23% to 42.25 ha, shortening of the weekday working day to cease at 5 pm and a reduction in maximum annual sand production from 600,000 to 530,000 tonnes.

The Department provided agencies with the opportunity to consider WSS's RTS. In most cases the RTS provided the details and assessment that had been requested by the Department and agencies and addressed the key issues identified in public submissions.

The Department and agencies then requested additional information, particularly in respect of the updated noise, air quality and biodiversity assessments. The RTS and additional information is provided in **Appendix C**. The Department has considered the input from agencies and the information provided by WSS within the relevant portions of **Section 5** below.

# 5. ASSESSMENT

In assessing the merits of the development, the Department has considered the:

- WSS's EIS and RTS;
- submissions from the public, special interest groups, public authorities and the WCEP;
- additional information provided by WSS in response to the Department's requests and agency submissions on the RTS;
- applicable EPIs and draft EPIs,
- the suitability of the site for the project; and
- relevant provisions of the EP&A Act, including its objects and the requirements of section 79C.

The following is a summary of the findings of this assessment.

### 5.1 Public Health and Safety

The Department's key consideration during this assessment has been, and remains, the health, safety and well-being of the residents of the surrounding district. This means that the operation of the proposed quarry must not increase the risk of harm to its neighbours beyond a negligible level. The Department defines negligible as *'small and unimportant, such as to be not worth considering'.*

The Department considers that the primary public health and safety concerns that are relevant to this project are PFAS contamination (particularly of groundwater), flooding, radiation from processed mineral sands tailings, the safe operation of trucks entering and exiting the quarry site, protection of HWC's groundwater drinking water supplies and the potential for harm from airborne silica. These concerns are addressed in the following sections of this report.

#### *5.1.1 Williamtown Investigation Area (the 'Red Zone')*

The Williamtown Investigation Area was established by the NSW Government in October 2015, following consultation between the EPA, WCEP, Hunter Water and DPI (see **Figure 4**). The purpose of the Investigation Area was to highlight the area under investigation for potential groundwater contamination. The boundaries of the Investigation Area were based on surface water drainage patterns and groundwater flow directions and preliminary investigations of PFAS contamination in the area resulting from firefighting foam chemicals (PFOS and PFOA) used at the RAAF Base.

The Investigation Area was not a development control zone and no prohibitions on development or any other activity are currently in place in this Area. However, the NSW Government has recommended that residents living inside the Investigation Area follow precautionary advice to minimise their exposure to PFAS chemicals originating from the RAAF Base. Until December 2017, across the Investigation Area, this advice was to:

- not use groundwater, bore water or surface water for drinking or cooking;
- avoid swallowing groundwater or surface water when bathing, showering, swimming and paddling;
- drink water from the reticulated supply (ie town water);
- avoid eating home grown food produced using contaminated water, including home slaughtered meat, eggs, milk, poultry, fruit and vegetables;
- moderate intake of, and seek further advice, regarding home produce that was grown within the area but was not produced with contaminated water; and

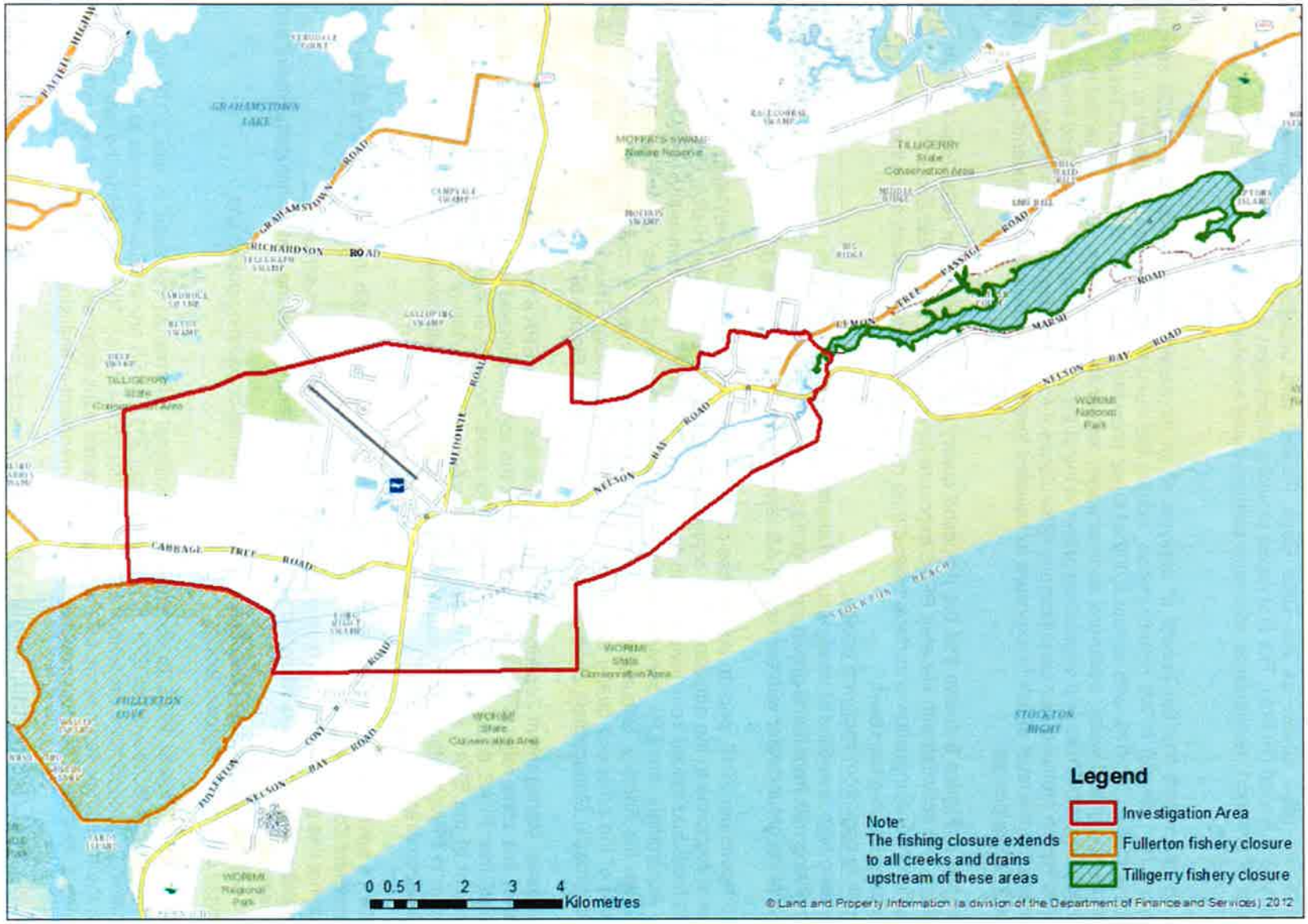



***Figure 4** – NSW Government's PFAS contamination Investigation Area (the 'Red Zone')*

- moderate the number of food servings of individual species of fish and other seafood sourced from the two estuarine areas adjacent to the Investigation Area (see **Figure 4**).

*Progression from Investigation Area to Risk-Based Management Zones*

In December 2017, the Commonwealth Department of Defence released its updated *Environmental Site Assessment* (also known as the Data Gaps Report) and updated *Off-site Human Health Risk Assessment Report* (HHRA). The first report provided information to fill data gaps identified in 2016 in respect of transport mechanisms, exposure pathways and exposed populations by sampling, analysis and modelling.

The second report has the benefit of analysis of an increased dataset of almost 10,000 samples analysed for potential PFAS contamination, double the number of samples considered in the initial HHRA published in 2016, with almost 5,000 of these provided by the Data Gaps Report. Testing was conducted on groundwater, sediment, surface water, residential tank water, other residential materials such as pool water, fruits and vegetables grown in the study area, and aquatic plants and animals. The updated HHRA provided four classifications (Risk Zones A to D, from highest risk to lowest risk) to help communicate the level of risk to exposure to elevated levels of PFAS and how residents can manage future PFAS exposure.

Reference to **Figure 5** shows that the proposed quarry site is largely within Risk Zone C (light grey shading). The activities with elevated PFAS exposure for occupants in this Risk Zone are:

- unintentional ingestion of surface water during recreational activities, such as swimming;
- eating home-grown beef;
- eating eggs from backyard poultry;
- eating high quantities of locally-sourced shellfish or finfish;
- drinking milk from home-grown cattle, or its use in cooking; and
- drinking groundwater with average PFAS levels above drinking water guidelines.

On 19 November 2017, prior to the release of the updated HHRA, the EPA revised its precautionary advice in response to the additional data contained in a draft version of the HHRA. The EPA reported that its focus had moved from 'investigation' to 'management' of PFAS contamination in the Williamtown area. Accordingly, the EPA provided a map of three "Management Zones" around the RAAF Base. These are the Primary, Secondary and Broader Management Zones. A small portion (less than one hectare) of the proposed quarry site, along its frontage to Cabbage Tree Road, is located within the EPA's "Broader Management Zone" (shown by pink hatching in **Figure 5**).

The Broader Management Zone indicates the lowest risk of the EPA's three management zones. The extent of this zone reflects the consideration that the topography and known hydrology of the area indicates that PFAS could be detected within this zone "now or in the future". This approach is a refinement of the EPA's advice to residents on actions to be taken, or avoided, to minimise risk of exposure to PFAs contamination, compared to the advice that it had previously provided for the entire Investigation Area.

The EPA's advice for the Broader Management Zone is consistent with its advice for the Secondary Management Zone, being:

- do not use groundwater, surface water or bore water for cooking or drinking;
- avoid swallowing water when bathing, showering or swimming in the water, including creeks and drains;
- do not use groundwater or surface water for swimming or paddling pools; and
- avoid eating home grown foods.

The Department asked WSS to consider the additional information released in late 2017 by the Department of Defence and the EPA. In late December 2017, WSS provided its response to the revised information in a report titled *December 2017 PFAS Response Paper*. The changes to the extent of risk zones, the recommended actions for management within each zone and WSS's response to the new documents have been carefully considered by the Department in finalising this assessment report.

Effectively, as of January 2018, there are three different mechanisms for describing the areal extent of PFAS contamination emanating from the RAAF Base, all of which are shown on **Figure 5**. These are:

- isopleths of the interpreted plume of PFAS contamination emanating from the RAAF Base, as well as isolated areas of contamination;
- Department of Defence Risk Zones; and
- EPA Management Zones.

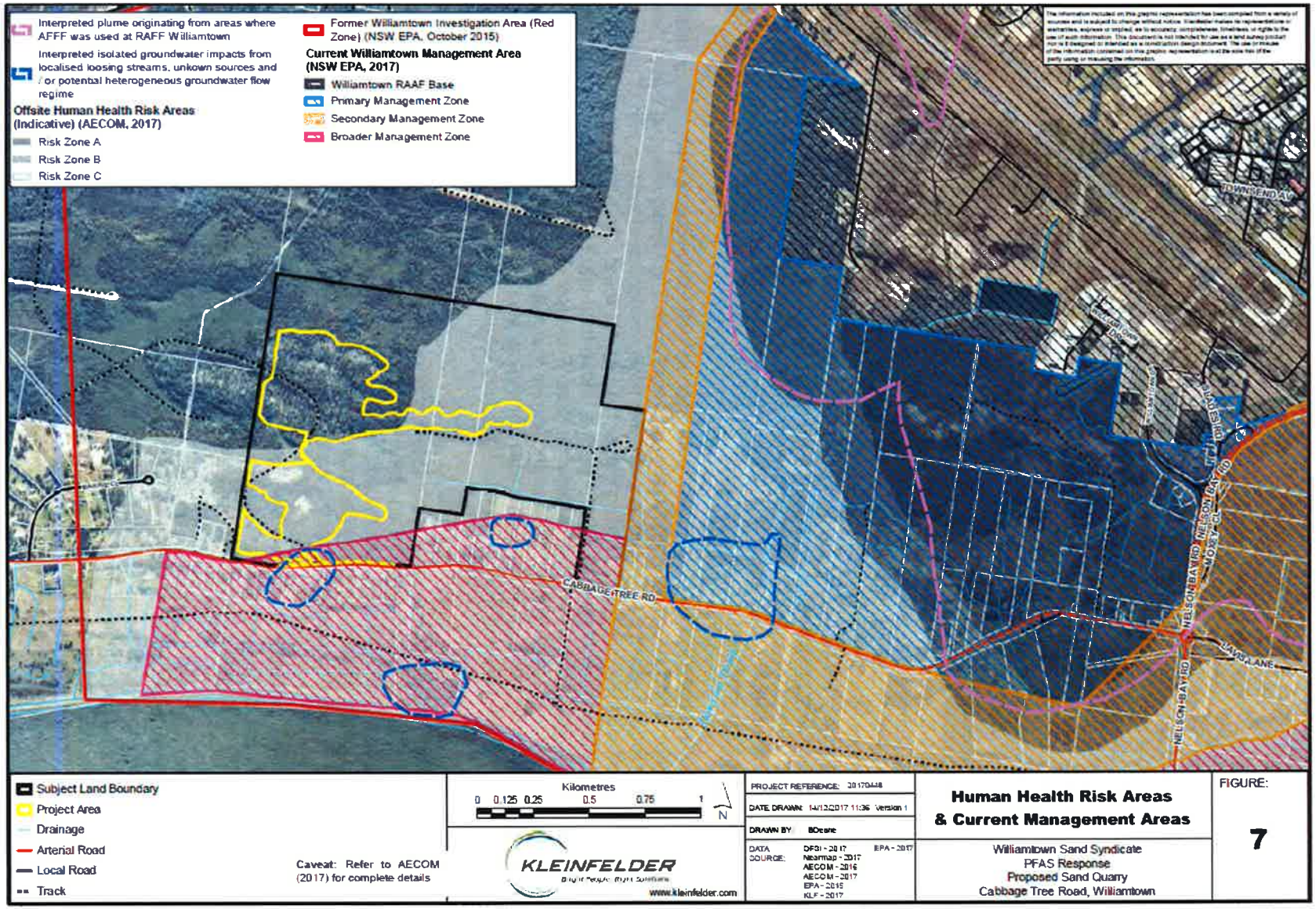



***Figure 5** – Mapped PFAS contamination Risk Zones and Management Zones (December 2017)*

Because the Department of Defence and the EPA have adopted different approaches to classifying and describing the zones of existing or potential PFAS contamination requires the Department to consider each approach in this report, insofar as they apply to the proposed quarry site.

From **Figure 5** it can be seen that the Department of Defence's Risk Zone C covers much more of the site than the EPA's Broader Management Zone. However, EPA officers stated in a public meeting in December 2017 that the EPA intends to revise its Management Zone boundaries to include all of a cadastral lot or property in the relevant management zone, where only a portion of that lot or property is currently included. This may extend the Broader Management Zone further into the site.

For its assessment of this quarry proposal, the Department has given consideration to the precautionary recommendations that apply to either Risk Zone C or the Broader Management Zone. However, most of the exposure pathways for Risk Zone C and the Broader Management Zone are directly applicable to eating and drinking and various residential and recreational activities and do not impinge on any construction or industrial activity, including the quarry proposal. The following sections of this assessment report consider potential PFAS exposure pathways and their consequences for the proposed quarrying operations.

*Health Risks Associated with PFAS*

The extent and nature of health risks associated with ingestion and accumulation of PFAS chemicals in human beings remain uncertain. NSW Health has advised the public that "there is no conclusive evidence" that PFAS chemicals cause any specific illness. However, some international experts are of the opinion that PFAS chemicals do have significant impacts on the human body, which could lead to significant health impacts. For example, Professor Philippe Grandjean, of the Harvard School of Public Health, has led a series of studies which have indicated that PFAS chemicals can suppress the human immune system, which it is postulated may in turn lead to the development of various diseases. The Commonwealth Department of Health has commissioned an epidemiological study to consider the potential health effects of PFAS exposure in the Williamtown area. However, it is understood that this study will not be complete until 2020.

On 8 July 2017, the *Newcastle Herald* (the Herald) published an extensive special investigation into a potential 'cancer cluster' along a 4 km stretch of Cabbage Tree Road. The Herald reported that at least 24 people who have lived or spent a significant amount of time in residences along this part of the road have been diagnosed with various types of cancer over the last 15 years. By 3 November 2017, the Herald had updated this number to at least 50 people. It is understood that this section of the road and its neighbouring residences all lie within the Investigation Area. Professor Bruce Armstrong, a professor of public health at the University of Sydney, advised the Herald that this apparent cancer cluster should be closely examined during the Commonwealth's epidemiological study. A subsequent parliamentary briefing concluded that the scope of the epidemiological study would be expanded to incorporate the findings of this investigation.

The Department acknowledges that there are significant uncertainties surrounding the scale of risks resulting from PFAS exposure and the nature and severity of human health impacts. These questions are obviously critical for current and past residents of the Williamtown area. They are also critical for a number of NSW and Commonwealth agencies (for example the NSW and Commonwealth Departments of Health, the NSW EPA and the Commonwealth Department of Defence.

The key question for the Department and the Commission (as the Minister's delegate) is whether this lack of certainty in public health information and the ongoing nature of the Commonwealth's epidemiological study is critical to determining the development application for this quarry proposal.

The Department considers that this question is best answered by examining whether there is any evidence that the proposed quarry could further spread existing PFAS contamination, or in some other way increase or change the PFAS exposure pathways for nearby residents. That is, the correct question is not whether the existing contamination is serious and associated with uncertain but potentially serious health impacts, but whether the proposed quarrying could increase this risk profile, to the detriment of any nearby resident. The Department's examination of the proposal has been undertaken with the primary purpose of examining the potential of the proposal to increase or otherwise vary the risk profile for local residents that has arisen as a result of the PFAS contamination arising from the RAAF Base.

*How PFAS Chemicals Interact with Water and Soil*

The Department considers that, in assessing the risks associated with the proposed quarrying, it is essential to understand how PFAS chemicals interact with water and various soil components. The

secretariat for the WCEP referred the Department's enquiries to the Chair of the Panel's WWG, A/Prof William Glamore, who provided the following information.

There are between 30 and 45 chemicals which fall into the description of being PFAS chemicals, although PFOS, PFOA and PFHxS are the most relevant to the contamination arising from the use of fire-fighting foams at the RAAF Base. These foams are produced by mixing small quantities of PFAS (c. 3%) with water. The PFAS chemicals in question are surfactants, and the foams are similar to other foams produced by other surfactants, such as household and other detergents.

The PFAS chemicals are highly soluble, which is the essential reason why surface residues of foam on the Base are carried underground to the aquifers below. That is, infiltrating rainfall and runoff has transported the great majority of PFAS chemicals lying on the surface at the Base down to the underlying groundwater layer. Generally speaking, the chemicals remain dissolved and are then carried away from the Base as groundwater moves along local gradients towards the ocean. Where contaminated groundwater intersects with the surface (such as in the low-lying drains which traverse the landscape, eg Moor's Drain) then the PFAS chemicals may enter the surface water system. If the surface water drains are 'losing' systems, then some of the PFAS within them returns to the groundwater, downstream of where the chemicals first entered the drain. However, if the drains do not lose water to the surrounding soils (ie they are 'gaining' systems), then the PFAS chemicals remain fully within the surface drains and are carried downstream. These are the major pathways for the spread of PFAS contamination from the RAAF Base to the surrounding area. They are the generally accepted explanation for the occurrence of four isolated areas of PFAS contamination in the general vicinity of Cabbage Tree Road and Fullerton Cove (shown by blues dashed lines on **Figure 5)** outside of the main PFAS plume emanating from the RAAF Base.

However, while the great bulk of PFAS chemicals are considered to remain dissolved within the groundwater and contaminated surface water systems, they also have the capacity to become attached ('bind') to various soil components. Prof Glamore indicated that the capacity for PFAS to attach to sand particles was low, due to the relatively low ionic charge on these particles. However, there is a greater capacity for the chemicals to attach to organic components of soil and to clays, which have much higher ionic charges. This capacity leads to the higher levels of PFAS chemicals found in the soils in or immediately adjacent to the surface drains.

This leads to the question, what would happen to PFAS chemicals which travel along a groundwater gradient to beneath the proposed sand quarry, when groundwater levels at the quarry site fluctuate significantly? Would the chemicals remain within the groundwater, as it rises and falls, or would some proportion of them become attached and remain attached to various components of the soil column?

Prof Glamore's opinion on this matter was primarily based on the very clean nature of the sands within the Tomago Sandbeds. Because these are old and windblown sands, they contain very limited amounts of organic material (except at the surface) and very limited amounts of clay. While a small proportion of PFAS chemicals may attach to sand particles as groundwater levels rise and fall, Prof Glamore considered that this was unlikely to be significant. Further, some such PFAS may be dissolved by the infiltration of a later rainfall event, and the chemicals carried down again to the groundwater.

It is this basic chemistry which underlies the view expressed by the WWG that "*as long as the operations* (of the quarry) *remain above the water table the sand mine presents a low risk with regards to PFAS exposure or contribution to the spread of PFAS*".

Nevertheless, this chemistry also underlines the importance of ensuring that any proposed quarrying does not disturb the groundwater underlying the site, and that an appropriate margin of safety is maintained to ensure this outcome.

*Proposed Quarrying*

A key concern expressed by the community is that the proposed quarry is located in the Investigation Area (now partially located within the Broader Management Zone). Other than this general concern, more specific concerns were that:

- sand extraction might intersect the water table and thence allow PFAS contaminated water to enter local surface water drainage lines, and provide an enhanced exposure pathway for people and their properties;
- lowering of the two sand dunes could lead to increased flooding and mixing of contaminated groundwater, which could then exit the site; and

- removal of vegetation would reduce evapotranspiration rates to the extent that the water table would rise, interact with surface water, and subsequently exit the site.

The primary means that WSS has proposed to prevent impacts from the quarry on groundwater (or vice versa) is that it would ensure that all sand extraction would occur at least 0.7 m above the 'predicted maximum groundwater level' (as recommended by HWC). Rehabilitation of the site would add another 0.3 m of soil material, so the final landform would be at least one metre above the predicted maximum groundwater level. These same requirements have been applied by the Department to other sand quarries in the Williamtown - Fullerton Cove - Salt Ash area. Further information on WSS's determination of predicted maximum groundwater levels is presented in **Section 5.1.2**.

What this effectively means is that the quarry would not directly interfere with the groundwater on this site, whether it is contaminated or not. Should the groundwater be contaminated, the quarry would not alter the level of contamination, or provide any enhanced pathway for contaminated water to interact with the surrounding community or the land on which it lives.

However, in response to issues raised in submissions regarding the project's potential to further the spread PFAS, WSS undertook additional investigations of groundwater in May 2016, with the outcomes presented in the RTS's Appendix 7 – Groundwater Assessment.

**Figure 6** shows the location of groundwater monitoring bores on and around the site and the direction of groundwater flow (black arrows). Bores BH 6, 8 and 11 were sampled and tested for PFAS compounds. These bores are located up-gradient from the proposed sand extraction site and between the site and the source of contamination at the RAAF Base.

Water sampling was undertaken by Robert Carr & Associates Pty Ltd (the water study) and the samples analysed by Eurofins Management Laboratory. Water samples from the three bores were analysed for PFAS chemicals as being below the testing laboratory's Practical Quantitation Limits (ie its 'limit of detection'). The samples therefore indicate that the groundwater up-gradient of the proposed area of disturbance was free of PFAS chemicals at the time of sampling and consequently met all guidelines relating to these chemicals, including the much stricter April 2017 enHealth guidelines published after the study.

Ordinarily, groundwater flows down-gradient (ie downhill). When considering this concept and the terrain of the proposed quarry site and its surrounds, it can be inferred that groundwater would flow from north to south. **Figure 7** identifies the terrain surrounding the proposed quarry site in relation to the location of PFAS 'hot spots' (ie PFOS measured above 10.1 parts per billion) at the RAAF Base. The direction of slope of the terrain is such that contaminated groundwater would likely flow south and southeast of the 'hot spots'. This is reinforced by the location of additional PFAS 'hot spots' located immediately south of those located on the Base itself.

The direction of groundwater flow is further reinforced by **Figure 8**, which was included in the RAAF Base Environmental Investigation Report conducted by AECOM in 2016 on behalf of the Department of Defence. AECOM identified the inferred flow of groundwater from the RAAF Base as moving in a south-southeast direction towards Fullerton Cove and Tilligerry Creek.

Historic and future modelling of the distribution of contamination by AECOM in 2016 indicates the spread of the contamination plume along surface water drainage channels, particularly in an easterly direction towards Tilligerry Creek.

The natural gradient of the land and various modelling undertaken by AECOM indicates that the direction of groundwater and contamination flow from the RAAF Base is *not* flowing southwest toward the proposed quarry site but south-southeast towards the Fourteen Foot Drain and thence to Fullerton Cove (see **Figure 8**). This is likely to be the fundamental reason why water sampling at the proposed quarry site was free from PFAS chemicals.

Despite the absence of detectable PFAS at the site and the likely direction of groundwater flow, the connectivity between groundwater aquifers means there is still potential for future PFAS migration from off-site sources through groundwater transport. The water study recommended further testing if groundwater was to be extracted from the site.

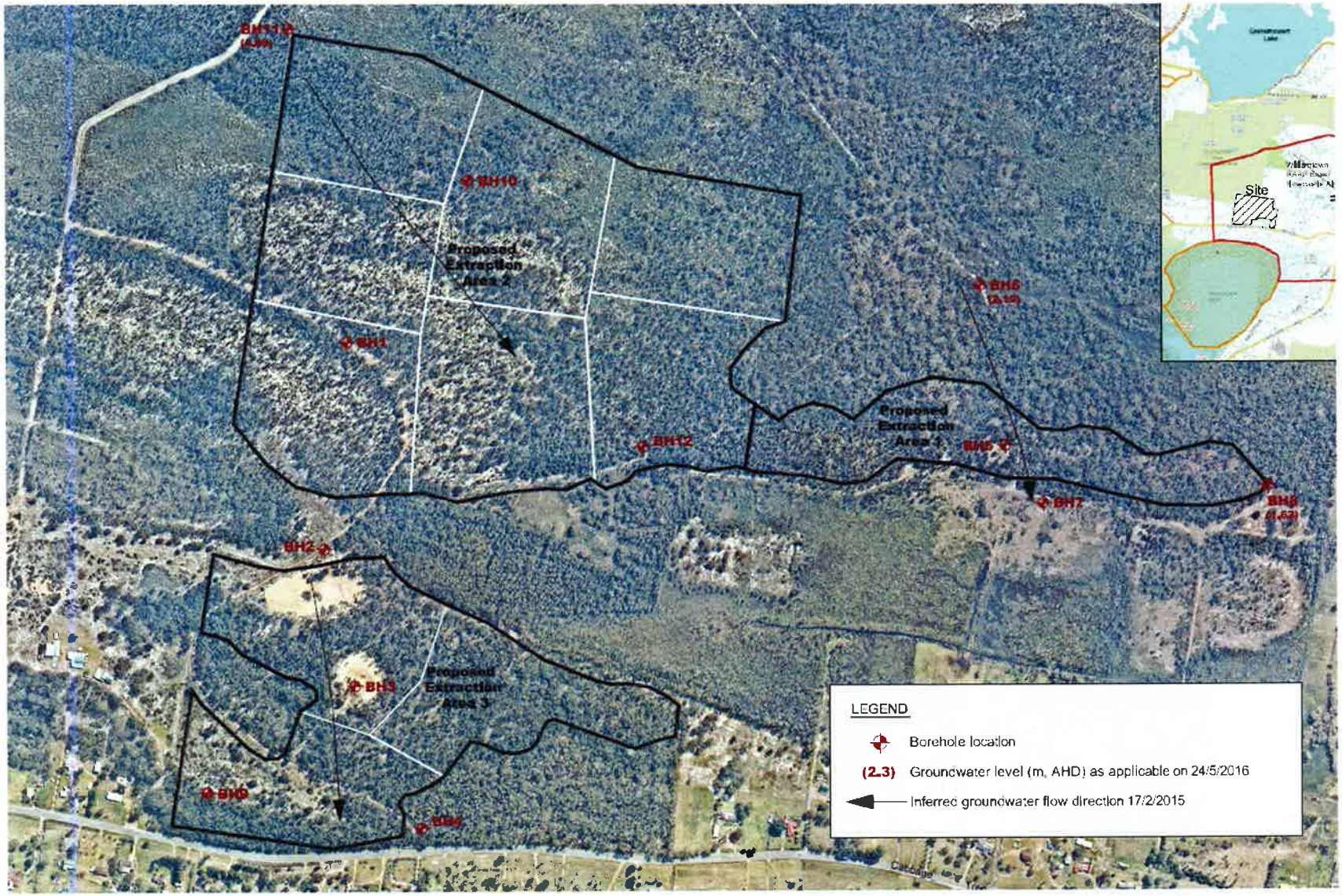



***Figure 6*** *– Groundwater monitoring locations*

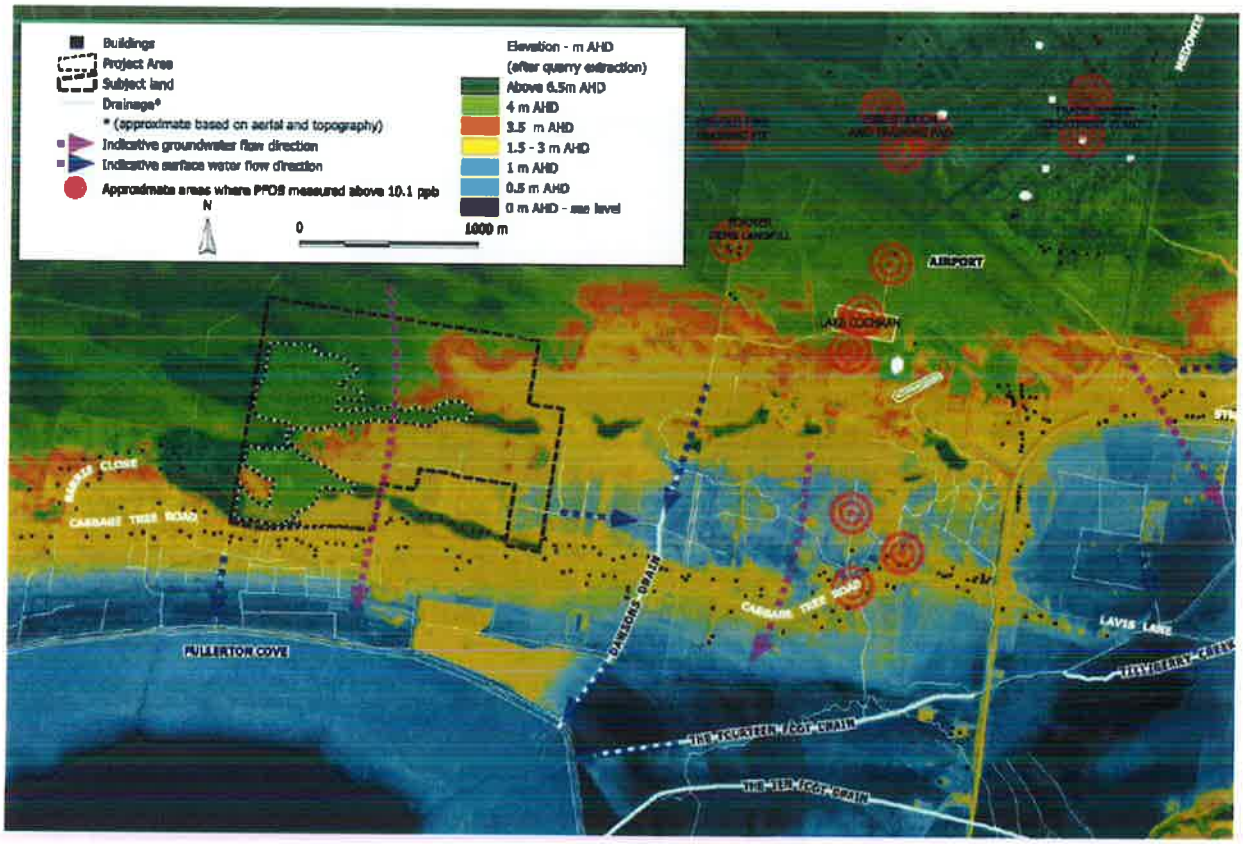



***Figure 7*** *– Site terrain and PFAS 'hot spots'*

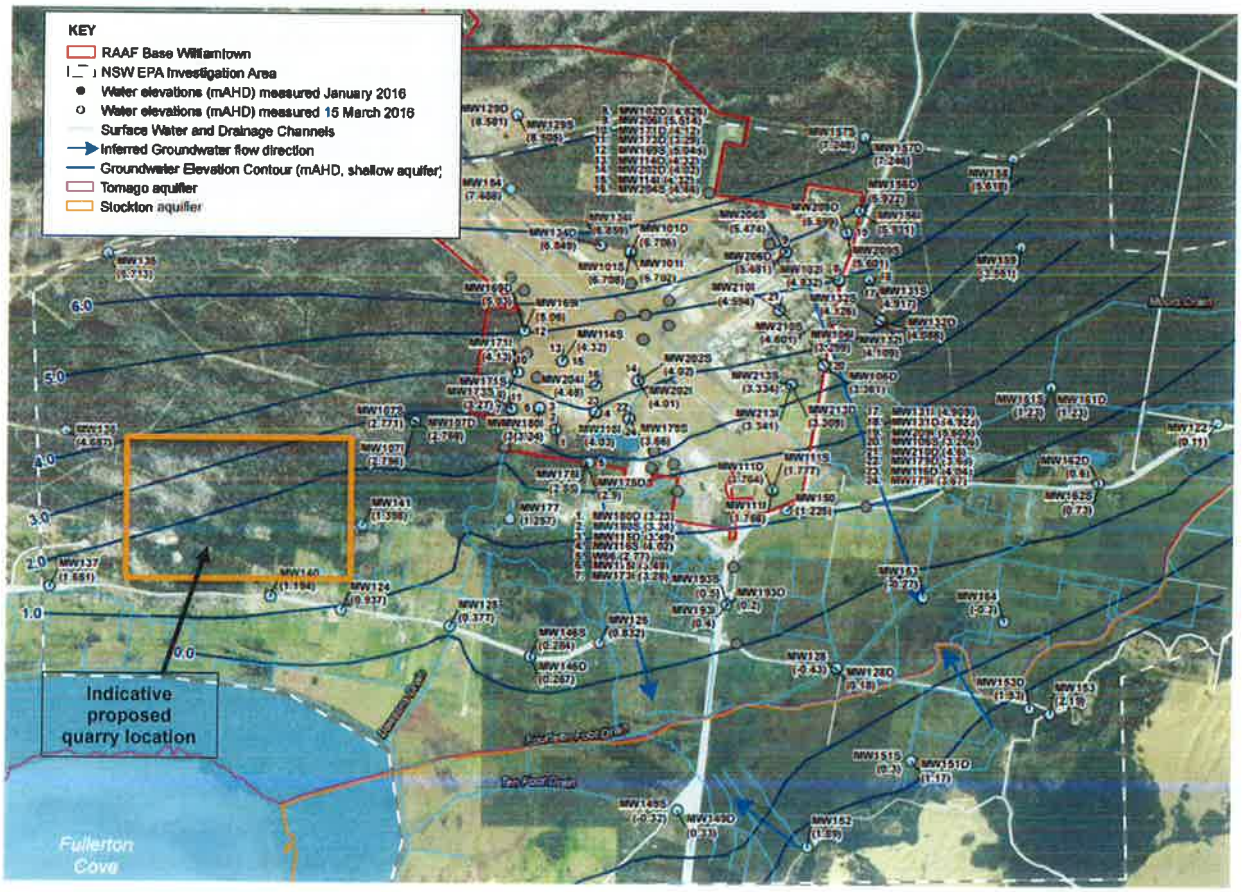



***Figure 8*** *– Inferred groundwater flow direction (AECOM, 2016)*

However, there are no plans to extract groundwater from the site. Nonetheless, the Department recommends a condition of consent that requires the northern groundwater bores on the site to be regularly tested for the presence of PFAS chemicals. In addition, and as recommended by the WWG, WSS would be required to implement a Construction Environmental Management Plan to remove any risks of its physical works intersecting with the water table.

In summary, sampling undertaken for WSS indicates PFAS chemicals are not currently detectable in groundwater in any areas where sand extraction is proposed. WSS would not be permitted to extract sand in a manner that would disturb groundwater. The northern bores would be monitored to identify any future potential PFAS contamination before it has the potential to migrate towards the sand extraction areas. Even if contaminated groundwater were to migrate to beneath a sand extraction zone, there would be no interaction between sand extraction and this groundwater.

The Department is satisfied that these measures, taken together, would ensure that in the proposed quarry operations would not increase the risk of groundwater water contamination for any residents or landowners.

*Recent Developments Approved in the Investigation Area*

The Department has investigated whether other developments have been approved by Council within the Investigation Area between December 2015 and June 2017. Developments approved include:

- dwellings and sheds;
- a swimming pool;
- an extension to an aircraft maintenance hangar at the RAAF Base;
- commercial property development and extensions; and
- residential alterations and additions.

For most of these developments, conditions of approval have included provisions in relation to groundwater extraction, particularly regarding the management of groundwater encountered during construction. Commercial development consents have required preparation of a Construction Phase Management Plan to detail disposal routes for extracted groundwater and controls to minimise workplace, public and livestock exposure to extracted water. Some of these consents also included provisions to prohibit the use of fill materials sourced from within the Investigation Area.

Conditions imposed for residential development appear to be less onerous, such as requiring 'consideration' of management measures to minimise exposure to extracted water prior to construction. Most residential consents contained conditions preventing extracted groundwater from running offsite and providing for management of groundwater that accumulates in excavations during construction.

The Department concludes that PFAS contamination has not prevented the assessment and approval of local development in the Investigation Area. However, it has resulted in Council imposing additional conditions requiring applicants to implement appropriate management measures.

### *5.1.2 Impact of Removal of Sand Dunes*

In October 2016, in response to issues raised in submissions, WSS undertook additional investigations of potential flooding impacts. The results are presented in the RTS's Appendix 6 – Potential for Sand Extraction to Increase Flooding Impacts in Surrounding Areas.

Predicted maximum groundwater levels were modelled using a groundwater model calibrated against measured groundwater levels in 14 of HWC's nearby monitoring bores over the period 1997 to 2015. This data set provides a very reliable means of calibration and included high groundwater levels associated with the heavy rains of July/August 1997 and June/July 2007 (the *Pasha Bulker* Storm).

As shown in **Figure 9,** groundwater levels within the sand dunes are largely independent of surface elevation. Even though the topography of the landscape varies, groundwater levels show a reasonably uniform decrease from north to south for dry, average and wet conditions.

As shown in **Figure 10**, the 95% groundwater level (ie approximately maximum recorded groundwater level) ranges from approximately 5.0 m AHD in the north to approximately 2.5 m AHD in the south of the site. The general direction of groundwater flow is from north to south (ie towards the Fourteen Foot Drain and thence to Fullerton Cove). As the elevation of the landform decreases, groundwater levels intersect with the land surface resulting in groundwater either ponding on the surface or freely draining across the surface via a constructed drainage system.

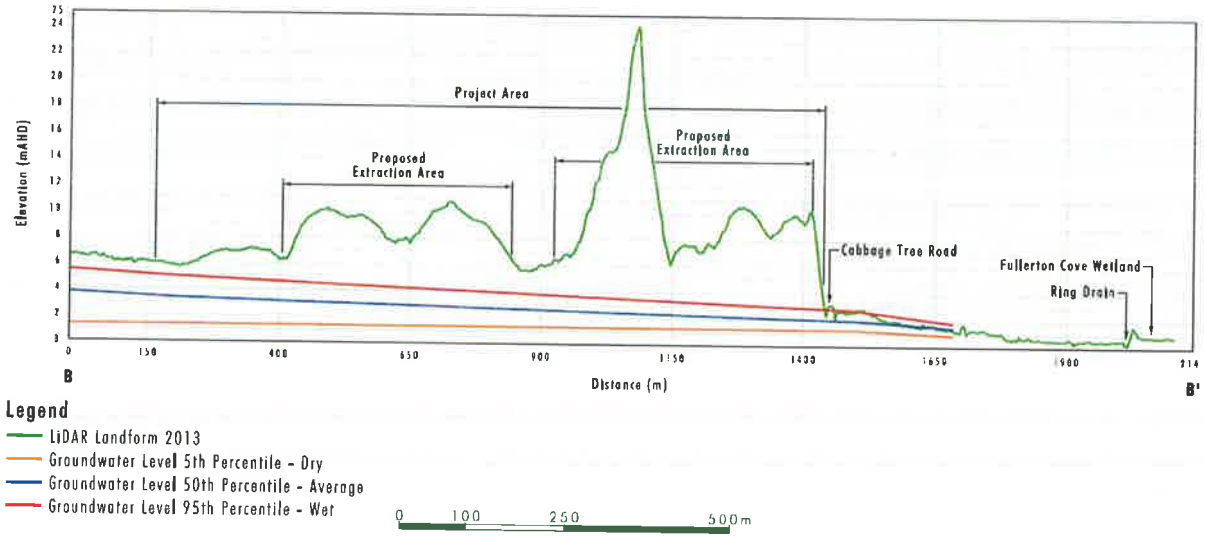



***Figure 9** – Groundwater levels in cross-section (location of cross-section shown on Figure 10)*

The modelling indicates that the horizontal rate of movement of groundwater through the sand aquifer would be approximately 100 millimetres (mm) per day. By comparison, observed rates of vertical infiltration of rainfall into the dunes are approximately 100 mm/hour, being about 20 times faster than the rate of horizontal movement of groundwater. This difference reflects both the low gradient of the water table and the high porosity of the Sandbeds, which both minimises the rate of horizontal flow.

This leads to the conclusion that the overall rate of groundwater movement from the dunes to the adjoining low-lying areas is controlled by the rate of horizontal flow through the aquifer, not the rate of vertical infiltration through the dunes, ie while rainfall infiltrates quickly, it then slowly moves off site.

Provided that extraction remains at a safe distance above the predicted maximum groundwater table, as proposed, reducing the thickness of the dunes by quarrying would not change the rate of horizontal movement of groundwater through the aquifer. The only change to the overall hydrological system would be a lesser thickness of sand, above the water table, which could hold some very small volume of water due to physical water retention on the surface of the sand particles.

The RTS concludes that low-lying areas that become water-logged or inundated in wet weather are unlikely to either expand or remain in that state for longer periods due to the project. Hence, sand extraction would not adversely impact low-lying areas adjoining the quarry. The Department accepts this conclusion.

Whilst the modelled levels provided in the EIS are a reliable indicator of the existing maximum predicted groundwater level, it is imperative that there is a clear and ongoing understanding of the maximum predicted groundwater levels on the site to ensure extraction remains at the appropriate depth and does not encroach on the recommended 0.7 m buffer.

The Department has recommended a condition of consent requiring the Applicant to prepare a Maximum Extraction Depth Report prior to the commencement of any ground disturbing activities and every two years thereafter. This report would require the modelling of maximum predicted groundwater levels using all available HWC and site-specific data (Boreholes 1-12, see **Figure 6**).

### *5.1.3 Changes in Evapotranspiration*

The proposed removal of sand dunes would leave the new surface of the landform closer to the water table. Theoretically, this could increase potential for evaporation from the surface through capillary rise and evapotranspiration (ie the movement of water from the ground to the atmosphere by the action of plant respiration).

However, **Figure 11** shows negligible change to modelled groundwater head equipotentials as a result of sand extraction activities, indicating that quarrying and the resultant final landform would not materially change groundwater levels. The depth from which evapotranspiration occurs is called the extinction depth. This depth is controlled by the depth of the root system and groundwater capillary rise. For the proposed sand extraction area, the modelled extinction depth is approximately 2.5 m.

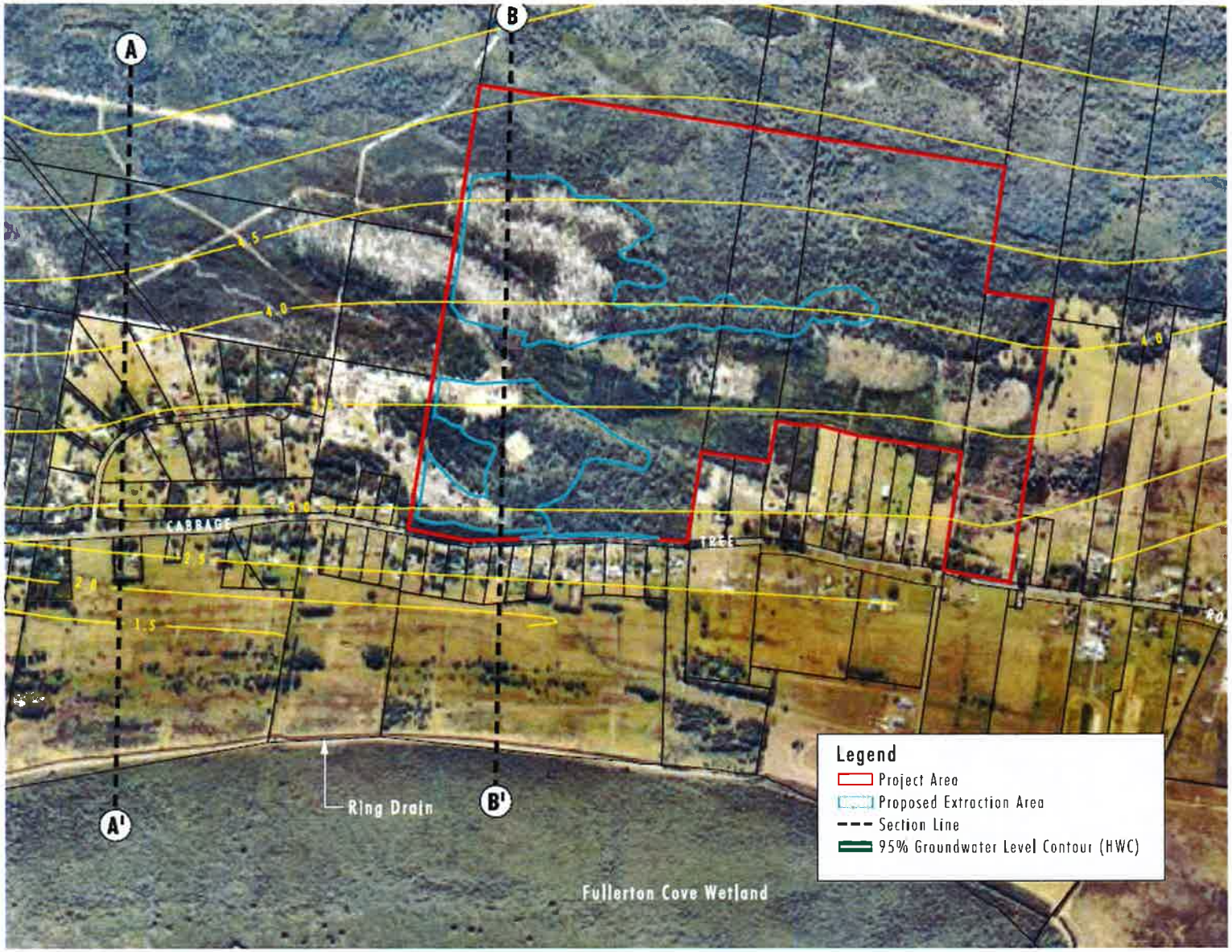



***Figure 10*** *- Groundwater levels*


***Figure 11** – Groundwater levels – effect of evapotranspiration*

As can be seen on **Figure 9**, the land surface is greater than 2.5 m above the groundwater table for most portions of the proposed quarry. In these areas, evapotranspiration is supported by soil moisture, rather than groundwater. Consequently, the RTS considers that evapotranspiration currently does not impact on groundwater levels. Instead, groundwater levels drop gradually during dry periods, reflecting the slow rate of horizontal flow towards Fullerton Cove.

However, the entire surface of the proposed final landform would be within the extinction depth for evapotranspiration. As a result, once deep-rooted vegetation begins to establish on the final landform, evapotranspiration would slightly reduce existing groundwater levels, with this negligible reduction being reflected on **Figure 11**.

As a further sensitivity analysis, the modelled extinction depth was reduced to an average of only one metre (ie minimum likely height of capillary rise in the fine sand). This was done to conservatively represent non-vegetated (ie bare) areas. As shown on **Figure 11**, this reduction produces almost no change to predicted maximum groundwater levels. Predicted final levels are very close to modelled existing levels. Again, this reflects the dominance of horizontal flow over vertical infiltration in determining overall groundwater levels.

In summary, the RTS's modelling demonstrates that the proposed quarrying operations would not result in rises in groundwater levels or adversely impact flooding or waterlogging in the low-lying areas adjoining the quarry. The Department accepts this conclusion.

### 5.1.4 Flooding

The Williamtown Salt Ash Flood Model[1] predicts that the 1% Annual Exceedance Probability (AEP) flood level near the site is 1.96 m AHD. At this height, sections of Cabbage Tree Road and significant sections of the adjoining properties on the southern side of Cabbage Tree Road would be flooded. However, the proposed extraction area of the quarry is above the 1% AEP flood level.

The estimated Probable Maximum Flood (PMF) level adjacent to the site is approximately 4.6 m AHD. The southern part of the proposed extraction area could be flooded by a PMF as it has a finished level of approximately 4 m AHD. The northern part of the extraction area would be above the PMF level and would provide a safe flood refuge for people and stock, in the event of a PMF.

Cabbage Tree Road adjacent to the quarry site would be flooded to a depth of between one and two metres during a PMF event and would not be safe for traffic or pedestrians. However, the risk of flooding to the Cabbage Tree Road area is driven by flood waters associated with a major Hunter River flood backing up in the Fullerton Cove area, which would have much broader implications across the Investigation Area and the general locality. This overriding causation would not be altered by whether or not the quarry proceeds.

### 5.1.5 Other PFAS Contamination Pathways

The PFAS group of chemicals have versatile physical properties including dirt, grease and water resistance, heat and chemical resistance, low friction, thermal stability and durability. Consequently, various PFAS chemicals have many speciality applications and have been used in a range of domestic and commercial products in Australia since the 1950s. PFAS chemicals have been commonly used in:

- clothing and textile products – including stain or water repellent for carpet, fabric/upholstery, apparel, leather and metal/glass (eg Scotchguard®);
- food products – including oil and water repellent surfaces for food packaging and containers (eg fast food wrappers, pizza boxes and popcorn bags);
- metal plating – used during manufacturing of non-stick kitchenware (eg Teflon®);
- detergents and insecticide solutions – including floor polish/wax and insect repellents (eg ant baits);
- hydraulic fluids – often used in aviation;
- photographic processes – including photo-imaging and anti-reflective coatings; and
- certain medical devices.

PFAS do not break down easily in the environment and are not metabolised or broken down in the body. Studies suggest that the half-life of PFAS in the human body can range from two to nine years. Additionally, PFAS can bioaccumulate and can travel long distances in water and air currents.[2]

A study on PFAS exposure undertaken by the University of Toronto (2011)[3] concluded that human exposure to PFAS involves a combination of direct and indirect sources. However, there is no evidence that points to one single dominant source of exposure over another. When considering all exposure sources as a whole, this study concluded that indirect exposure (including the use of the relatively common domestic and commercial products listed above) is likely to be a significant contributor to human PFAS exposure and bioaccumulation.

Whilst the PFAS contamination from the RAAF Base is clearly a significant source of exposure for people in the Williamtown community (particularly for those who have had direct contact with surface water or groundwater and/or ingested local water or produce grown using this water), the Department must conclude that it is likely that there have been other contributing sources of PFAS exposure for this community. If members of the Williamtown community have avoided exposure to contaminated groundwater and surface water and local produce subject to exposure, and still have elevated levels of PFAS within their bodies, then it is difficult to identify what might be the dominant exposure pathway due to the prevalence of PFAS chemicals in this wide variety of domestic and commercial products.

### 5.1.6 Conclusions on the Effect of Sand Extraction on PFAS Interactions

The Department has considered whether the physical removal of most of the material from the two vegetated sand dunes on the site would (or could) cause changes to interactions between potentially contaminated groundwater and surface waters. The Department concludes that:

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[1] WBM Oceanics Australia (2008) Williamtown Salt Ash Flood Study, prepared for Port Stephens Council

[2] Department of Health Australian Health Protection Principal Committee (2016) Per-and poly-fluroalkyl substances (PFAS) Fact Sheet

[3] D'eon & Mabury (2011) Is Indirect Exposure a Significant Contributor to the Burden of Perfluorinated Acids Observed in Humans? *Environmental Science and Technology*, 45, 7974-7984, American Chemical Society

- removing the sand dunes would not cause the water table to rise through faster rainfall infiltration, as horizontal flow rates govern the rate of groundwater transfer from the site to surrounding areas. The horizontal flow rate would be unaffected by the proposed quarry;
- changes in vegetation cover would not practically change evapotranspiration rates and therefore not affect groundwater levels on the site;
- the proposed quarry would not cause increased runoff from the site and would not affect flood levels in the area; and
- as the proposed quarry would not affect groundwater or flood levels, it would not alter or enhance the risk of PFAS contaminated water being transmitted to nearby properties.

On this basis, the Department can see no scientific or technical reason to vary the standard conditions of consent applied over recent years to a number of sand quarries in the Williamtown - Fullerton Cove - Salt Ash area (ie extraction not below 0.7 m above predicted maximum groundwater level and rehabilitation to 1.0 m above predicted maximum groundwater level) remain appropriate in the present case, notwithstanding its location on the fringe of the Broader Management Zone. The Department's view is strengthened by the submission from HWC, which sought a buffer of 0.7 m between extraction operations and the maximum predicted groundwater level (as well as other key operational measures) to protect groundwater resources (see **Section 5.1.9** below).

### *5.1.7 Radiation Risk*

Monazite, a heavy mineral which displays low-level natural radioactivity, is an unwanted by-product of previous mineral sands processing on the site. Monazite concentrates left over from heavy mineral sands processing were buried in trenches on the site and then covered with about one metre of capping material. Both DRG and the EPA recommended that the location of this material be properly determined and appropriate management strategies should be considered by WSS. On this basis, the Department required WSS to "*engage an independent expert to…undertake a radiometric survey*" of the proposed sand extraction areas as part of its RTS.

WSS commissioned a radiometric survey of the site in May 2016, which is reported in the RTS's Appendix 9. The on-ground survey was unable to follow a strict grid pattern due to difficulties for the surveyor, laden with recording equipment, in pushing through areas of dense vegetation and traversing the site along straight lines as first intended.

In spite of this limitation, the report was able to conclude that "*there are no radioactive concentrations or activities that are of any concern for the proposed use of the land/sand. All but one location are below the level of 0.7 µSv/hr set by the NSW Guideline for residential use.*" This "one location" registered a level of 0.72 µSv/hr, and was located in a gully that appears to correspond to the location of the monazite trenches. This is outside the proposed sand extraction areas. Therefore, none of the proposed sand extraction activities would disturb these low-level radioactive sites.

The survey report also strongly recommended that additional radiometric surveys be conducted prior to commencing sand extraction, following the removal of vegetation.

To ensure that this occurs, the Department has recommended a condition of consent that requires additional radiometric surveys to be conducted following vegetation removal and prior to sand extraction. Regardless, the primary safety measure is that the quarry would not be permitted to extract any sand from the known locations of the monazite trenches.

### *5.1.8 Silicosis Concerns*

The sand resource at the site is primarily composed of the mineral silica (also known as quartz). Long-term inhalation of silica dust by humans can lead to the formation of scar tissue in the lungs. The development of such scar tissue is known as silicosis, which is a serious lung disease. Several community submissions raised concerns that airborne respirable dust from the proposed quarry could be a cause of silicosis for residents.

In its RTS, WSS cited studies by the World Health Organisation, the Western Australian Department of Health and the Australian Senate, which indicate that the risk of silicosis outside of a work environment is remote, and that prolonged exposure at levels above 200 $\mu g/m^3$ is needed for risks to occur. Safe Work Australia's national exposure standard for respirable crystalline silica is 100 $\mu g/m^3$ as a time weighted average (ie the average over an eight-hour work day, five days per week).

There is no NSW-based impact silica impact assessment criterion. Consequently, the RTS compares predicted dust levels from the proposed quarry against standards from other regulators such as Safe Work Australia and the Victorian EPA. In all cases, the criteria are predicted to be easily met.

The Air Quality Impact Assessment for the project predicts that exposure levels for all forms of dust (ie Total Suspended Particles or TSP) would be less than 50 $\mu g/m^3$ on an annual average basis. Because much of the TSP would be comprised of fine organic particles, exhaust emissions and bushfire and other smoke, the actual levels of crystalline silica within the total dust would be a much smaller fraction.

The Department agrees with the conclusion in the RTS that the levels of respirable silica exposure at surrounding dwellings are likely to be well-below any level of concern.

### *5.1.9 Protection of Drinking Water Supplies*

Excluding a small portion of the site close to Cabbage Tree Road, most of the site is located within the Tomago Sandbeds Special Area, which is managed under the *Hunter Water Regulation 2015* (see **Figure 12**). The aquifer within the Tomago Sandbeds is used as a drinking water supply for Newcastle and surrounding urban areas. HWC has the operational and legal responsibility to protect this water supply in order to maintain the health and well-being of the local population. Sandbed water supplies are used throughout the year, but become especially important during times of drought when dam levels are depleted.

In its initial submission, HWC recommended that:

- no sand be extracted from below 0.7 m above the predicted maximum groundwater level;
- elevation of the extraction area is regularly surveyed to ensure this outcome;
- the final rehabilitated landform be at least one metre above predicted maximum groundwater level;
- all machinery used in extractive operations be removed from the Special Area at the end of each workday (to prevent the risk of unattended spills of fuels and oils); and
- appropriate management and monitoring plans be prepared and implemented.

Following consultation with HWC, WSS committed to replacing most diesel-fuelled equipment with electrically-powered equipment, and to locating fuel and chemical storage facilities, refuelling facilities and designated vehicle and mobile plant parking areas outside of the Special Area. **Figure 13** shows a fenced compound surrounding the workshop, weighbridge and office. An exception has been agreed with HWC to allow one dozer and one excavator to remain with the Special Area during vegetation clearing operations, on the proviso that all refuelling takes place in accordance with measures to prevent any hydrocarbon spillages from reaching the sand surface.

The objective of these measures is to prevent the contamination of drinking water supplies by inadvertent spillage of fuels or chemicals. Both HWC and the Department are satisfied that this objective can be met and risks to drinking water supplies would be negligible, or less.

### *5.1.10 Quarry Entry Intersection Safety*

The Department considers that the major existing traffic safety risk on Cabbage Tree Road is for drivers, travelling eastwards, effecting a right turn (legally) into residential driveways. These turns are across double unbroken lines in a 90 kph speed zone, subject to high traffic flows containing significant numbers of heavy vehicles. Anecdotal reports suggest that near misses occur when through traffic, travelling at speed, either seeks to come to a complete stop behind a stationary vehicle waiting to make a right-turn, or attempt to pass such a vehicle to the left by driving off the verge of the road.

The design of the quarry entry presented in the EIS involved a traffic island within the road verge to ensure trucks would undertake a left-in, left-out, turn to and from the quarry. The Department considered this to be an unacceptable safety risk for the property immediately opposite the proposed quarry entry as well as for adjacent properties to the west, as it would be a barrier to through traffic passing to the left of vehicles waiting to turn into the private driveways.

In its RTS, WSS presented a revised intersection design with a sufficiently-wide road verge to allow through traffic to safely pass to the left of any stationary vehicles waiting to make a right-turn into properties on the southern side of Cabbage Tree Road. The design now allows for a safe left passing manoeuvre for through traffic adjacent to the residence opposite the proposed quarry entry. In addition, another seven properties would be able to benefit from the proposed deceleration and acceleration lanes. These lanes would not be in use for 98% of the time, and would therefore provide a wide sealed surface for vehicles passing to the left.

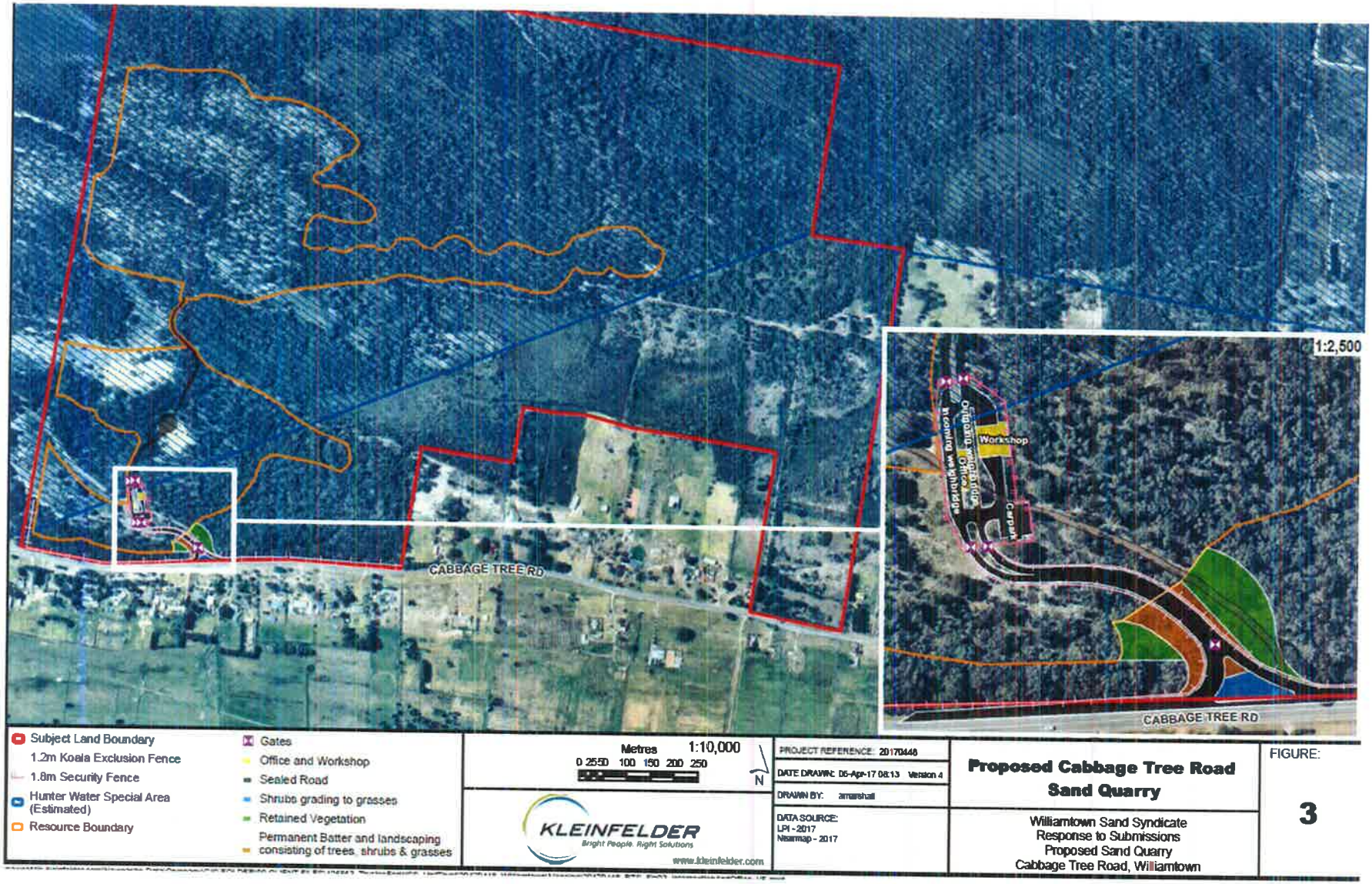


***Figure 12** – Protection of HWC Special Areas*

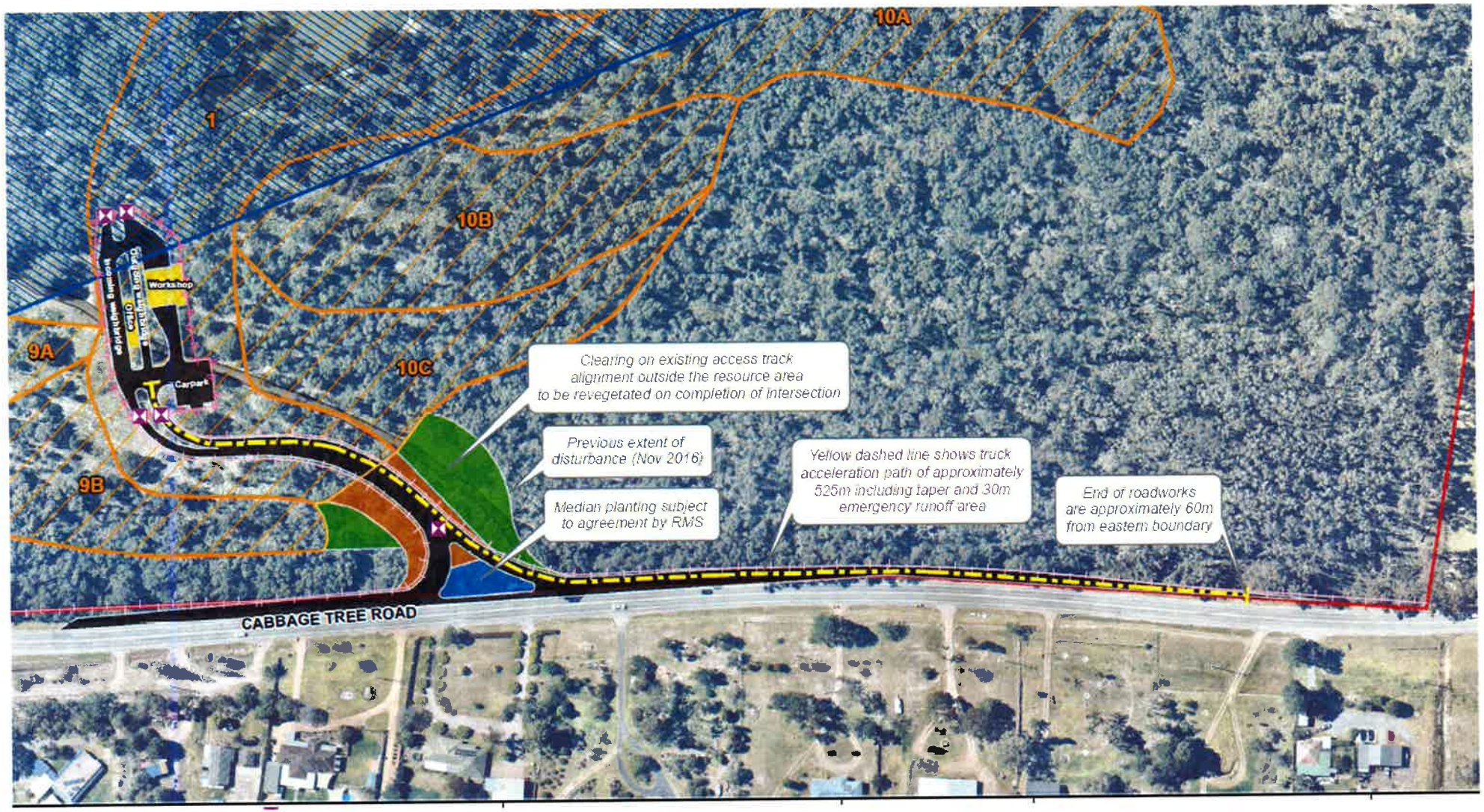


***Figure 13*** *– Revised quarry entry intersection (April 2017)*

The intersection design was further refined in April 2017 to ensure the acceleration lane did not extend in front of privately-owned land, and thereby interfere with access to private properties or roadside parking in front of these properties (see **Figure 13**). The exit from the quarry site was altered so that laden trucks would be able to reach a speed of 60 kph at the entry to the acceleration lane, (rather than 40 kph as initially proposed) and so allow the acceleration lane to be shortened.

The design of the quarry entry presented in the EIS involved a traffic island within the road verge to ensure trucks would undertake a left-in, left-out, turn to and from the quarry. The Department considered this to be an unacceptable safety risk for the property immediately opposite the proposed quarry entry as well as for adjacent properties to the west, as it would be a barrier to through traffic passing to the left of vehicles waiting to turn into the private driveways.

In its RTS, WSS presented a revised intersection design with a sufficiently-wide road verge to allow through traffic to safely pass to the left of any stationary vehicles waiting to make a right-turn into properties on the southern side of Cabbage Tree Road. The design now allows for a safe left passing manoeuvre for through traffic adjacent to the residence opposite the proposed quarry entry. In addition, another seven properties would be able to benefit from the proposed deceleration and acceleration lanes. These lanes would not be in use for 98% of the time, and would therefore provide a wide sealed surface for vehicles passing to the left.

The intersection design was further refined in April 2017 to ensure the acceleration lane did not extend in front of privately-owned land, and thereby interfere with access to private properties or roadside parking in front of these properties (see **Figure 13**). The exit from the quarry site was altered so that laden trucks would be able to reach a speed of 60 kph at the entry to the acceleration lane, (rather than 40 kph as initially proposed) and so allow the acceleration lane to be shortened.

The length of the acceleration lane would allow laden trucks to reach a safe merging speed with the through traffic, which would be travelling at up to 90 kph. This final design was produced in consultation with RMS. Although the final design details would need to be confirmed as part of RMS's Works Authorisation Deed (WAD), RMS has expressed its satisfaction with the design. Matters such as provision of adequate roadside drainage are also considered by the RMS as part of this WAD process.

The Department recognises that attempting to make a right-hand turn from any part of Cabbage Tree Road into private property carries an element of risk if following drivers travelling at up to 90 kph are inattentive. However, the current intersection design appears to ensure that, at least for the eight properties opposite the proposed quarry intersection, these risks would be reduced, rather than increased, should the quarry be approved.

### *5.1.11 Health Issues Conclusion*

No agency (including the EPA, NSW Health or the WCEP) has put forward any evidence that the proposed quarrying would cause a risk of exacerbating the PFAS contamination already present in the Williamtown area. The Department must acknowledge that many community submissions express fears and concerns that quarrying would (or at least could) cause or increase such risks. However, it must also note that no community submission contains any substantive or reliable evidence supporting these concerns, particularly in respect of the project as amended in WSS's RTS.

On the basis of all available evidence, the Department must conclude that the proposed quarry can be operated in a manner that does not cause any more than negligible increases in risk to the community's health and safety. In regard to most health and safety risks considered, there would be no increase in risk. In the instance of traffic safety, for residents turning right into properties located opposite the quarry entry, there would be a reduction of risk due to the presence of the adjoining deceleration and acceleration lane.

Nonetheless, the Department recommends a precautionary approach, in particular through the application of both primary and secondary systems of management and regulatory control. This might be considered to be a 'belt and braces' approach. If any proposed control or mitigation measure does not perform as expected, then monitoring must ensure that this is detected quickly. The Department has recommended additional layers of protection to be in place to prevent impacts from occurring or exceeding negligible levels. This includes stringent surface and groundwater monitoring requirements, a program to regularly review and report on the effectiveness of management and monitoring systems, and an annual review of PFAS exposure pathways to demonstrate quarrying operations are not increasing the risk of PFAS exposure for local residents and the environment.

## 5.2. Air Quality

### *5.2.1 Introduction*

The proposed development has the potential to generate dust emissions through:

- the removal of sand from extraction areas;
- use of front-end loaders to load mobile conveyors, hoppers and trucks;
- sand processing (screening and air separation);
- truck movements and conveyor transfers; and
- wind-blown dust from exposed areas and sand stockpiles.

The Air Quality Impact Assessment (AQIA) assessed the project's potential impacts on air quality through its emission of total suspended particulates (TSP), $PM_{10}$, $PM_{2.5}$, respirable crystalline silica (see **Section 5.1.8**) and deposited dust. The dominant winds are from the northwest and west in autumn and winter, and from the northeast in summer and spring. Rural-residential properties are close to the site's eastern, western and southern boundaries and generally downwind of the dominant winds. The AQIA modelled air quality impacts at the 79 sensitive receptor locations shown in **Figure 14**.

The Department raised concern that the AQIA predictions were not indicative of the potential air quality impacts as modelling did not include the proposed mitigation measures. Many public submitters also raised concern regarding the potential human health impacts associated with dust exposure. In response to these concerns, and due to the amended project scope, WSS provided a revised AQIA as part of its RTS in November 2016.

The EPA reviewed the RTS's AQIA and were critical of its lack of justification for many assumptions inputted to the air quality model and the data sets (such as those relating to meteorology) used. That is not to say that the use of these assumptions and data were incorrect, but rather that their use had not been sufficiently justified. The EPA also noted that the peak dust emissions, as modelled, were lower (even though almost identical) than average emissions. This outcome is, of course, not possible.

The EPA also advocated use of staged shutdowns of operations at the quarry, if air emissions increase towards the relevant criteria. Such an approach would need to be supported by real-time dust monitoring to allow effective mitigation actions. The EPA also recommended that close attention be given to the proposed quarrying operations in the south of the site, closest to Cabbage Tree Road and its residences.

In response, WSS engaged a specialist air quality consultant, not previously involved in the assessment, to address the EPA's criticisms and to peer-review the AQIA.

The resulting final AQIA, on which the Department has based its assessment, was supplied in March 2017 (the 2017 AQIA). The main changes in both revisions of the AQIA were to consider an amended configuration for the quarry. Importantly, this included reductions in the area of extraction (by about 23%), an increase in buffer distances from extraction areas to houses to the east of the site and a reduction by 13% in the maximum annual sand extraction rate.

### *5.2.2 Predicted Impacts*

The 2017 AQIA addressed the data gaps identified by the EPA and provided an expanded discussion of the assumptions underlying the AQIA's modelling. Improvements were made in selection of inputs to the air quality model, such as the most appropriate data sets to characterise background air quality. A feature of the final AQIA is its consideration of both 'typical' and 'maximum' daily production rates, at roughly double the 'typical' rate.

Overall, the operation of the proposed quarry, without the implementation of any targeted mitigation measures, is predicted to meet all relevant air quality criteria except the maximum 24-hour average $PM_{10}$ criterion of 50 $\mu g/m^3$. The worst-case outcomes of this modelling are presented in **Table 2.** These values do not incorporate any use of staged shutdowns, or reductions in working hours.

Under all operational circumstances, including operating at a daily extraction rate of 3,000 tonnes, no exceedances are predicted for the criteria for annual average $PM_{2.5}$, maximum 24-hour average $PM_{2.5}$, annual average $PM_{10}$, annual average TSP, and monthly deposited dust.

However, maximum 24-hour average $PM_{10}$ criterion of 50 $\mu g/m^3$ is predicted to be exceeded during times of high background dust. That is, if the maximum predicted project-alone emissions of 37.7 $\mu g/m^3$ are added to high ambient background levels, then total $PM_{10}$ levels may exceed 50 $\mu g/m^3$ and may in fact reach 67 $\mu g/m^3$.

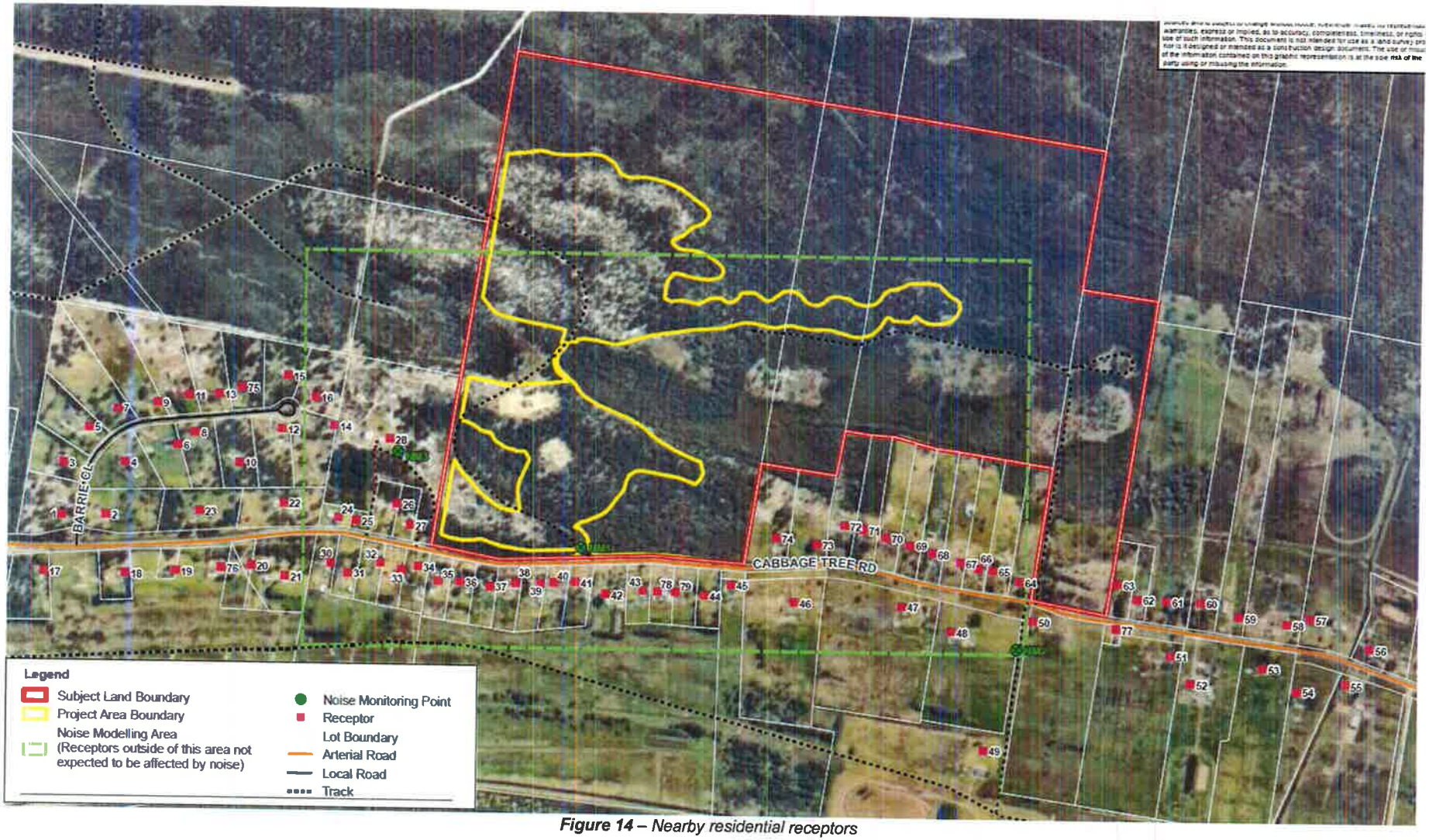


***Figure 14** – Nearby residential receptors*

**Table 2:** *Air quality predictions at 3000 tonnes per day ('maximum' daily production without mitigation measures)*

| Pollutant | Averaging Period | Criterion/Standard | Maximum Project Alone Increment | Maximum Cumulative Prediction |
|---|---|---|---|---|
| $PM_{2.5}$ | Annual mean | 8 µg/m³ | 0.3 | 7.8 |
| | 24-hour max | 25 µg/m³ | 6.5 (4.0)[1] | 20.2 (20.8)[1] |
| $PM_{10}$ | Annual mean | 25 µg/m³ (formerly 30 µg/m³) | 1.1 | 21 |
| | 24-hour max | 50 µg/m³ | 37.7 (20.9)[1] | **67** (49)[1] |
| TSP | Annual mean | 90 µg/m³ | 1.8 | 50 |
| Deposited Dust | Annual mean | Max increase of 2 g/m²/month | 0.3 | NA |
| | | Max total of 4 g/m²/month | NA | 2.3 |

1. Values in brackets are based on daily production to meet 530,000 tonnes a year ie 'typical' production days.
2. On 20 January 2017, the EPA revised some applicable air quality criteria, in accordance with recently agreed national standards. All current standards relevant to this assessment are provided in **Table 2.**

There are nine identified residences (Receptors 35-38, 40-42, 44 and 79) located immediately opposite the site along Cabbage Tree Road. This total $PM_{10}$ criterion is generally predicted to be exceeded on one day in a year for these receptors, except for Receptor 41 (2 days) and Receptor 42 (3 days).

These residents are most likely to be affected when quarry operations are undertaken in the southwestern corner of the southern sand dune. Following consultation with some of these residents about how to reduce visual impacts, WSS modified its extraction plan to exclude a small parcel of vegetation immediately to the west of the entry (see green cross-hatched area in **Figure 2**).

The retention of this vegetation would reduce dust impacts in two ways. Firstly, by pushing quarrying operations further away from some residents and secondly by retaining vegetation that would catch some of the dust from sand quarrying. WSS also committed to moving the southern extraction area away from Cabbage Tree Road to maintain a batter at 9.0 m AHD, 5.0 m above the extraction area. The Department considers that these reductions in impacts would not be large, but they would be reductions nevertheless.

The 2017 AQIA investigated the circumstances of the predicted exceedances and found that they were more likely to occur either early in the morning or late in the afternoon, when atmospheric mixing heights are lower and the consequent dispersion of dust emissions is limited. The other factor leading to predicted exceedances is, not surprisingly, when the prevailing wind direction is towards the receptor.

WSS responded by reducing its daily sand extraction period by one hour, with a revised finishing time of 5.00 pm. It has also committed to the introduction of a Trigger Action Response Plan (TARP) to reduce emissions from the site when the wind direction is towards residences on the southern side of Cabbage Tree Road. This TARP consists of:

- No topsoil stripping or dozer push to occur when:
  a) wind is directed toward surrounding residences; AND
  b) rolling $PM_{10}$ 24-hour average exceeds 35 µg/m³; OR
  c) rolling $PM_{10}$ 1-hour average exceeds 50 µg/m³.
- If levels continue to increase after two hours, suspend sand extraction and processing (loading of trucks would continue) when:
  a) wind is directed toward surrounding residences; AND
  b) rolling $PM_{10}$ 24 hour average exceeds 42.5 µg/m³; OR
  c) rolling $PM_{10}$ 1-hour average exceeds 50 µg/m³.
- If levels continue to increase after two hours, suspend loading of trucks as well (ie no machinery operating) when:
  a) wind is directed toward surrounding residences; AND
  b) rolling $PM_{10}$ 24 hour average exceeds 45 µg/m³;OR
  c) rolling $PM_{10}$ 1-hour average exceeds 50 µg/m³.

The use of a TARP and the trigger levels proposed by WSS is in keeping with those proposed by the EPA in its recommended conditions of consent. The Department endorses this approach and believes that, coupled with real-time air quality monitoring to identify when trigger levels are reached, they are robust measures capable of achieving compliance with all relevant air quality criteria at all times.

With the implementation of this TARP, use of real-time air quality monitoring and an end to sand extraction operations at 5.00 pm instead of 6.00 pm, the development is expected to meet all relevant criteria, including the maximum 24-hour average $PM_{10}$ criterion. This applies even for days when 3,000 tonnes of sand would be extracted, which is roughly twice the average daily extraction rate needed to produce 530,000 tonnes a year

The Department has recommended a condition of consent requiring at least two real-time air monitors to be located at the site to ensure that WSS is aware of real-time trends in the site's air quality. This information, when combined with an approved Air Quality Management Plan, would provide specific air quality triggers, established in consultation with the EPA, requiring WSS to progressively shut down operations at the quarry, as set out in the TARP. The Department is confident that this approach to dust management would ensure that the quarry would not cause exceedances of any air quality criteria.

### *5.2.3 Conclusion*

To ensure that the proposed operations are undertaken in a way that would minimise impacts on air quality, the Department has recommended conditions that would require WSS to:

- comply with all relevant air quality criteria;
- implement all reasonable and feasible mitigation and management measures to minimise air quality impacts;
- install and operate an effective real-time air quality monitoring system;
- prepare and implement a comprehensive Air Quality Management Plan for its operations; and
- cease quarrying operations in accordance with its proposed TARP, which is to be finalised in consultation with the EPA.

Subject to such conditions, in the Department's view, the project's air quality impacts are acceptable.

## 5.3 Noise

### *5.3.1 Introduction*

The Department has based its consideration of the proposed quarry's noise impacts on the revised Noise Impact Assessment (NIA) included in the RTS. The same 79 residential receptors considered for the AQIA were assessed for noise impacts (see **Figure 14**). This figure also shows the location of two sites where background noise monitoring was undertaken for the project in 2015 (NM1) and 2016 (NM3). Background noise monitoring undertaken nearby in 2011 at a third site for a separate project was also applied (NM2).

The background noise data were used to establish the Project Specific Noise Levels (PSNLs), or noise impact assessment criteria, for the project in accordance with the EPA's *Industrial Noise Policy* (INP). A difficulty for the Department is that each set of background data potentially gives rise to differing PSNLs. To illustrate this, background noise monitoring at NM1 (located on Cabbage Tree Road at the entry gate to the site) indicates lower calculated PSNLs than either NM2 or NM3. NM3 is located off Barrie Close (a quiet cul-de-sac), west of the Proposed Extraction Area 3, and nearly 100 m from Cabbage Tree Road. NM2 is located around 330 m south-southeast of the Proposed Extraction Area 1 and about 50 m south of Cabbage Tree Road.

Nonetheless, the Department has no clear reason to doubt the data. The differences may, for example, represent different background noise levels at different times of the day or the year, rather than being due to other factors, such as the monitoring site's distance from Cabbage Tree Road. **Table 3** provides a comparison of the possible noise criteria for the project, based on the background noise monitoring. The Department recommends that the lowest PSNLs (those calculated based on monitoring at NM1) are applied. The lower PSNLs would favour the large number of receivers located on the southern side of Cabbage Tree Road opposite the quarry site.

***Table 3**: Possible PSNLs - (dB(A), $L_{eq,\ 15minute}$)*

| ***Monitoring Site*** *(Date of Survey)* | ***Day Criterion*** *7 a m to 6 pm* | ***Night Criterion*** *10 pm to 7 am* | ***Shoulder Criterion*** *5 am to 7 am* |
|---|---|---|---|
| NM1 (2015) | 43 | 35 | 38 |
| NM2 (2011) | 46 | 41 | 43 |
| NM3 (2016) | 46 | 37 | 41 |

### 5.3.2 Operational Noise

The NIA in the RTS modelled predicted noise emissions for six different operational scenarios under 'worst-case' locations for quarrying operations in terms of proximity to nearby residences. For all operational scenarios, the lowest Daytime noise criterion of 43 dB(A) would be met at all privately-owned residences. In all but one of the scenarios, the residence predicted to receive the highest noise impact is residence R28 (about 60 m from the western boundary of the quarry). R28 was predicted to receive 43 dB(A), which is the proposed criterion. Only when quarry operations are undertaken in the south-eastern portion of the southern dune (ie in proposed Extraction Area 2) would some residences south of Cabbage Tree Road be expected to receive higher noise levels than R28.

The Department advised WSS that it would be prudent for it to seek an agreement with the landowner of R28 in respect of the predicted noise levels. WSS obtained such an agreement. Accordingly, the proposed quarry operations are predicted to meet the Daytime noise criterion of 43 dB(A) at all privately-owned properties.

*Noise Impacts Generated by Vegetation Clearing*

Vegetation clearing operations are an infrequent, but noisy, component of the proposal. These would occur in stages in advance of sand extraction operations during the life of the quarry, with each campaign lasting up to five days. As clearing operations occur at ground surface level, there would be no shielding of noise emissions to adjacent residences by the quarry working face (as occurs in operational scenarios).

If a bulldozer were to be used, predicted impacts of up to 51 dB(A) would occur at the worst-affected residence. If an excavator were to be used, impacts would be reduced by 3-4 dB(A), with the worst-affected residence predicted to receive 47 dB(A). The most-affected residences would be those located directly opposite the quarry on Cabbage Tree Road (R34 – R43), located variously between 30 m and 60 m from ground disturbing activities. These would be affected by three vegetation clearing campaigns, that is, up to 15 days during the 8 to 15-year life of the quarry.

The Department considers that specific noise criteria should be applied during vegetation clearing campaigns. The noise level that the Department recommends is 47 dB(A), to be available for a maximum of five days each campaign, based on levels that can be attained after the implementation of reasonable and feasible noise mitigation measures (ie the use of an excavator in place of a bulldozer). WSS should be able to achieve these criteria by restricting operations to times when the wind is blowing from the northeast, east or southeast, and avoiding clearing operations during westerly winds.

WSS would be required to prepare and implement a Noise Management Plan prior to any ground disturbing activities, including vegetation clearing. The Department has also recommended a condition restricting the sound power levels of equipment used in vegetation clearing operations to 104 dB(A) and prohibiting the use of a bulldozer.

*Construction Noise*

Construction activities would include the construction of the upgraded intersection and site entry, internal haul roads, the works compound, offices, weighbridge and parking areas along with vegetation clearing for these areas (as against vegetation clearing for the purposes of sand extraction). These activities should be completed within 12 weeks. The noisiest construction activity would be the works on Cabbage Tree Road, which are predicted to take eight weeks to complete, and would typically have the same impact as any other road upgrade works being undertaken by Council or RMS.

The *Interim Construction Noise Guideline* makes provision for noise impacts from construction activities, requiring these to be conducted in a way that employs reasonable and feasible noise mitigation measures, but recognising that such activities are of relatively short duration. The road upgrades were assessed against a 'highly noise affected' construction noise criterion of 75 dB(A), with the highest predicted residential impact being 62 dB(A), which is well within this criterion. All other construction activities were predicted to meet the 'noise affected' criterion of 48 dB(A).

The Department recommends conditions that would require WSS to prepare and implement a Road Construction Management Plan for construction of the intersection of the quarry access road with Cabbage Tree Road. This Plan would have to be prepared in consultation with affected residents and consider noise, vibration, dust and property access impacts of the construction works. It would also have to set out ways to avoid, minimise or offset impacts or provide respite for affected residents from extended periods of construction activities. These might include scheduling clearing operations while

residents are away from their homes or offering respite such as movie tickets so that residents do not need to put up with the high noise levels for the entire day.

*Vibration*

All construction activities are predicted to comply with the relevant criteria for intermittent activities contained within the EPA's guideline *Assessing Vibration: A Technical Guideline*.

Compaction of roadbase material using vibrating rollers may be felt by some residents, but should be within the relevant criterion and not cause any damage to residences. To provide reassurance to residents, and to be sure that its predictions are achieved, WSS would, subject to landowner approval, engage an expert to undertake building dilapidation reports on all properties within 300 m of the proposed roadworks or quarrying operations. Copies of these reports would be provided to landowners.

*Road Noise*

The additional traffic generated by the project is predicted to increase road traffic noise by 0.1 dB(A). This negligible increase complies with the relative increase criterion set out in the *NSW Road Noise Policy* (RNP), which considers any increase of less than 2.0 dB(A) to be barely perceptible.

#### *5.3.3 Conclusion*

The Department is satisfied that the proposed quarry can be managed to meet all relevant noise and vibration criteria, other than for the very short campaign periods of vegetation clearing activities.

The Department has recommended conditions of consent to establish the noise criteria that apply to the project and that a Noise Management Plan must be prepared and implemented to ensure that noise predictions are met. In addition, WSS must provide building condition inspections, if agreed to by the landowner, for all residences within 300 m of either quarrying operations or road construction activities.

### 5.4 Traffic

76 submissions raised concerns over traffic and safety along Cabbage Tree Road, including in respect of the road's existing poor condition and potential increased traffic and safety hazards resulting from increased truck movements. These issues are considered below. The related issue of safety risks associated with residents making right turns into their driveways and the proposed design of the quarry entry intersection has been considered in **Section 5.1.10** above.

#### *5.4.1 Impact of More Trucks and Traffic on Cabbage Tree Road*

WSS has committed to operate the proposed quarry with a maximum of 6 laden truck dispatches (ie a total of 12 truck movements) per hour between 5 and 7 am, and 10 laden truck dispatches (ie a total of 20 truck movements) per hour between 7 am and 5 pm on weekdays. On Saturdays, up to 10 laden trucks per hour would be dispatched between 7 am and 4 pm. These rates are in line with recommendations made by RMS that no more than 6 laden trucks are dispatched each hour between 5 am and 7 am and no more than 10 trucks per hour for the remaining operational hours of the quarry.

Daily traffic flow on Cabbage Tree Road is around 8,900 vehicles per day (vpd), with heavy vehicles contributing about 5% of this total. Nelson Bay Road has more traffic at around 17,000 vpd, with heavy vehicles making up about 15% of this traffic flow. WSS has proposed a maximum of 63 laden truck dispatches per day (126 truck movements in total). Allowing for light vehicle use by workers and occasional deliveries and visitors, a reasonable maximum for the project overall would be 150 vpd. Considering the traffic assessment for the period of 7 am to 10 pm, when 7,560 vpd use Cabbage Tree Road, the quarry would add an extra 2% (at the most) to existing traffic volumes on this road.

The RTS provides a micro-simulation study of the impact of proposed quarry traffic on the existing road network. Level of Service A was predicted to be maintained for the Nelson Bay Road / Cabbage Tree Road roundabout, with average delays per vehicle increasing by just 1 or 2 seconds. Average traffic speeds on Cabbage Tree Road are predicted to decrease by approximately 2%.

The Department is satisfied that the traffic generated by the proposed quarry would not cause more than minor impacts to other road users and that the road network and intersections have sufficient capacity to accommodate the proposed additional road use.

#### *5.4.2 Amenity Issues at the Quarry Entry*

Local residents could potentially be affected by trucks:

- slowing to enter the quarry;
- using compression braking when slowing, creating high noise levels;

- queuing at the quarry entry prior to the site's gates being opened or potentially 'parking up' along other sections of Cabbage Tree Road; and
- generating noise from radios or idling engines whilst 'parked up'.

WSS has committed to a range of measures to reduce any such impacts for local residents. The Department considers the most important of these is the proposed use of pre-booked loading slots for trucks arriving between 5 am and 7 am. Should a truck arrive without a booking, the driver would need to wait until a slot became available, which would most likely be after 7am and would likely result in delays for the driver. The Department considers the enforcement of this system would quickly modify driver behaviour, as time spent waiting to load would quickly increase operating costs.

The Department has explored the issue of haulage truck driver behaviour at sand quarries in the assessment of a 2016 modification application at nearby Mackas Sand Quarry. The Department proposes that similar conditions to those imposed by the Commission on Mackas Sand should apply to this proposal. These include the use of a weighbridge control system and CCTV cameras to monitor and enforce truck dispatch rates.

At Mackas Sand, one of the most effective measures in ensuring that no more than the allowed number of laden trucks are dispatched in any given hour has been the installation of a weighbridge that does not operate once an allowed number of trucks has been dispatched. A system of red and green lights lets the driver know when to proceed to the weighbridge. All weights are recorded and held on computer file, which allows the company to accurately report on disputes and, if necessary, allows the Department's Compliance Branch to check dispatches against hourly, daily and annual load limits.

This system has been combined with CCTV cameras which record vehicles entering and leaving the Mackas Sand site. These cameras have been installed so they only record activities on the quarry site, and cannot record activities on other private or public lands. The CCTV recordings are retained for at least 30 days, which enables the company and regulatory agencies to check vehicle movements to and from the quarry in the event a complaint. These measures have proven to be very effective.

With the booked loading slots system in use, there should be little incentive for trucks to arrive early and risk queueing. WSS has also committed to instructing any early arrivals (by signage) to turn off engines while they wait for the quarry to open. The entry road has sufficient length to store three trucks between Cabbage Tree Road and the quarry's entry gates.

However, the Department holds residual concerns over the possibility of more than three trucks arriving prior to the opening of the site's gates. This could result in trucks parking up illegally on Cabbage Tree Road. To guard against this, the Department has recommended that the entry to the quarry be monitored by a security service for the first six months of the quarry's operations. Any vehicles arriving before 6 am without a booked loading slot would be informed that they will not be loaded until a loading slot becomes available and directed to move on unless parking on the entry road is available.

The design of the intersection of the quarry access road with Cabbage Tree Road, including its deceleration and acceleration lanes, is shown in **Figure 13**. In its March 2017 submission, the EPA clarified its position on hours of operation for the development, stating that it "*was concerned at the proposed transport and loading start time of 5.00 am on weekdays given the close proximity of a number of residences*". The EPA went on to recommend that all activities be restricted to 6.00 am to 5.00 pm Monday to Friday, and 6.00 am to 1.00 pm on Saturday. However, the EPA recognised that "*there may need to be more negotiation between the Department, the proponent and residents concerning hours of operation, should the Department consider approval appropriate*".

Up until January 2018, WSS indicated its strong opposition to the later start time of 6 am, claiming it would place an unacceptable financial imposition on the quarry and its ability to service its proposed markets. The Department recognises that the early morning is a time of heavy demand for supply of sand to major construction markets (particularly for concrete batching plants).

However, the Department's view is that the arrival and departure of trucks between 5 and 6 am is likely to be annoying to most residents living immediately opposite the deceleration and acceleration lanes. A similar situation was encountered at the Mackas Sand operation. A condition was included in its project approval that provided for a weekdays transportation start time of 6 am, with the potential to extend this to 5 am with the agreement of all private landowners fronting the local public roads used to gain access to the quarry. Mackas Sand was successful in gaining the needed agreement to commence transportation of sand at 5 am on weekdays.

The Department believes that a similar approach should be applied to this proposal. **Figures 13** and **14** indicate that there are eight residences located opposite the proposed deceleration and acceleration lanes. The Department considers that these residences would be those most-affected by the noise of trucks either slowing down or accelerating. By the time laden trucks reach the end of the acceleration lane they should be travelling at similar speeds to the through traffic. This lane ends 60 m before the first private property on the northern side of Cabbage Tree Road and the Department does not recommend including any further residences in this condition.

In February 2018, WSS indicated that it was accepting of the draft conditions of consent proposed by the Department (see **Section 6**). These include a condition which provides that truck transport of sand from the site would only be permitted to commence at 6 am, **unless** all landowners immediately opposite the acceleration and deceleration lanes agree to an earlier start time of 5 am.

In terms of transport and operating hours for Saturdays, the Department accepts that WSS's proposed hours of 7 am to 4 pm are reasonable. The company's proposal of no operations or transport on public holidays or Sundays is also reasonable.

WSS has also committed to preparing and implementing a Drivers' Code of Conduct that sets out expected behaviours, internal speed limits, reduction in impacts for local fauna, consideration of local residents and road users.

#### *5.4.3 Condition of Cabbage Tree Road*

The Department considers the condition of Cabbage Tree Road to be a matter for the relevant road authority, being RMS for the carriageway and Council for the road verges. The design of roadside drainage for the proposed quarry entry and deceleration and acceleration lanes would be a component of RMS's WAD for the intersection and associated works.

#### *5.4.4 Conclusion*

The Department supports the measures proposed by WSS to manage the arrival and dispatch of trucks at its proposed quarry. The Department is satisfied that the proposed arrival and dispatch of trucks from the quarry under a booking system for loading slots, is an improvement to current best practice at quarries in NSW. The Department also considers that the proposed intersection of the quarry entry and Cabbage Tree Road has been well-designed and should operate safely for other road users and nearby residents. The data presented in the EIS demonstrates that additional traffic from the quarry would represent about a 2% increase on existing traffic volumes, which would also reduce traffic speeds and increase queuing delays by about 2%. These minor impacts are considered to be acceptable.

### 5.5 Biodiversity

#### *5.5.1 Threatened Species Associated with the Site*

Ecological issues were raised more than any other issue, including 85 submissions about Koalas and 61 concerning more general ecological issues. It is evident that Koalas are considered by most of the local community to be an iconic species of the Port Stephens district, which is one of the most important strongholds of the species in coastal areas of NSW. This concern is reflected in Council's CKPM which incorporates all the requirements of *SEPP 44 – Koala Habitat Protection*.

WSN is concerned about impacts to threatened species including the Koala, Earp's Gum and the Wallum Froglet. WSN considered that the impact assessments in the EIS on threatened species were inadequate, including the quality of survey work undertaken for Koala habitat. Many submitters also noted the absence of a biodiversity offset strategy.

To address these concerns, WSS undertook additional surveys of the site for the RTS, including remapping the vegetation communities. Targeted searches for threatened species were also undertaken. Deficiencies in information or survey methodology that were identified in OEH or community submissions were addressed. A survey of hollow-bearing trees was also provided.

Three threatened flora species listed as Vulnerable under the TSC Act and the EPBC Act were identified on the site:

- Camfield's Stringybark (*Eucalyptus camfieldii)*;
- Earp's Gum or Drooping Red Gum *(Eucalyptus parramattensis* subsp. *decadens)*; and
- Small-flowered Grevillia *(Grevillia parviflora* subsp. *parviflora*).

Eight threatened fauna species listed under the TSC Act and/or EPBC Act were initially identified:

- Eastern Bentwing-bat;
- Eastern Freetail-bat;

- Eastern Osprey;
- Grey-headed Flying-fox;
- Koala;
- Little Bentwing-bat;
- Varied Sittella; and
- Wallum Froglet.

On 4 November 2016, a newly-described frog species, Mahony's Toadlet (*Uperoleia mahonyi)* was described in the literature. As sightings of this species occurred close to the site, the Department requested that WSS undertake specific surveys for this new frog species. In December 2016, this species was located on the site, outside of proposed sand extraction areas. The species received an emergency listing as an endangered species on 10 March 2017.

### *5.5.2 Impacts to Individual Species*

The proposal would directly impact three threatened flora species and habitat for nine threatened fauna species on the site. The updated impact assessment concluded that the proposal is unlikely to significantly impact any of these threatened species.

*Camfield's Stringybark:* The RTS's revised Ecological Assessment identified a significantly larger number of individuals within the site than had been identified in the EIS. The proposal would impact approximately 10% of the identified local population. Nonetheless, the Department considers that the proposal is unlikely to significantly impact the local population as the loss of individuals relates to plantings established as part of rehabilitation efforts for lands mined for minerals sands in the 1990s. Additionally, a large number of individuals (1,641) would be retained on the site and this species would also be a component of WSS's rehabilitation of the site at the completion of sand extraction.

*Earp's Gum:* The RTS's revised Ecological Assessment estimated that the proposal would impact on 0.57% of the local population of this species. Due to the small scale of this impact, the proposal is unlikely to significantly impact the species.

*Small-flowered Grevillia:* This species would not be impacted by the proposal and would be retained and protected within the proposed on-site offset area.

*Koala:* Koalas have often been recorded on the site, most recently during a 2011 survey for this project. Submissions in response to the EIS raised concerns about disturbance to Koala populations, destruction of preferred Koala habitat and the inadequacy of WSS's proposed Koala Management Plan.

Council has undertaken a generational mapping exercise of the location of Koala within its LGA. Under this exercise, Koalas are considered to be persistent in an area if they continue to be recorded over a period of three generations, or 18 years. Koalas were mapped as being persistent on the site up until 2011. It is thought that the fierce bushfire of 2013, and again in 2018, has made the site temporarily unsuitable for Koalas. While the site does not seem to currently be a home for Koalas, it could provide a future home.

A total of 101.94 ha of preferred Koala habitat was identified within the site, of which 19.19 ha occurs within the disturbance area, and 82.75 ha would be retained within the offset area and residual land. A total area of 21.19 ha of supplementary Koala habitat occurs within the disturbance area and 22.02 ha would be retained within the offset area (see **Figure 15**).

The RTS assessed the proposal as removing approximately 1.01% of the preferred Koala habitat and 0.78% of supplementary Koala habitat within the Tomago Sandbeds Koala Management Unit (KMU). The proposal has the potential to displace individual Koalas whose home-range occurs within the extraction area. However, this is not considered a significant impact because habitat availability is not a limiting factor for the local Koala population. It is likely that there are areas of suitable habitat that are either un-occupied, or could support a higher density of Koalas, to which any affected individuals could self-relocate. Due to the relatively small area of habitat removal, the proposal is unlikely to significantly impact the local population.

Generationally persistent populations are known in the Heatherbrae/Tomago area and also to the north of the site. Until the site is re-populated, it provides an important link in the pathway/corridor for Koalas to move between these two known populations. This pathway/corridor is in the process of being strengthened and secured. The land to the northwest of the site is already secured as part of the Tilligerry SCA. HWC is in the process of converting the lands to the north and west of the site into biobank sites. WSS's proposal to convert 130 ha of the site into a biobank site would provide linkages

between other conservation lands and secure the Koala habitat corridor between the two existing Koala populations (see deep purple coloured areas on **Figure 15**).


***Figure 15** – Koala habitat*

The RTS assessed the proposal as removing approximately 1.01% of the preferred Koala habitat and 0.78% of supplementary Koala habitat within the Tomago Sandbeds Koala Management Unit (KMU). The proposal has the potential to displace individual Koalas whose home-range occurs within the extraction area. However, this is not considered to lead to a significant impact because habitat availability is not a limiting factor for the local Koala population. It is likely that there are areas of suitable habitat that are either un-occupied, or could support a higher density of Koalas, to which any affected individuals could self-relocate. Due to the relatively small area of habitat removal, the proposal is unlikely to significantly impact the local population.

Generationally persistent populations are known in the Heatherbrae/Tomago area and also to the north of the site. Until the site is re-populated, it provides an important link in the pathway/corridor for Koalas to move between these two known populations. This pathway/corridor is in the process of being strengthened and secured. The land to the northwest of the site is already secured as part of the Tilligerry SCA. HWC is in the process of converting the lands to the north and west of the site into biobank sites. WSS's proposal to convert 130 ha of the site into a biobank site would provide linkages between other conservation lands and secure the Koala habitat corridor between the two existing Koala populations (see deep purple coloured areas on **Figure 15**).

*Wallum Froglet:* The removal of habitat for this species (0.13 ha core (ie breeding habitat) and 0.57 ha of supplementary (ie foraging habitat)) is not considered to be large enough to significantly impact long-term local survival prospects for this species. Additionally, the proposal would not fragment or isolate any areas of potential habitat for the species.

*Mahony's Toadlet:* The Department understands that the key habitat requirement for this newly-identified species is low-lying areas where water is likely to collect in shallow pools with sandy bottoms. WSS undertook a 7-part test in April 2017 which concluded that the proposed quarry would not have significant impact on the species.

The proposed sand extraction areas would involve removal of sand dunes and avoid all low-lying areas on the site, with the exception of the haul road corridor between the northern and southern dunes. With recommended conditions of consent requiring sand extraction to be at least 0.7 m above the predicted maximum groundwater level, the Department believes that risk to this species would be reduced to negligible levels. OEH considered that this 7-part test *"adequately addresses the impacts and has made reasonable conclusions".*

*Other Threatened Species Identified on the Site:* The site represents suitable foraging habitat and nesting or roosting habitat for four bat species (Eastern Bentwing-bat, Eastern Freetail-bat, Grey-headed Flying-fox and Little Bentwing-bat) and two bird species (Eastern Osprey and Varied Sittella). The proposal would remove 40.4 ha of suitable habitat for these species, compared with removal of 48.1 ha, as originally proposed, a reduction of 16%. The remaining vegetated areas of the site are proposed to be conserved and managed as a biobank site. Due to the high availability of suitable habitat in the locality and the highly mobile nature of these avifauna, the proposal is unlikely to have a significant impact on any of these species.

### *5.5.3 Biodiversity Offset Strategy*

WSS's RTS provided a detailed Biodiversity Offset Strategy (BOS) which addressed the Department's requirement that the EIS contain '*a comprehensive offset strategy to ensure the development maintains or improves the terrestrial and aquatic biodiversity values of the region in the medium to long term*'. The BOS identified and assessed the proposed offset measures for the quarry, including their ability to compensate for loss of biodiversity values on the site through application and consideration of the *Biobanking Assessment* Methodology 2014 (BBAM).

The total site area is 176.12 ha, of which 42.25 ha would be impacted by the project. WSS proposes that the majority of the remaining land (131.12 ha with 130.14 ha of native vegetation) would be secured as a biobank site. There are small areas of exotic vegetation in the southeast corner (1.26 ha) and on the southwestern boundary (1.46 ha) of the site which are not part of the proposed biobank site.

The vegetation proposed to be cleared is almost exclusively one plant community type (PCT): *HU860: Smooth-barked Apple – Blackbutt – Old Man Banksia – woodland on coastal sands of the Central and Lower North Coast.* There are small areas (0.25 ha) of two other PCTs that would be cleared, but they fall below the minimum area for consideration in biobanking calculations.

Six different PCTs make up the proposed on-site biobanking site. These are:

- *HU851: Scribbly gum – Wallum Banksia – Prickly-leaved Paperbark on heathy coastal woodland on coastal lowlands*;
- *HU860: Smooth-barked Apple – Blackbutt – Old Man Banksia – woodland on coastal sands of the Central and Lower North Coast*;
- *HU865: Parramatta red gum – Fern-leaved banksia – Melaleuca sieberi swamp woodland of the Tomaree Peninsula*;
- *HU917: Wallum Banksia – Monotoca scoparia heath on coastal sands of the Central Coast and lower North Coast*;
- *HU938: Broad-leaved Paperbark – Swamp Oak – Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast;* and
- *HU948: Wallum Bottlebrush – Leptocarpus tenax – Baloskion pallens – Wallum sedge heath of the lower North Coast.*

The location of all PCTs within the biobank site is shown in **Figure 16**. The HU938 PCT is considered to satisfy the description of *Swamp sclerophyll forest on coastal floodplains of the NSW north Coast, Sydney Basin and South East Corner Bioregions Endangered Ecological Community* (EEC).

**Table 4** summarises the credits required for biodiversity impacts and those available on the on-site biobank site to fulfil, or partially fulfil these requirements.

The on-site biobank site can provide 54% of the ecosystem credits required to offset the proposed clearing of HU860 vegetation. WSS proposes to retire these ecosystem credits (1,189 ecosystem credits), as per Variation Criterion (f) under Tier 3 'Mitigated Net Loss Outcome' under OEH's 2011 Interim Policy for offsets. This variation criterion allows for conversion of ecosystem credits to a regional conservation priority as identified in a regional conservation plan or similar.

***Table 4**: Biobank credits required and available*

| **Credit Type** | **Credits Requirements** | **Credits available to be retired at the Biobank site (% of credit requirement met)** | |
|---|---|---|---|
| ***Ecosystem Credits*** | | | |
| HU860 Ecosystem Credits | 2,207 | HU860 | 273 |
| | | HU851 | 311 |
| | | HU917 | 80 |
| | | HU965 | 22 |

| | | | |
|---|---|---|---|
| | | HU938 | 388 |
| | | HU948 | 115 |
| | | Total | 1,189 (54% of credits required) |
| ***Species Credits*** | | | |
| Camfield's Stringybark | 17,479 | Camfield's Stringybark | 11,651 |
| | | Earp's Gum | 1,281 |
| | | Small-flowered Grevillia | 724 |
| | | Total | 13,656 (78% of credits required) |
| Earp's Gum | 3,220 | 3,220 (100% of credits required) | |
| Koala | 1,050 | 744 (71% of credits required) | |
| Eastern Osprey | 525 | 717 (137% of credits required) | |
| Wallum Froglet | 9 | 606 (6,733% of credits required)) | |

The proposed biobank site is of high conservation value due to:

- its location, as it occurs adjacent to Tilligerry SCA, proposed HWC biobank sites and mapped fauna habitat and corridors;
- quality of vegetation, as it supports moderate to good vegetation that is predominantly old-growth; and
- the presence of threatened species and ecological communities within the site.

WSS is committed to retiring between 80% - 85% of the ecosystem credits for the development, using the ecosystem credits generated at the on-site biobank site and additional credits available at a potential off-site biobank site located to the east of Williamtown Airport. OEH considers this approach to be acceptable for this site as the impact area contains predominantly rehabilitated or regenerating vegetation (54% of the impact area) and the high quality of vegetation within the on-site and potential off-site biobank sites (mainly old-growth forest). Additionally, both the on-site and potential off-site biobanks contain an EEC (Swamp Sclerophyll Forest) and multiple threatened species (based on historical records).

WSS has also proposed specific management actions proposed for the biobank sites to address each of the standard and relevant additional management actions listed under the BBAM to enable the retirement of ecosystem and species credits. Key management actions include weed control, vertebrate pest control, installation and maintenance of fencing and signage, preparation and implementation of a fire management plan, and erosion and sediment control.

The on-site biobank site fulfils the species credit requirements for impacts on Earp's Gum, Eastern Osprey and Wallum Froglet. The biobank site does not generate enough species credits for Camfield's Stringybark, with a shortfall of 5,828 species credits, and Koala, with a shortfall of 306 species credits.

The biobank fulfils 67% of the species credits required for Camfield's Stringybark at the development site. As such it is proposed to apply Variation Criterion (b) – Convert one type of species credit to another type of species credit with the same or more endangered conservation status, under Tier 3 'Mitigated Net Loss Outcome' in OEH's 2011 Interim Policy. There are residual species credits generated at the biobank site for Earp's Gum (1,281) and Small-flowered Grevillia (724). As such the total number of species credits available at the biobank to offset impacts on Camfield's Stringybark is 13,656 (78% of the required 17,479 credits, which is considered adequate). As the majority of Camfield's Stringybark on the development site is part of a planted population, it is highly unlikely that the species would have been present in this area prior to rehabilitation. Additionally, the species would be replanted within the rehabilitation area for the proposed quarry.

There are additional species credits generated at the biobank site for both the Eastern Osprey and Wallum Froglet. While these species credits may not be directly transferred to offset impacts against Camfield's Stringybark, WSS also proposes to retire these credits as part of the offset package for the proposal.

WSS is committed to retiring the remaining 306 Koala species credits at an off-site offset within the Tomago Sandbeds KMU. WSS is currently investigating potential freehold land to the east of Williamtown Airport to establish a biobank site. Based on a desktop assessment, the land contains preferred and supplementary Koala habitat and could potential fulfil the remaining Koala credit requirements. To ensure these credits are offset, the Department has recommended a condition of consent requiring these offsets to be obtained and retired within 18 months of the commencement of quarrying operations.

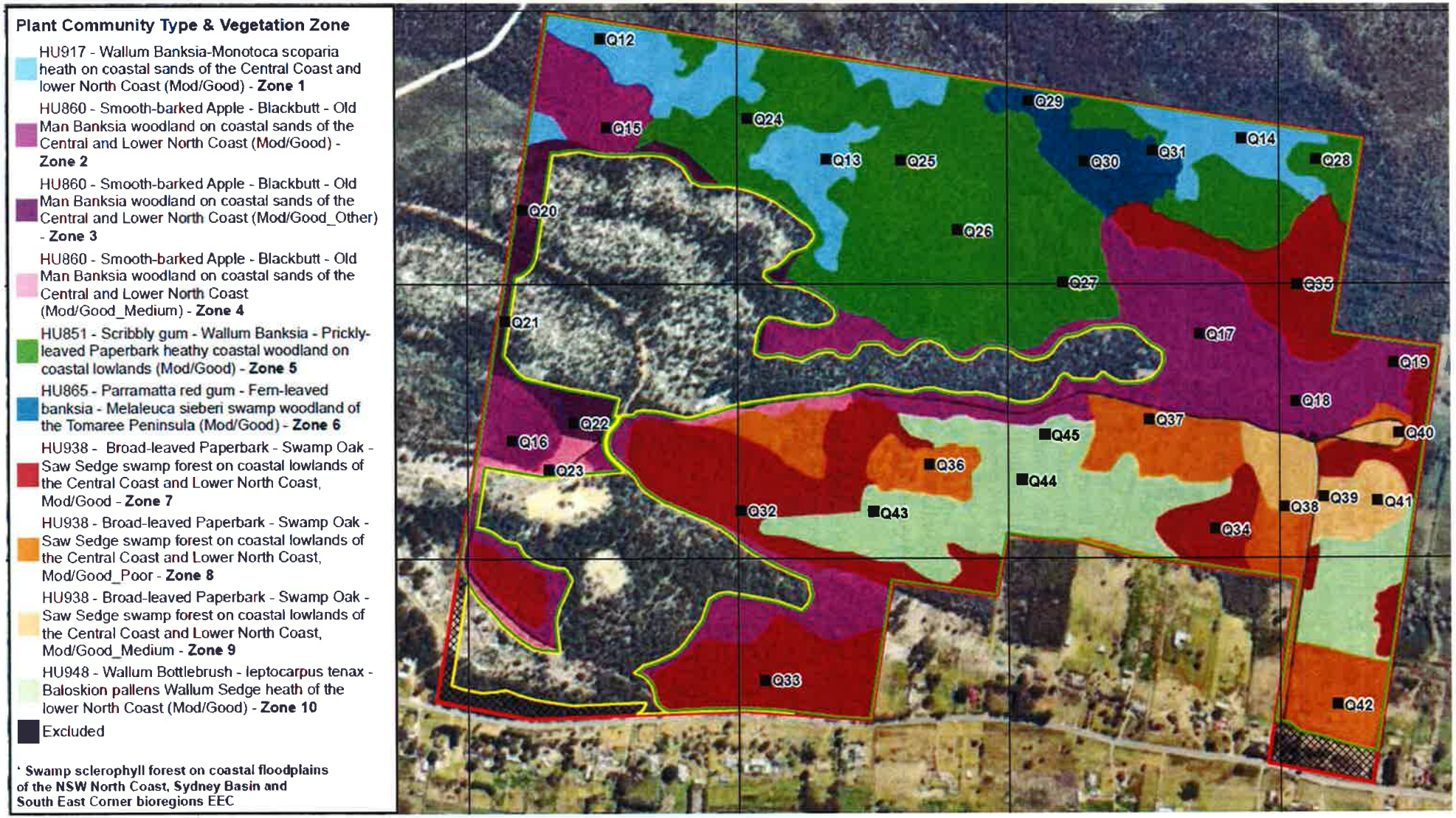


***Figure 16*** *– Plant community types of the Biobank site*

Both OEH and the Department are satisfied that the proposed offsets would enable the quarry to proceed in a manner that reduces its impacts on biodiversity values to the greatest extent practicable. The proposed on-site and off-site biobanks are considered to be adequate, particularly in view of the fact that over half of the vegetation to be cleared is on revegetated land produced as part of rehabilitation efforts for past mineral sands mining. The OEH and the Department consider that an 80-85% offset of biobanking credits generated by impact to the planted population of Camfield's Stringybark is an equitable biodiversity outcome.

### 5.6 Social Impacts

The Department considers the overriding social impact of the proposed quarry to be its cumulative impact on residents who have been living within, or near to, the Investigation Area of potential PFAS contamination from the Williamtown RAAF Base.

These residents have already been engaged in, and endured, a lengthy period of uncertainty concerning their health, lifestyle and long-term residential prospects. Other important matters such as depressed property values and restricted options to resolve the PFAS contamination issue have also affected members of the community. Some community members have devoted large amounts of time to researching issues related to the PFAS contamination and its risks, engaging with a range of Commonwealth and State government departments, attending medical appointments, consulting with experts, making decisions in an environment characterised by incomplete information and initiating of a class action lawsuit against the Commonwealth.

The Department understands that community involvement in, and consideration of, this development application process for a new quarry impacts on their time and resources and would add to already high stress levels.

The Department considers that the local community has responded to these challenging circumstances strongly and has clearly stated its concerns about the proposed quarry. In particular, those living close to the proposed quarry have expressed their concern over the proposal, the main ones being a fear that the proposed quarry could increase the risk of impacts from PFAS and concerns about impacts to property values, biodiversity, noise, air quality and traffic.

The proposed quarry's main positive social impacts would be the economic benefit that would accrue to Council from the agreed $5 / tonne royalty and the agreed $100,000 per year rental for the site. In all, Council would be expected to receive about $17 million (see **Section 5.7**). It could be expected that these funds would be spent on community facilities, roadworks and the like across the LGA.

However, as is correctly pointed out by residents living near the quarry, the LGA as a whole (or other parts of the LGA) would receive most of these benefits, while the residents of Cabbage Tree Road would bear the brunt of most impacts, including possible property devaluations. Nonetheless, some community benefits would be expected to flow to residents of Cabbage Tree Road. For example, it could be expected that Council would not have to raise rates as much as it otherwise would without the benefit of this income stream.

As a direct result of submissions made by local residents, WSS reduced the impacts of the proposal by:

- reducing the extraction footprint by 22.5%;
- increasing buffer distances from extraction areas to nearby residences;
- changing its extraction method to use quieter equipment;
- designing a much safer quarry entry intersection; and
- retaining a patch of vegetation near the quarry entry to reduce visual and noise impacts.

The Department considers that the environmental impacts of the quarry would meet all impact assessment criteria under current regulatory frameworks. However, for some people, perceived impacts are as important as actual impacts. For example, if the wider community believes that the site and its surrounds are impacted by the proposal, then it would be expected that there would be an impact on property values, whether the applicable environmental impact assessment criteria are met or not.

In this respect, the Department considers that property values are overwhelmingly affected by the PFAS contamination issue rather than the quarry proposal. In part, this is due to the fact the site is a former mineral sands mine and most of the natural attributes of the two sand dunes proposed to be quarried result from a relatively successful rehabilitation program. Whatever value accrues to local residents from living near a site that once contained a mineral sand mine but is now rehabilitated, it is likely that those same values would recover following extraction of sand and successful rehabilitation of the site. This outcome can be predicted with relative confidence due to the past rehabilitation success, which included

the successful establishment of Earp's Gum, a threatened species, on the site. With the benefit of lessons learned, future site rehabilitation should be of a higher quality, with greater species diversity.

Should the project be approved, WSS has committed to management of most of the site under the terms of a Biobanking agreement. This means that WSS would provide funds for the ongoing management of biodiversity values on the majority of the site which would not be subject to sand extraction.

The Biobanking agreement would provide long-term assurance that the site would not be developed for other projects, such as residential housing or industry. The result would be that the site would retain (or else develop) the very qualities that many people now appreciate in having a neighbouring vegetated parcel of land. The site would then provide long-term protected habitat for threatened fauna, such as Koala and the newly-identified Mahony's Toadlet, and also provide an effective and important linkage for the movement of Koalas within the Port Stephens district.

The Department acknowledges that this proposal is opposed by most residents living close to the site and that it has led to increased levels of stress in the community. The Department has recommended a condition of consent that requires WSS to establish a Community Consultative Committee (CCC) with an independent Chairperson. The CCC would provide an ongoing means of sharing information about what is planned for the site and for community representatives to ask questions, express concerns and propose amended monitoring, management or reporting strategies to WSS.

The Department's Compliance Branch would also respond to and investigate any complaints about the quarry and has power to take enforcement actions or to impose fines for non-compliant behaviour. The Department has been very willing to talk with members of the community about this proposal prior to exhibition, during exhibition and at any time during assessment and would continue to engage with local residents throughout the life of the project, through to its rehabilitation phase.

The Department considers that, in the medium-term (after quarrying is completed) the social impacts of the proposal would be positive, mainly because the site would form an important component of the protection of biodiversity values for the district and provide a natural amenity backdrop for residents living close to the site. In the short-term, there would be impacts to neighbours from the operation of the quarry, offset by a financial contribution of around $17 million to Council to be spent on services and facilities for the Shire's wider community, including the residents of Cabbage Tree Road.

### 5.7 Economic Impacts

As indicated in **Section 2.2,** WSS considers the key economic benefits of this project include:

- facilitating a supply of construction and industrial grade sand into the greater Sydney and Hunter regional markets to meet identified demands;
- supporting population growth in the area through the efficient supply of construction materials;
- employing six quarry personnel and up to 20 road transport drivers, with positive flow-on effects to the local and regional communities; and
- contributing an estimated $16.25 million in royalties to Council in addition to site rental payments.

The project has a capital investment value of approximately $4.7 million and the Department estimates that the gross (gate) value of the sand proposed to be extracted would be as high as $65 million.

WSS has not attempted to quantify the economic flow-on benefits of the project. The Department considers that these flow-on benefits would be relatively modest in the context of the local or State economy, but would nevertheless be real and certainly important to those who gain employment from the project. Other than the economic activity generated by the expenditure of employees' wages, the project would provide employment in the area of vehicle maintenance and the supply of equipment and services (such as environmental monitoring) to the quarry.

An important economic consideration relevant to the project is the depletion of Sydney's construction sand supply caused by completion of the Penrith Lakes Scheme and the Besmaw Quarry at Kurnell, which previously supplied approximately two million tonnes each year to the Sydney market. Replacement supplies are not available close to Sydney, with sand supplies now sourced from quarries located on the South Coast, Central Coast and Port Stephens. Planned dispatches from the proposed quarry to Sydney would make up approximately 12% of the replacement resources required for that market. The quarry would likely operate for a period of eight to ten years, and would help meet market demand and assist in reducing price pressures for building sand, and consequently for building and construction costs within the greater Sydney area.

The supply of sand into the Hunter regional market (ie Port Stephens, Newcastle, Maitland and Lake Macquarie) would be similarly affected, as it is now part of the wider Sydney and surrounds market. Accordingly, the proposed quarry would also help to ameliorate cost pressures for the local building and construction industries.

Due to the ownership of the site by Council, a significant proportion of the economic benefits of the proposed quarry would be retained in the Port Stephens LGA. The estimated royalty income of $16.25 million over the life of the quarry would rise to between $17 million and $17.5 million, once annual site rental payments are considered. This very significant financial contribution to Council would enable it to provide improved services to the community and/or reduce pressures to increase rates.

The point is well made by residents along Cabbage Tree Road that, while these benefits may accrue to the wider Council area, it is they that would bear the costs to their amenity and changes to their current lifestyle. Although these residents would also benefit as residents of the wider Council area, these are shared benefits. Nonetheless, any consideration of the 'public interest' in regard to the project must give significant weight to the 'greater good', as well as take into account impacts on nearby residents.

The Department has considered the predicted impacts to local amenity and lifestyle and is satisfied that the quarry could be operated in a way the meets all relevant environmental criteria for noise, air quality, traffic and visual impacts. The impacts to local residents would eventually be replaced by a rehabilitated quarry site surrounded by a biobanking site, protected in perpetuity. It would provide important habitat for threatened species and a bushland neighbour for properties along Cabbage Tree Road. The Department considers that the residual impacts to local residents are not such that they outweigh the social and economic benefits to the wider local and State communities (ie the 'greater good').

### 5.8 Other Issues

The Department is satisfied that the other impacts associated with the proposed project are likely to be minor. Consideration of these other impacts is provided in **Table 5**, below.

*Table 5: Summary of other issues*

| Issue | Consideration | Conclusion & Recommendation |
|---|---|---|
| *Aboriginal Heritage* | ▪ The EIS included an Aboriginal Heritage Impact Assessment (AHIA). No new archaeological sites were identified however, one site (#38-4-1681) was re-located and re-assessed to determine its significance. This site, which contains 66 artefacts scattered across an area of 70 x 90 m, would be directly impacted as it is within the proposed extraction area. It has been previously disturbed by clearing, nearby sand and rutile excavation, access tracks and erosion. Consequently, the integrity of the site was assessed as poor, and its research potential and scientific significance as low. WSS has proposed to mitigate impacts by facilitating surface collection of artefacts prior to any works commencing. This was agreed to by the registered Aboriginal stakeholders.<br>▪ OEH raised concern regarding the EIS's lack of reference to its input into the Department's Environmental Assessment Requirements as well as incorrect advice regarding the protection of Aboriginal objects in the project area.<br>▪ A revised Aboriginal Cultural Heritage Assessment was submitted as part of the RTS that satisfactorily addressed these concerns. | ▪ The Department considers that due to the disturbed nature of #38-4-1681 and the management and salvage measures outlined in the AHIA, the physical impacts of the project on Aboriginal cultural heritage are acceptable.<br>▪ The Department has recommended a condition that requires WSS to prepare and implement an Aboriginal Cultural Heritage Management Plan that would:<br>– be prepared in consultation with OEH and registered Aboriginal stakeholders;<br>– include a salvage and management plan for all Aboriginal sites proposed to be disturbed, especially #38-4-1681;<br>– include protocols for monitoring during vegetation clearing to identify any previously unknown Aboriginal sites and monitoring the sand processing plant's oversize material screens for Aboriginal objects;<br>– provide for measures to be undertaken following discovery of any unpredicted Aboriginal objects;<br>– provide Aboriginal cultural awareness training for quarry workers as part of site induction; and<br>– provide for on-going consultation with Aboriginal stakeholders. |
| *European Heritage* | ▪ The footings of a World War II radar installation may be located on the site. WSS only became aware of the possible existence of these footings via information | ▪ The Department has recommended a condition that requires WSS to undertake photographic archival recording of the radar installation |

| Issue | Consideration | Conclusion & Recommendation |
|---|---|---|
| | provided by the local community and has been unable to locate them. | footings, should they be located, prior to their removal. |
| *Greenhouse Gas Emissions* | ▪ WSS provided a revised greenhouse gas assessment in its RTS, which indicated that the Scope 1 and 2 emissions from the proposed quarry are not expected to trigger reporting requirements under the *National Greenhouse Gas Energy Reporting Act 2007*.<br>▪ Most emissions would be Scope 3 emissions associated with consumption of diesel fuel by trucks transporting product sand to market.<br>▪ WSS has committed to monitoring and reporting on its energy use and to regularly reviewing its operations to identify improvements in energy efficiency with the twin goals of improving economic returns and reducing carbon intensity. | ▪ The Department is satisfied that WSS has identified the reasonable and feasible measures to reduce the greenhouse gas emissions that could result from operation of the quarry.<br>▪ The Department has recommended conditions of consent to require WSS to implement all reasonable and feasible measures to minimise its greenhouse gas emissions. |
| *Rehabilitation* | ▪ WSS proposes to undertake progressive rehabilitation of the site and return the quarried landscape to a condition consistent with the existing characteristics of the site.<br>▪ Rehabilitation would focus on site stabilisation and natural regeneration.<br>▪ The final landform would be shaped to an elevation of 4.0 to 5.5 m AHD and would be at least 1 m above the predicted maximum groundwater level across the site.<br>▪ WSS proposes to prepare a Quarry Closure Plan three years before ceasing quarrying operations. | ▪ The Department has recommended conditions requiring WSS to prepare and implement a Landscape and Rehabilitation Management Plan that would:<br>– be prepared in consultation with OEH;<br>– include rehabilitation methods and completion criteria; and<br>– require a Quarry Closure Plan to be prepared and approved by the Secretary.<br>▪ WSS would also be required to lodge a security bond with the Department to cover the full cost of accumulated and anticipated rehabilitation.<br>▪ Subject to adoption and implementation of these conditions, the Department is satisfied that WSS would successfully rehabilitate the site. |
| *Visual* | ▪ The proposed development would modify the existing landform by clearing vegetation, removing a large portion of two sand dunes and establishing site infrastructure.<br>▪ The project's extraction area and office/ administrative facilities may be visible from public and private viewing locations.<br>▪ To minimise visibility, WSS proposes to maintain existing vegetation outside the extraction limit and to undertake infill planting.<br>▪ WSS has agreed to a request from some neighbours to retain a 75-m long patch of vegetation on the western side of the quarry entry. This is to reduce sight lines into the quarry (see **Figure 12**).<br>▪ In addition, WSS has proposed a number of mitigation measures including:<br>– progressive rehabilitation;<br>– minimising the disturbance area at any one point in time;<br>– retaining a strip of vegetation fronting Cabbage Tree Road; and<br>– ensuring structures are finished in non-reflective natural tones. | ▪ The Department is satisfied that WSS has implemented all reasonable and feasible measures to minimise the visual impacts of the proposed development.<br>▪ The Department has recommended conditions of consent which require WSS to:<br>– prepare and implement a Landscape and Rehabilitation Management Plan, including measures to establish vegetation screening; and<br>– minimise the visual impacts of the final rehabilitated landform. |

# 6. RECOMMENDED CONDITIONS

The Department has recommended conditions of consent for the project (see **Appendix E**) that:

- prevent, minimise, and/or offset adverse impacts;
- set standards and performance measures for acceptable environmental performance;
- ensure regular monitoring and reporting; and
- provide for ongoing environmental management.

Conditions recommended by Council and State agencies have been incorporated where appropriate. WSS has reviewed and commented on the recommended conditions. The Department has taken these comments into consideration in finalising its recommendation.

Initially WSS did not support the Department's proposed condition that would not permit the despatch of laden trucks from the site between 5 and 6 am, unless agreed to by the owners of land immediately opposite the proposed deceleration and acceleration lanes along Cabbage Tree Road. However, in February 2018, WSS indicated its acceptance of the draft conditions proposed by the Department.

# 7. CONCLUSION

The Department has undertaken an assessment of the development application, including the EIS, submissions received on the proposal, the RTS, additional information from WSS and supplementary comments from agencies on this additional information in accordance with the relevant statutory requirements of the EP&A Act and the EP&A Regulation.

This project has raised several issues not usually encountered with other sand quarries. The Department has been particularly aided in its assessment by the input of specialist government agencies. This is particularly so in respect of the issue of PFAS contamination. While this is an emerging issue nationwide, it has had to be considered in respect of this particular development application due to the proposed quarry being located adjacent to the Williamtown RAAF Base and within the NSW Government's Broader Management Zone for PFAS contamination. The Department has diligently made itself aware of publicly-available information on the PFAS groundwater plume and potential exposure pathways relevant to this quarry proposal.

WSRAG has also been helpful in alerting the Department to information sources and the wider context of PFAS contamination. The WCEP, chaired by the former NSW Chief Scientist and Engineer, Professor Mary O'Kane, and its WWG, have been extremely helpful in providing a technical assessment of the potential risks of the proposed quarry in relation to water borne PFAS exposure. The WWG reviewed the EIS and concluded that "*as long as the operations* (of the quarry) *remain above the water table the sand mine presents a low risk with regards to PFAS exposure or contribution to the spread of PFAS*".

Further help was provided by the EPA and NSW Health in the matter of potential air borne exposure pathways for PFAS. The EPA advised that, after applying worst-case soil contamination levels, the risk from inhalation and/or ingestion of PFAS chemicals for humans is extremely low. The EPA also advised that there are no accredited methods for air borne sampling of PFAS chemicals available in Australia or overseas.

WSS also assisted in the assessment of this issue by taking soil samples from the site and checking for PFAS contamination. All soils samples were clear of detectable PFAS contamination.
The Department is satisfied that the operation of the proposed quarry would not elevate risks of PFAS contamination for its neighbouring residents. The Department has recommended conditions of consent which clearly set out how the quarry must be operated in order to avoid interactions with PFAS contamination.

Amenity issues such as noise, air quality and visual impacts have been assessed in a staged manner, with the quality and applicability of the information provided by WSS improving significantly as the assessment progressed. The documentation also reflected a number of modifications that WSS has made to its proposed project to reduce impacts.

By reducing the quarry footprint by 23% and reducing maximum annual production from 600,000 to 530,000 tonnes, the revised proposal is predicted to have fewer impacts to vegetation, native fauna, air

quality and noise amenity. WSS also shortened its proposed weekday finish time from 6 pm to 5 pm to reduce air quality impacts at times when dust does not easily disperse. WSS has also consulted with residents close to its proposed quarry intersection, and by acting on suggestions received, retained a patch of vegetation to reduce visual impacts.

The overall outcome of these changes is that the quarry is predicted to meet all relevant environmental amenity criteria, with a very minor exception to noise criteria during vegetation clearing activities.

Traffic impacts are considered to be acceptable in terms of traffic volumes, noise and safety. However, the Department and EPA have concerns about the amenity impacts caused by sand trucks arriving and leaving the quarry between 5 and 6 am. The Department has therefore recommended that trucking operations commence at 6 am. However, if WSS can obtain the agreement of eight landowners immediately opposite its quarry entry deceleration and acceleration lanes, then the quarry would be able to commence dispatch of trucks from 5 am.

The Department and OEH are satisfied that the proposed biodiversity offset proposal is consistent with the Government's Biodiversity Offsets Policy and would provide an important vegetated link for movement of Koalas, consistent with the Council's CKPM.

The Department has recommended conditions that require WSS to prepare relevant management plans and monitoring programs to ensure these potential impacts are minimised in accordance with best practice.

Overall, the Department considers, that if operated in accordance with the recommended conditions of consent and required best practice measures, the quarry would cause low-level impacts. The proposed quarry would meet all relevant amenity criteria, except for a limited number of five-day vegetation clearing campaigns, which would be undertaken in accordance with a management plan to limit impacts.

The Department believes the project would deliver positive socio-economic benefits to the local and regional communities, including ongoing local employment and a significant financial contribution to Council through sand royalty and site rental payments of about $17 million. Accordingly, the Department considers that the proposal is in the public interest and is approvable, subject to the proposed conditions of consent (see **Appendix E**).

This assessment report is hereby presented to the Planning Assessment Commission for determination.

Howard Reed

Howard Reed 6.2.18
**Director**
**Resource Assessments**

6/2/18

Oliver Holm
**Executive Director**
**Resource Assessments and Compliance**