

#### 4.10.10 Conservation of flora and fauna values

Sand mining inevitably results in the removal of existing vegetation in the areas affected. However, the rehabilitation of the site presents the opportunity to recreate, as far as possible, some of the major features of its previous vegetation coverage.

Some impacts have been avoided or can be adequately mitigated or managed. However, some other impacts cannot be adequately mitigated. These relate to the loss of native vegetation as a consequence of sand extraction.

As identified in **Section 4.10.9**, the following endangered ecological community (EEC) and threatened flora species are likely to be affected by the proposal:

- approximately 5.2 hectares of Shale Sandstone Transition Forest (EEC);
- approximately 5.4 hectares of Sydney Sandstone Ridgetop Woodland; and
- approximately 42 individuals of *Tetratheca glandulosa*.

It is therefore proposed to address these residual impacts by implementing an offset strategy that would contribute to the long term conservation and enhancement of local biodiversity values. The development of the Biodiversity Offset Strategy would be based on the principles set out in Appendix 2 of *Guidelines for Biodiversity Certification of Environmental Planning Instruments, Working Draft* (Department of Environment and Climate Change 2007). These are:

- inclusion of all appropriate measures to eliminate offsite impacts on biodiversity values;
- addressing all regulatory requirements;
- application of sound ecological principles;
- achievement of a net improvement in biodiversity values over time;
- provision of management resources to achieve a permanent improvement;
- agreement on measures to be implemented prior to the occurrence of the impacts;
- clear focus on measures directly related to the identified loss of biodiversity resulting from the Proposal, appropriately located and targeted on biodiversity priorities; and
- amenable to monitoring to determine that actions are leading to positive outcomes.

Based on the results of the ecological assessments undertaken for the environmental assessment and the discussion of impacts, a preliminary offset strategy has been identified. This comprises a set of actions which could be implemented to offset residual biodiversity impacts. It is anticipated that through further investigations and consideration involving consultation with government agencies that these actions would be refined to form the adopted offset strategy for the proposal. The principle components of the Offset Strategy are:

- Provision of compensatory habitat through revegetation of land surplus to final use of the site. Availability of suitable land within the site would determine the location of those areas to be revegetated. As far as possible, these would be contiguous with the appropriate vegetation communities not disturbed by site activities or those located adjacent to the site boundary.
- Supplementary revegetation and enhancement of retained vegetation within the site.

**Figure 4.12** shows 5.2 hectares of Shale Sandstone Transition Forest to be removed as part of the proposal. Areas considered suitable for revegetation with the principle flora species making up this community and derived from seed obtained from the existing woodland have been identified and make up approximately 12 hectares resulting in a 2:1 compensatory ratio. Approximately 5.4 hectares of the Sydney Sandstone Ridgetop Woodland would also be removed. Compensation for this loss would be provided by suitable revegetation of the steeper slopes around the periphery of the site. No Sydney Sandstone Gully Forest would be removed.

Areas of known *Tetratheca glandulosa* would be marked and protected with suitable setback distances maintained where these are in the proximity of the extraction areas.

## 4.11 Cultural heritage

### 4.11.1 Introduction

A survey for Aboriginal sites in the vicinity of the former Maroota Trig was carried out by John Edgar in July 1995 (Corkill 1995) as part of the EIS supporting the original application to Baulkham Hills Shire Council to extract sand from the site (Collin Donges & Associates 1996). The survey covered the entire site subject to the current application with the exception of Lot 2 DP752039. It identified one open site, a scatter of five stone artifacts (MR1) in addition to two isolated stone artifacts (IF1 and IF2) and concluded that both, located in areas of heavy and continuous disturbance, had low archaeological significance. A second survey was undertaken as part of the current environmental assessment covering Lot 2 DP752039 and Lot 1 DP34599 (Navin Officer 2004). This is summarised in the following sections and is included as **Technical Paper 7** in Volume Three with the earlier study attached as an appendix.

### 4.11.2 Aboriginal heritage

A survey of Aboriginal Archaeological Sites on the areas proposed for extraction was undertaken in August 2004. The archaeologists were accompanied by representatives of the Deerubin Local Aboriginal Land Council, Darug Tribal Aboriginal Corporation and the Darug Custodians Aboriginal Corporation. The report of this survey and its findings is provided in **Technical Paper 7**.

The assessment included four main components:

- review of existing documentation;
- liaison with relevant local Aboriginal organisations;
- field survey of the study area; and

- assessment of site significance.

Previous archaeological impact assessments in the Maroota area have identified 99 sites within a five kilometre radius of the Hitchcock Road site. These have been recorded on the Aboriginal Heritage Information Management System held by the Department of Environment and Climate Change. Some of these sites comprise multiple elements or features, such as a shelter containing art, deposit and engravings totaling 112 occurrences. The majority of these, approximately one third of the total comprised rock engravings.

Archaeological survey has previously been undertaken within the present study area. Edgar (1995) completed an assessment of the entire 100 hectares of the Hitchcock Road mining area. The report aimed to assess the impacts of development of the sand quarry operation on Aboriginal heritage sites (Edgar 1995). Edgar found that much of the study area (50%) had been heavily disturbed by previous land use practices such as orchard and vegetable gardens. The rest of the study area had been disturbed through sand mining, clearing and dam construction (Edgar 1995:3).

Three Aboriginal sites were identified, a scatter of five artifacts (MR1) and two isolated finds (IF1, IF2), all within the south eastern part of the study area. The isolated finds were found on the edge of a dam where visibility was 100 percent. These are shown in **Figure 4.13**. They are not located in the area included in the proposal.

The most relevant site was therefore MR1. It consisted of five artifacts scattered within the cleared ground used as the fuel depot. The ground surface had been leveled and highly disturbed. Edgar found that there was no potential for subsurface deposits in the immediate vicinity of MR1 and that visibility was good within the surrounding forest (Edgar 1995:11). Edgar concluded that the site had low significance due to the level of disturbance, while also acknowledging that such open sites are rare in the Hawkesbury sandstone region.

Corkill (1989) investigated about 40 hectares of land comprising Lots 198 and 35 and Lot 1 DP588936, adjoining blocks about one kilometre north of the present study area, for extension of sand mining proposals. Much of the study area was disturbed through clearing, excavation and dumping. The survey was carried out on foot, inspecting all rock exposures and areas of bare ground such as vehicle tracks. No sites were found during the survey, no areas of rock overhangs suitable for occupation were identified, and none of the rock platforms showed engravings, despite close inspection (Corkill 1989:7-8). Additional surveys by Corkill in the Maroota area associated with the sand mining operations also failed to find any archaeological sites (Corkill 1991a, 1991b, 1991c).

The largest survey apart from the Edgar (1995) study was a comprehensive survey of 3.45 square kilometres conducted by Koettig within the upper catchment of Little Cattai Creek (Koettig 1989). This area is situated to the southwest of the present study area. The survey detected 14 archaeological sites, 97 rock shelters where past Aboriginal occupation or utilisation was considered to have been possible, and three isolated finds. The recorded sites consisted of nine shelters with art (three with occupation deposit), one open engraving site and four open sites with grinding grooves. A small percentage of the total survey area included ridgetop contexts on the main watershed ridgeline.

Corkill (1994) surveyed another sand mining operation about three kilometres north of the present study area and four new sites were identified. Site CC1 comprised two sets of grinding grooves with nine and 11 definite grooves about 20 metres apart within the bedrock of an ephemeral drainage line. Site CC2 comprised two engravings and a set of 11 grinding grooves about 10 metres from the engravings. The engravings were found on a boulder about 20 metres above the creek and the grooves were located within a



**Figure 4.13**  
ABORIGINAL AND EUROPEAN HERITAGE ITEMS

- Isolated find (IF)
- Artifact scatter (MR)
- Potential archaeological deposit (MRPAD)
- HRH European site
- Area previously subject to sand extraction or agriculture

shallow rock-lined watercourse. The third site, CC3 was a shelter with deposit and a single silcrete flake. A second shelter with deposit CC4, contained two basalt flakes that showed evidence of grinding. Another shelter with potential archaeological deposit but no artifacts was also located (Corkill 1994).

#### **4.11.3 Aboriginal sites**

No Aboriginal sites were identified during the survey.

A thorough inspection of the location of site MR1 was carried out but no artifacts were found. The area had been recently graded and debris pushed into large piles of soil and rubbish. This activity may well have removed any artifacts.

A potential archaeological deposit (PAD) is defined as any location where the potential for subsurface archaeological material is considered to be moderate or high, relative to the surrounding study area landscape. Archaeological potential is assessed using criteria developed from the results of previous surveys and excavations relevant to the region.

The boundaries of PADs are generally defined by the extent of particular landforms known to have high correlation with archaeological material. A PAD may or may not be associated with surface artifacts. In the absence of artifacts, a location with potential will be recorded as a PAD. Where one or more surface artifacts occur on a sedimentary deposit, a PAD may also be identified where there is insufficient evidence to assess the nature and content of the underlying deposit. This is mostly due to poor ground surface visibility.

The topographic location of the site MR1 is on a flat spur crest at the head of Cattai Creek. The topographic feature extended beyond the disturbance into areas of more natural vegetation that had been considerably less disturbed. It is possible and even likely therefore that the artifact scatter extends beyond the heavily disturbed area into the remnant forest. Although the crest of the spur line has shallow soils, visibility was poor enough to prevent making unequivocal statements about the potential for the site to be larger, with the main area of visibility provided by a track with sandy sheet wash.

The section of spur crest retaining native vegetation therefore has been identified as having potential archaeological deposit, even though the actual deposits may be shallow. The crest area extends for approximately 200 by 100 metres. This area is referred to as MRPAD1.

#### **4.11.4 European heritage**

Settlers had moved into the area west of Wisemans Ferry by the late eighteenth century and grain and other crops were being grown for the colony. These early farmers provided Sydney Town with a great deal of its food. The produce was delivered by boat down the Hawkesbury River - a situation which saw Wisemans Ferry rapidly develop as an important river port - out into the Pacific Ocean and around into Sydney Harbour.

The convict Solomon Wiseman arrived in Sydney on 20 August 1806. In 1817 he was granted 200 acres on the banks of the Hawkesbury River where by 1821 he had established an inn called the Sign of the Packet. In 1826 he built himself a two-storey residence, Cobham Hall, which he later used as a hostelry calling it The Branch Inn.

During this time the main land route from Sydney to Newcastle was via Windsor, along to Wisemans Ferry and up the Putty Road to Singleton. Governor Darling had ordered the construction of a road from Sydney to the Hunter Valley after receiving a petition from settlers in the Hunter Valley.

Construction of the Great North Road, as it was called, started in 1826 from Castle Hill and proceeded to Wisemans Ferry and on to the Hunter. It was finished in 1836 but even as the convict gangs working on the project completed their task, the Wisemans Ferry section had fallen into disuse. The road was not the most favoured route due to the threat from bushrangers, its isolation and lack of facilities such as hotels. Other routes emerged and the impact of the paddle steamer industry also meant that there were more efficient means of travel (Comber 1990).

The Maroota Trigonometrical Station, which formed part of the main geodetic network of NSW, was originally a stone cairn type constructed in 1880. The Maroota parish map indicates that the station was first notified in 1888 but the original trig has been destroyed. It was replaced in 1974 with a standard concrete pillar trigonometrical station (TS2985 [P] Maroota) which is located 3.5 metres east of the original stone trig site. The reserve number is 6739 (personal communication, Paul Neale, Survey Services, NSW Department of Lands 2004).

The Maroota Trigonometrical Station is typical of the standard and most common type in NSW. It is less than 50 years of age and as such is not a heritage item under the NSW Heritage Act.

#### **4.11.5 European sites**

One European site (HRH1) was located during the investigations.

The site was a simple farm shed but appeared to be over 50 years of age and therefore of potential heritage significance. The shed was about 12 metres long, seven metres wide and three metres high at its northern end. It comprised a gable roof at the southern end and a simple sloping awning type roof at the northern end. This section had been upgraded recently with new battens and corrugated iron.

The main part of the semi-enclosed shed was constructed with upright timber slabs, probably taken from the back of sleepers. Internal posts have been squared using an adze and there was a double swinging door at the southern end for vehicles. There were also two person doors, one at the eastern side and one on the southern end of the shed.

In general the shed is in poor condition and does not appear to be in use except to house disused farm equipment and vehicles.

Moveable items in the shed included a fruit conveyor, old rotary hoe, a trailer, vehicle chassis and various pieces of timber and wooden fruit boxes.

The farm shed located during the survey does not meet the threshold where it would be considered significant under any of the criteria established by the NSW Heritage Office. The site does not therefore require any additional assessment or listing on any of the local or State registers.

## **4.12 Traffic and access**

### **4.12.1 Existing road network and traffic conditions**

#### ***Wisemans Ferry Road***

Wisemans Ferry Road is a two lane, two-way rural road with a posted speed of 70 kilometres per hour in the vicinity of the site entrance. Access to the site is available via an existing intersection on Wisemans Ferry Road, located approximately 400 metres south of the Old Northern Road intersection. This intersection provides access to both the western section containing the central process plant (Lot 198) and the eastern section

(Hitchcock Road). Wisemans Ferry Road provides access to Pitt Town and Windsor to the south-west and connects to Old Northern Road to the north-west of the site.

Changes in traffic volumes from 1987 to 2002 on Wisemans Ferry Road, south of Old Northern Road are shown in **Table 4.12**. The annual average daily traffic in 2002 was 1,745 vehicles. The annual average daily traffic on Wisemans Ferry Road increased at a rate of less than one percent per annum over the 15 year period, well below the metropolitan average. Since 1999, traffic on Wisemans Ferry Road has declined at a rate of 1.3 percent per annum in the most recent three year period.

Full traffic classification counts were conducted on Wisemans Ferry Road north of the site entrance. These data were collected for a week between 17 and 23 July 2004. The counts show that average daily traffic (seven-day average) of 1,505 vehicles per day was recorded at this point. This is equivalent to 1,862 axle pairs per day, which is slightly higher than the Annual Average Daily Traffic figure reported by the RTA for 2002. While this may indicate an increase in traffic volumes on Wisemans Ferry Road, the difference could also be attributed to seasonal adjustments by the RTA which are not explained and cannot be taken into account in comparison to the full classification counts.

**Table 4.12: Traffic on Wisemans Ferry Road, south of Old Northern Road**

Year	Annual Average Daily Traffic
1987	1,663
1989	1,481
1991	1,573
1993	1,636
1996	--
1999	1,820
2002	1,745

Source: Traffic Volume Data for Sydney Region, RTA, 2002

The two-way peak hour traffic for an average weekday occurred from 08.00 to 09.00 hours and 16.00 to 17.00 hours during the morning and evening peak periods respectively. The peak hour volumes are summarised in **Table 4.13**.

**Table 4.13: Average weekday peak hour volumes on Wisemans Ferry Road, north of the site entrance 2004**

	Northbound	Southbound	Total
Morning Peak (8.00 to 9.00)	78 (9.8%)	48 (6.1%)	126 (8.0%)
Evening Peak (4.00 to 5.00)	52 (6.6%)	88 (11.2%)	140 (8.9%)

Average weekday traffic volume is 1,578 vehicles on Wisemans Ferry Road. The classification count shows that of these vehicles:

- 79 percent (or 1,249 vehicles) were light including cars, vans, or a car towing a boat (Classes 1 and 2);

- 13 percent (or 200 vehicles) were rigid trucks and buses (Classes 3, 4 and 5);
- 8 percent (or 121 vehicles) were articulated trucks with three to six axles (Classes 6, 7, 8 and 9); and
- less than one percent (or 7 vehicles) were B-Doubles (Classes 10, 11 and 12).

While overall traffic volumes were similar in both directions, the data show that there was an additional 47, or 94 percent of Class 3 vehicles (two axle trucks) traveling southbound compared to that class in northbound traffic. There was a similar reduction in the number of Class 1 vehicles (passenger cars) recorded for the southbound traffic. Class 3 vehicles (two axle trucks) had the second highest vehicle count for both directions followed by Class 9 vehicles (six axle articulated trucks). The highest number of vehicles counted was Class 1 vehicles (passenger cars).

These figures indicate a slight bias toward northbound traffic during the morning peak period, and the reverse is true for the evening peak period with a slight bias toward southbound traffic. The number of Class 3 vehicles (two axle trucks) was the highest during the evening peak period and the number of Class 9 vehicles (six axle articulated trucks) the highest following the morning peak period.

**Old Northern Road**

Old Northern Road is a two lane, two-way rural road with a posted speed of 70 kilometres per hour in the vicinity of the Wisemans Ferry Road intersection. Maroota Public School is located some 600 metres to the north of the intersection. Speeds are limited in the school zone to 40 kilometres per hour during school periods. There is a posted speed limit of 90 kilometres per hour to the south of the intersection. Old Northern Road provides access to Wisemans Ferry to the north, Glenorie and Dural to the south.

**Table 4.14** shows the changes in traffic volumes from 1987 to 2002 on Old Northern Road, south of Wisemans Ferry Road. The annual average daily traffic in 2002 was 2,212 vehicles. Annual average daily traffic on Old Northern Road has increased at a rate of 1.5 percent per annum over the 15 year period.

**Table 4.14: Traffic on Old Northern Road, south of Wisemans Ferry Road**

Year	Annual Average Daily Traffic
1987	1,806
1989	1,502
1991	1,677
1993	1,996
1996	--
1999	2,108
2002	2,212

Source: Traffic Volume Data for Sydney Region, RTA, 2002

Full classification counts were conducted on Old Northern Road, south of Wisemans Ferry Road. These data were collected for the week between 17 July 2004 and 23 July 2004. The traffic counts generate an average daily traffic (seven-day average) of 1,837 vehicles on Old Northern Road. This is equivalent to 2,178 axle pairs per day, which is comparable to the annual average daily traffic figure for 2002. There has been no significant increase in traffic over the past two years.

Two-way peak hour traffic for an average weekday occurred from 07.00 to 08 00 hours and 16.00 to 17.00 hours during the morning and evening peak periods respectively. The peak hour volumes are summarised in **Table 4.15**.

**Table 4.15: Average weekday peak hour volumes on Old Northern Road, south of Wisemans Ferry Road 2004**

	Northbound	Southbound	Total
Morning Peak (8 00 to 9.00)	102 (10.9%)	47 (7.9%)	149 (7.9%)
Evening Peak (4.00 to 5.00)	61 (6.5%)	111 (11.5%)	172 (9.1%)

Average weekday traffic was 1,895 vehicles on Old Northern Road. The classification count shows that of these vehicles:

- 83 percent (or 1,567 vehicles) were light vehicles including cars, vans, or car towing a boat (Classes 1 and 2);
- 11 percent (or 209 vehicles) were rigid trucks and buses (Classes 3, 4 and 5);
- 6 percent (or 112 vehicles) were articulated trucks with three to six axles (Classes 6, 7, 8 and 9); and
- less than one percent (or 6 vehicles) were B-Doubles (Classes 10, 11 and 12).

Vehicle composition was similar in both directions, with northbound carrying slightly more articulated trucks during the day. The number of Class 3 vehicles (two axle trucks) was the second highest for both directions, followed by Class 9 vehicles (six axle articulated trucks). The highest number of vehicles counted was Class 1 vehicles (passenger cars).

The figures show a distinctive tidal flow during the peak periods, with a bias towards the northbound traffic during the morning peak period, with the reverse occurring during the evening peak period where the bias was towards the southbound traffic. The number of Class 3 vehicles and Class 9 vehicles (two axle trucks and six axle articulated trucks respectively) were the highest before the morning peak period.

#### **4.12.2 Intersection turning movements**

Full turning movement counts were conducted at two key intersections near the site along Wisemans Ferry Road: at Old Northern Road and at the site entrance. The counts were conducted on 22 July 2004 for four hours covering the morning peak period (from 05.00 to 09.00 hours) and for three hours covering the evening peak period (from 16.00 to 19.00 hours).

At the intersection of Wisemans Ferry Road and the quarry site entrance, the morning peak hour occurred between 08.00 and 09.00 hours. At the intersection of Wisemans Ferry Road with Old Northern Road, the morning peak hour occurred from 07.15 to 08.15 hours. The evening peak hour for both intersections occurred from 16.00 to 17.00 hours.

The morning peak hour for the heavy vehicle movements at the quarry site entrance occurred from 06.00 to 07.00 hours, earlier than the morning peak hour for all vehicles. As the variation in the heavy vehicle movements was minor compared to the light vehicle

movements during the surveyed period, the morning peak hour for the light vehicle movements was considered to be more significant and is therefore used in the assessment.

Analyses were undertaken for two intersections using the modeling software SIDRA. The intersection assessment results are summarised in **Table 4.16** and the criteria used for assessing intersection performance are discussed in **Technical Paper 3** in Volume Two.

The two intersections analysed are currently operating satisfactorily with a level of service A in both peak periods. The intersection results indicate that both intersections currently operate with minimal delays and virtually no queues form in either peak periods analysed. The results produced by SIDRA correlate very well with on-site observation of the current intersection performance.

**Table 4.16 Intersection assessment**

Intersection	Peak period	Assessment results			
		Degree of saturation	Delay (seconds)	Level of service	Queue length (m)
Wisemans Ferry Road/Old Northern Road	Morning	0.11	11	A	4
	Evening	0.08	11	A	3
Site Access/Wisemans Ferry Road	Morning	0.07	102	A	1
	Evening	0.07	10	A	1

#### 4.12.3 Site access and internal haul road

Access to the site is available via an existing intersection on Wisemans Ferry Road, purposely built to accommodate heavy vehicle movements. This is located approximately 400 metres south of the Old Northern Road intersection. The intersection provides access to both the eastern section (the Hitchcock Road site) and the western section (Lot 198 and the central process plant).

As the proposed changes to sand extraction would occur mainly within the existing site boundaries, any additional traffic generated would continue to use the existing access on Wisemans Ferry Road.

The majority of traffic generated by the proposal to use Wisemans Ferry Road would be from the western site (Lot 198), as there will be no transport of Tertiary sand by truck from the site to the central wash plant, except during periods of routine maintenance or as a result of plant/pipeline breakdown.

It is also proposed to use the existing access onto Old Northern Road from Lot 1 DP34599 on a temporary basis for the transport of extracted friable sandstone which does not need to be washed at the central process plant. This is a high standard access with good sight lines along the road at a point where it has been widened to three lanes. The use of this access would not generate any additional truck movements.

#### 4.12.4 Site traffic movements

The existing consent allows 200 laden trucks (or 400 truck movements) per day to be generated as a result of all PF Formation sand extraction activities in Baulkham Hills local government area. The site currently operates from 06.00 to 18.00 hours, Monday to Saturday. The proposal does not seek to amend the consent condition relating to the daily number of truck movements allowed.

Currently, there are between 50 and 60 laden truck movements per day generated by activities on the Hitchcock Road site. It is expected that future development on the Hitchcock Road site will not significantly increase the daily generation of laden truck movements although this will vary depending on market conditions. It is anticipated that up to an additional 20 laden trucks could be generated in each direction if the consent is extended to permit the processing of materials transported from sites other than the Hitchcock Road or Lot 198 developments. Depending on the material type, the incoming trucks would be processed either on the Hitchcock Road site or at the central process plant on Lot 198.

In addition to the Hitchcock Road development, the future development of Lot 198 would generate a maximum of 10 laden trips per day over the period from 2005 to 2010 onto Wisemans Ferry Road.

Due to variability in market demand over time and the low volume of heavy vehicles at the quarry site entrance, no specific pattern can be established for the truck movements in the area. Currently there is an approximate 50:50 split in truck movements between Old Northern Road and Wisemans Ferry Road and this is expected to continue. There are no existing route restrictions applying to truck movements in the region. In addition, it is assumed that the inbound and outbound truck movements are evenly distributed during the operating hours of the site.

As there is no proposed change to staff numbers as a result of the proposed development, it is assumed that there would be no variations in the movement of light vehicles to and from the site in the future.

**Table 4.17** shows the estimated peak hour generation of the ultimate development. This includes the development of Hitchcock Road and Lot 198 site and the extension of the consent to process materials transported from other sites. The impact is small as for the most part the truck movements do not occur in peak traffic periods.

**Table 4.17 Estimated peak hour traffic generation (trucks)**

Development	Origin/destination	Morning peak		Evening peak	
		Wisemans Ferry Road	Old Northern Road	Wisemans Ferry Road	Old Northern Road
<b>Hitchcock Road</b>	Inbound	2	2	2	2
	Outbound	2	2	2	2
<b>Lot 198</b>	Inbound	1	1	1	1
	Outbound	1	1	1	1
<b>Recycling</b>	Inbound	1	1	1	1
	Outbound	1	1	1	1

#### 4.12.5 Assessment of impacts

The performance of the two key intersections in the vicinity of sites under post-development conditions was simulated using SIDRA. As the proposed development could generate up to an additional 10 laden truck movements per day until the year 2015, this future year was adopted as representing the maximum generation of truck movements from the site. The post development conditions were analysed in two scenarios – one based on the projected 2006 traffic volumes and the other on the projected 2015 traffic

volumes using a growth factor derived from a 15 year range of RTA annual average daily traffic volumes.

**2006 Scenario**

The post-development intersection turning volumes for 2006 estimated by projecting the surveyed traffic flows using an average growth rate derived from traffic data for Old Northern Road, south of Wisemans Ferry Road. The post-development intersection assessment results are summarised in **Table 4.18**.

The proposed developments would have no significant impact on the performance of the two intersections analysed and would be operating satisfactorily with a level of service of A in both peak periods. Under 2006 post-development traffic conditions, the two key intersections would continue to experience minimal delays and virtually no queue in both peak periods. In essence, current intersection performance would be retained.

**Table 4.18 Post development intersection assessment 2006**

Intersection	Peak period	Assessment results			
		Degree of saturation	Delay (seconds)	Level of service	Queue length (m)
Wisemans Ferry Road/Old Northern Road	Morning	0.13	11	A	5
	Evening	0.10	11	A	4
Site Access/Wisemans Ferry Road	Morning	0.07	10	A	1
	Evening	0.07	10	A	1

**2015 Scenario**

The projected morning and evening peak hour volumes for 2015 post-development conditions were derived by superimposing the 2015 projected volumes onto traffic generated by the proposed developments. The post development intersection assessment results are summarised in **Table 4.19**

**Table 4.19 Post development intersection assessment 2015**

Intersection	Peak period	Assessment results			
		Degree of saturation	Delay (seconds)	Level of service	Queue length (m)
Wisemans Ferry Road/Old Northern Road	Morning	0.13	11	A	5
	Evening	0.10	12	A	4
Site Access/Wisemans Ferry Road	Morning	0.08	10	A	1
	Evening	0.08	11	A	1

The proposed developments would have no significant impact on the performance of the two intersections analysed. They would continue to operate satisfactorily with a level of service of A in both peak periods. The analysis results indicate that both intersections would operate with minimal delays and queue for both peak periods during the 2015 post development conditions. Both intersections would essentially retain their current 2004 base intersection performance even under the worst case scenario for traffic impact.

**4.12.6 Mitigation measures**

The aims of the proposed traffic impact mitigation measures are to:

- minimise the impact of trucks on the local road network and local residents;
- comply with approved access and vehicle movements under the existing development consent; and
- comply with the performance criteria for sand transport set out in *Baulkham Hills Development Control Plan 16*.

The results of the intersection analyses indicate that there would be significant spare capacity at the two key intersections within the vicinity of the sites. The intersections would be operating satisfactorily with a level of service of A in both peak periods under scenarios including additional traffic generated from the ultimate development of the Hitchcock Road and Lot 198 sites, the extension of the consent to include the processing of materials transported from other sites and projected traffic growth along Wisemans Ferry Road and Old Northern Road,. Both would retain their current intersection performance for both peak periods under the 2006 and 2015 peak post-development traffic conditions. Therefore no additional mitigation measures would be required in relation to infrastructure provision.

The existing quarry operates under an Environmental Management System (DFA Consultants, 1999), which includes an Environmental Procedure for Roads and Traffic Management. This procedure would be followed for the proposed operation and would be revised to include the following additional mitigation measures:

- all truck loads will be covered before leaving the site;
- the intersection and access road will be inspected by the site manager for damage to road surfaces on a monthly basis and damage repaired as required;
- the intersection will be inspected weekly by the site manager for accumulated sand and clay and maintained as necessary by removing the material;
- all new truck drivers will be provided with Site Induction for Drivers outlining site requirements and expected driver behaviour such as observing the speed limits and not using exhaust brakes in sensitive locations; and
- speed limited to 20 kilometres per hour on roads within the site.

## 4.13 Visual impacts

### 4.13.1 Objectives

The aim of the visual assessment is to:

- describe and illustrate the existing visual environment of the site and its surroundings;
- determine the sensitivity of the site to public view;
- determine the level of visual impact that the proposal would produce and establish appropriate development guidelines; and
- provide visual quality objectives for the development.

Commonly used methods of visual assessment seek to minimise its subjective nature (United States Forestry Service 1974, the Forestry Commission of Tasmania 1983 NSW Department of Planning 1988 and the Queensland Department of Main Roads 1997). The main elements of the assessment consider:

**Visual quality**-which measures the degree to which the visual aesthetics of a landscape are valued from a human perspective. Relevant studies by others have concluded that landscapes that are relatively natural and vegetated are preferred, especially those with water features, dramatic topography and visual contrasts. Landscapes least preferred are those with a high degree of human disturbance as well as those with few trees and landforms that are flat and unvaried (Wright 1973, Colleran and Gearing 1980).

**Visual sensitivity**-which measures the degree to which any visual change to the landscape is likely to affect humans. Locations normally most sensitive to visual change are those with high and/or fixed viewing populations, relatively natural settings and visually prominent and elevated sites. In addition, the closer the viewer is to the site of the change, the higher the potential for impact. Permanent visual impacts to residents are also obviously of more concern than the more transient impacts on passers-by.

**Landscape change**-the greater the proposal would contrast with the surrounding landscape, the more the type and severity of the landscape change would be an issue. Aspects of this could include dramatic alterations to the natural landform, the effect of the introduction of alien (urban) elements into a natural or rural landscape, visual separation between adjacent areas or the obstruction of existing and valued views. All these factors influence the extent to which the proposal would result in visual impacts.

**Impacts over time**-an allowance needs to be made for the changes that would occur over time following completion of the proposal, the implementation of any mitigation measures and their maturation. Impacts can be expected to be highest during and immediately following completion of extraction with a gradual reduction in impacts occurring as the surrounding landscape matures and viewers become more familiar with the permanent visual changes.

The following is a summary of the visual assessment which is included in full in **Technical Paper 8** in Volume Three.

#### **4.13.2 Existing visual environment**

The site is bounded to the north west by Wisemans Ferry Road, to the north east by Old Northern Road, to the west by Hitchcock Road and to the south and south east by adjoining Crown land which also constitutes the boundary of the Maroota sector of *Sydney Regional Environmental Plan 9 - Extractive Industry (No 2)*.

The dominant natural feature of the site is the former Maroota Trigonometrical Hill which reaches an elevation of 240.7 metres Australian Height Datum. The lowest point on the site has a level of approximately 188 metres Australian Height Datum while the majority the area has an elevation at or above 200 metres Australian Height Datum. The site is therefore generally higher than the surrounding areas. As a result, views into and across the site from the peripheral roads are limited to a small number of locations along Old Northern Road and Hitchcock Road. Views from other locations are restricted by rising ground within the site or bunds constructed as part of the present development.

The site is located in a rural environment at the southern end of the Maroota Ridge which forms part of the Hornsby Plateau. The Hawkesbury River is to the north west of the site within a deeply incised valley with heavily forested steep river terraces.

The high parts of the site provide views of the Blue Mountains to the west, the heavily forested areas to the south and across the cleared and cultivated areas to the east.

A number of visual mitigation measures, predominantly earth bunds along the periphery of the site included as part of the current development, have reinforced the natural screening effects of the topography resulting in a reduction in visual sensitivity.

#### **4.13.3 Scenic quality guidelines**

Under *Sydney Regional Environmental Plan 9 – Extractive Industry (No 2)* consent must not be granted to extractive industry on land identified in Schedules 1 or 2 unless a rehabilitation plan has been prepared. The form and content of the required plans is set out in the planning report attached to the plan. This includes an item on visual amenity of the site where its protection or improvement so that it blends into the surrounding landscape is considered to be a rehabilitation objective. Tree planting and/or a landscape program is required for visual screening, the reduction of wind-blown dust, noise attenuation or as part of the post-extraction land use.

*Development Control Plan 16 – Extractive Industries* (Baulkham Hills Shire Council 1997) addresses the issues of visual amenity and scenic quality and provides the following performance criteria:

- provision of setbacks capable of minimizing the visual impact of extraction sites particularly when viewed from surrounding private and public places;
- protection and retention of visible features of local historical, archaeological and geological significance;
- protection of the surrounding natural and/or rural landscape;
- minimise the sources of visual and other environmental pollution; and
- rehabilitation of extraction sites to a final landform capable of integrating with the physical elements and land use patterns contributing to the high scenic quality and diversity of a catchment.

#### **4.13.4 Visual elements of the proposal**

The proposed development would remove vegetation, topsoil, overburden and the available Tertiary Sand and friable sandstone resource from defined areas on the site. This would result in remoulding of the existing landform and, during active extraction, the exposure of substantial parts of the area. Progressive rehabilitation would return the site to a vegetated state as quickly as possible.

Visual mitigation measures such as bunds and vegetated setbacks have been implemented along the periphery of the site and parts of the site where extraction is complete have been reformed and seeded with local native species.

#### **4.13.5 Mitigation measures**

Extraction to date has taken place behind vegetated bunds within the setbacks prescribed in *Development Control Plan 16–Extractive Industry* (Baulkham Hills Shire Council 1997). This has resulted in the minimisation of visual impacts and will be extended, as appropriate, into those areas where extraction is yet to be undertaken.

Large-scale revegetation, predominantly on the steeper slopes would be undertaken as part of site rehabilitation. Over time, this would assist in blending the topography into the

surrounding area and remove visual contrast between the lighter colour of the disturbed parts of the site and the darker background of the existing native vegetation.

#### **4.13.6 Assessment of impacts**

While visibility is a key factor in determining the level of potential visual impact of a proposal, other considerations need to be addressed. These are:

- visual contrast with the surrounding landscape; and
- the capacity of the proposals including various mitigation measures and the time required to restore any contrasts that would occur as a result of the development.

The use of these two additional factors is based on the premise that all developments, particularly of this nature, will cause, to varying degrees, some form of visual contrast with the surrounding landscape. This contrast may take the form of landform contrasts, soil colour contrasts, vegetation pattern contrasts and so on. Depending on its extent, this contrast may, over time, be reduced so as to become negligible within the surrounding landscape. Factors which affect this recovery time include the capacity of the site to be rehabilitated, that is, soil types, water and nutrient availability and work programs specifically aimed at reducing the length of time that contrasts exist, such as progressive rehabilitation programs.

In determining the possible visual contrasts that could be generated by the development, the key variables are:

- landform - in terms of its change, its scale and its form;
- colour contrasts - caused by exposed soils, haul roads and other physical changes; and
- vegetation - changes to its pattern, particularly skyline vegetation.

##### ***Landform***

The current landform would be substantially modified as a result of the proposed development. The former Maroota Trigonometrical Reserve hill, which has the highest elevation in the general area, is proposed for reduction with the result that its final form would be some 30 metres lower than its current level. The profile of the central part of the site would be changed from a ridge with steep batters to the north and south to a lower landform which is less visually prominent and better integrated with the surrounding topography with shallower batters. The final landform of the site is shown in **Figure 2.6**.

While the landform changes will be observable over a period of time, particularly on the high points of the site, there would come a point when these changes are no longer apparent. Boundary mounding and screen planting measures already in place, will ensure that any visual contrasts developed as a result of the landform changes would be reduced.

##### ***Colour contrasts***

The most observable contrast of the proposed development would result from the exposure to public view of the yellow coloured sand which could cause a distinct colour contrast with the surrounding landscape. This is currently visible from a small number of locations around the periphery of the site.

While it is an expected contrast of a quarry operation, it is also readily and permanently removed once a grass cover is established. Sensitive mine planning, progressive

rehabilitation and an ongoing maintenance program permanently solves this potential problem.

### **Vegetation**

The greatest visual contrast caused by the removal of sections of vegetation occurs when the site has a uniform tree cover, or when the vegetation removal occurs on the skyline in respect to the observer's viewpoint.

When trees are removed from landscapes that have a diverse vegetation pattern where a mixture of treed and cleared area exists, as on the Hitchcock Road site, the impact or contrast caused by their removal can be regarded as low.

On this basis, the removal of the skyline vegetation from the former Trigonometrical Reserve hill ridge top will result in visual contrasts until the ridge top itself is removed. Vegetation removal from other areas within the site excluding that to be retained for visual reasons would generally not cause a contrast due to the diverse vegetation pattern on the site.

Potential visual contrasts could readily be generated by this development if due care is not undertaken. However these contrasts can be generally minimised, at worst reduced, and at best eliminated, through sensitive planning of mine operations, provision of mitigation measures (such as boundary mounding and screen planting) and the progressive rehabilitation of works areas together with an ongoing maintenance program.

### **Recovery time**

The third key factor in determining the visual impact of a proposed development, relates to the ability of the landscape to either absorb or disguise the contrasts caused, and thus the time frame in which this will occur.

The principal natural elements which determine the site's ability to disguise these contrasts and minimise recovery time include the biophysical elements pertaining to the site itself - that is, its landform, its vegetation screening ability, the ability of the soils to develop new fast growth and the level of rainfall.

Human intervention in the process relates to:

- determining guidelines and design techniques to help and assist absorb or disguise visual contrasts such as mine planning and the retention of existing or development of new screening; and
- influencing prevailing biophysical factors by progressive rehabilitation, improving soil quality and providing continuing maintenance.

As a result of the extensive change proposed at the site, few of the natural biophysical elements will remain to help absorb visual contrasts and minimise recovery time of the landscape. This process is therefore reliant on the provision of mitigation measures, many of which have been implemented as part of the present development.

### **4.13.7 Conclusions**

The site is only visible from publicly accessible areas at a small number of locations. This is due to the topography, peripheral bunds already in place and existing vegetation.

The highest points on the site are visible in the middle distance from Hearses Road. However, this is currently used by few people (it is not a through road) and will soon become part of a major sand extraction operation recently approved. Public access will

be limited or not available depending on site activities and views to the Hitchcock Road site will be across an active sand extraction operation. There are few, isolated, long distance views to the site from Wisemans Ferry Road.

Limited views of the extraction area proposed for Lot 2 DP555184 would be available from a short section of Old Northern Road when travelling to the south. However, the introduction of intervening bunds and additional screening vegetation would eliminate these. Views of the current extraction activities on Lot 1 DP34599 are not visible from Old Northern Road due to the topography which slopes away from the road and intervening dense vegetation which would not be removed as part of the proposal.

Visual impacts of current operations on the site are minimal and the proposed development would result in minor visual changes which are unlikely to be visible to the public.

## **4.14 Hazard and risk**

### **4.14.1 Assessment of hazard**

*State Environmental Planning Policy 33 – Hazardous and Offensive Development* requires that the safety and pollution impacts of a proposal are addressed at an early stage of the development application process. The policy provides a procedure which links the permissibility of the proposal to its safety and pollution control performance.

If a proposal is either potentially hazardous and/or potentially offensive, the policy applies. *Applying State Environmental Planning Policy 33* (Department of Urban Affairs and Planning 1994) provides a method of determining if a proposal falls into these categories.

The policy specifies screening thresholds based on the quantity of a potentially hazardous substance or on the quantity of the substance relative to the distance from where it will be stored to the nearest site boundary. If the storage quantity proposed exceeds the relevant threshold, the preparation of a preliminary hazard analysis is required.

State Planning Policy 33 defines hazardous materials as substances falling within the classification of the *Australian code for the Transport of Dangerous Goods by Road or Rail* otherwise known as the *Australian Dangerous Goods Code* (Federal Office of Road Safety 1992). Raw materials to be extracted, processed and stockpiled on the site are not classified as hazardous substances under this code. Diesel fuel and lubricating oil are stored at the workshop on Lot 198 in bunded compounds and would not be stored on site. Both of these are combustible liquids, Class C1 and C2 respectively but are not classified as hazardous substances under the *Australian Dangerous Goods Code*.

The application of the screening procedure set out in *Applying State Environmental Planning Policy 33* indicated that as no hazardous materials as defined by the code were stored on site, the development is not classified as hazardous and State Environmental Planning Policy does not apply.

### **4.14.2 Assessment of offensiveness**

A development is potentially offensive if, in the absence of safeguards, it would emit a discharge resulting in significant offence. *Applying State Environmental Planning Policy 33* recommends that the following are considered when determining if a proposal is potentially offensive:

- is a licence required under any pollution control legislation administered by the EPA (now the Department of Environment and Conservation)? If so, the proposal should be considered potentially offensive;
- does the proposal require any pollution control approval required by any legislation or by-law administered by the council? and
- if such a pollution control licence or approval is not required, does the proposal cause offence having regard to the sensitivity of the receiving environment?

The key issue in assessing the potential offensiveness of a proposal is the presence of adequate safeguards to ensure control of emissions from a facility. In the majority of cases, compliance with a pollution control licence under Department of Environment and Conservation legislation is sufficient to demonstrate that a proposal is not offensive. Where the proposal does not require such a licence, additional licence requirements under other consent authorities need to be considered.

The development proposed requires an environmental protection licence from the Department of Environment and Conservation under the *Protection of the Environment Operations Act, 1997* as scheduled works or activities would be carried out on the site. Compliance with the conditions of this licence would ensure minimal offence.

The implementation of safeguards and compliance with the Environment Protection Licence would ensure that the proposal is not offensive.

#### **4.14.3 Assessment of risk**

The risks associated with the operations undertaken at the site relate to environmental issues such as landslip and bush fire. The storage and use of dangerous goods is discussed in **Section 4.14.1**.

##### ***Land slip***

The land slip potential of the site is limited to failure of excavated sand profiles within the operational areas, along the haul road and access roads to the cut faces and within batters associated with detention ponds and acoustic bunds.

Potential hazards of land slip would be mitigated by drainage control measures which divert surface runoff away from excavated areas and the use of appropriately designed batters with intermediate benches during extraction and bund construction. The excavated faces and bunds would be completed to maximum final slopes of 1 vertical to 3 horizontal to reduce their susceptibility to failure. All extraction operations would be undertaken in compliance with standard quarry safety procedures.

##### ***Bush fire***

Approximately 35 percent of the total area of the site is classified as Vegetation Category 1 on Bush Fire Prone Land map, Sheet 12 (Baulkham Hills Shire Council 2004) while the remaining areas are Vegetation Buffer (100m x 30m) (50%) or unclassified (15%). Vegetation Category 1 includes Groups 1 and 2 vegetation types which are forest, woodlands, heaths and wetlands. Agricultural lands used for annual and/or perennial cropping, orchards, market gardens and nurseries are excluded from these categories.

The site comprises cleared agricultural land which has experienced extensive sand extraction. There remain isolated stands of vegetation within this area and extensive areas of woodland are located in the south eastern parts of the site contiguous with the denser vegetation of Maroota State Forest creating a potential fire hazard downslope of the site.

The proposal would require the removal of isolated stands of trees and shrubs and a proportion of the denser woodland would also be removed where necessary. Access is available via the current haul road and an ample water supply is available for fighting fires from existing dams across the site. The proposal would progressively reduce the bush fire hazard on the site although substantial areas of woodland would remain in the south eastern part of the site together with a small number of dwellings within or adjacent to its boundary.

Bushfire response measures would include:

- provision of training on related hazards and fire control for all site operatives;
- establishment of response procedures for the control of accidental fires;
- identification of potential fire hazards and establishment of coordinated response procedures with Council and the Rural Fire Service;
- provision of well-maintained fire fighting equipment;
- fitting of spark arresters on equipment; and
- provision of fire extinguishers in all on-site vehicles.

A detailed set of bushfire mitigation measures is included in the current Environmental Management Plan for the site. These would be reviewed and amended if necessary.

## **4.15 Waste management**

Waste from the proposed development would comprise:

- vegetable matter from clearing;
- overburden from the initial extraction works;
- tailings from the wash plant;
- used oils, filters and machinery parts;
- wastewater from the existing amenities; and
- general office and administration waste.

The overall waste management objective is to minimise the generation of waste, maximise recycling and ensure that wastes are managed in a way that minimises impacts on the environment.

Trees, shrubs and other plants stripped during site clearing would be reused during rehabilitation to provide a source of seed, organic matter and refuge for fauna.

All overburden would be used in rehabilitation of the previously extracted area or adjacent parts of the site. Tailings, the fine clays and silts that are removed from the sand during washing would be disposed of in tailings ponds on the site.

General waste would be managed at the workshop and offices on Lot 198 which provides separate receptacles for paper, aluminium, glass, plastic and general domestic

waste with the recyclables (paper, aluminium, glass and plastic) collected by a licensed disposal contractor.

Sewage treatment and disposal is provided by an *enviro-cycle* type plant. It is not proposed to install any additional office facilities or amenities on the site.

Waste oil and grease is collected and stored in a bunded tank and periodically removed by a licensed oil recycling contractor. Building waste and putrescible material is also removed from site on a regular basis and this procedure would continue.

## 4.16 Socio-economic effects

### 4.16.1 Population profile and future growth

Information on the population of Baulkham Hills Shire has been derived from *Baulkham Hills Demographic Profile* (Nexus Learning Systems 1999) and the 2001 and 2006 Census data (Australian Bureau of Statistics). Maroota is located in the Wisemans Ferry Planning District of the Shire.

The population of Baulkham Hills Shire was 119,545 in 1996. This rose to 139,403 in 2001 and 159,391 in 2006 at an average annual growth rate of 3.3 percent, one of the highest in NSW. The age structure of the local population compared to that in the Sydney Statistical Division and NSW as a whole is shown in **Table 4.20**.

**Table 4.20 Population age profile of Baulkham Hills Shire**

Age	Baulkham Hills local government area (percentage)		Sydney 2006 (percentage)	NSW 2006 (percentage)
	2001	2006		
0-4	6.4	6.6	6.6	6.4
5-14	15.4	15.0	13.0	13.4
15-24	15.3	14.7	13.8	13.3
25-54	44.2	42.4	44.1	42.0
55-64	10.6	12.2	10.2	11.0
65+	8.0	9.1	12.3	13.8
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: Australian Bureau of Statistics

This growth is taking place in the southern parts of the shire and in the adjacent local government area of Blacktown. Growth is expected to continue at rates similar to those experienced over the past five years resulting in a shire population of 180,000 by 2011. However, this projection was based on a population of 150,000 in 2001 which was not achieved. There are no urban growth areas in the northern parts of the shire. Population growth here is restricted by a limited road network, steep topography and sensitive land uses which are protected by restrictive zoning.

### 4.16.2 Employment

In 2006, 63.6 percent of the residents of Baulkham Hills over the age of 15 were in full-time employment (27.9 percent were in part-time employment). This showed a decrease over

the percentage for 2001 (68.5 percent) but is higher than that for Sydney (60.8 percent) and for NSW (63.1 percent). The employment profile for the shire in 2006 is shown in **Table 4.21**.

Industries with the highest participation in 2006 in Baulkham Hills were the retail trade, health and social services and professional, scientific and technical services. The proportion employed in the shire in construction, wholesale and retail trade and education exceeded that for Sydney as a whole but a smaller proportion was employed in manufacturing, accommodation and food services, government administration and support and arts and recreational services. Only 0.1 percent was employed in the mining industry compared to the state figure of 0.7 percent.

**Table 4.21 Persons employed by industry 2006**

Industry	Persons employed (percentage)		
	Baulkham Hills	Sydney	NSW
Agriculture, forestry and fishing	0.6	0.4	2.7
Mining	0.1	0.2	0.7
Manufacturing	9.4	9.7	9.6
Electricity, gas and water supply	0.8	0.8	1.0
Construction	8.0	7.1	7.3
Wholesale trade	7.4	5.6	4.7
Retail trade	11.6	10.4	11.1
Accommodation and food services	4.6	6.0	6.5
Transport, postal and warehousing	3.4	5.3	5.0
Information, media and telecommunications	2.6	3.0	2.4
Finance and insurance services	6.2	6.4	5.0
Rental, hiring and real estate services	2.1	1.8	1.7
Professional, scientific and technical services	9.5	9.9	7.3
Administrative and support services	2.7	3.4	3.1
Public administration and safety	4.7	5.6	6.0
Education and training	8.6	7.2	7.5
Health and social assistance	10.1	9.8	10.5
Arts and recreational services	1.2	1.5	1.4
Other services	4.1	3.7	3.8
Inadequately described/not stated	2.3	2.8	2.7
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: Australian Bureau of Statistics

#### **4.16.3 Community relations**

The Environmental Management Plan prepared for the Hitchcock Road Sand Extraction and Rehabilitation Project (DFA Consultants 1999 updated 2004) provides details of the management procedures adopted for community relations and complaints protocols to

effectively manage and monitor social impacts of sand extraction activities in Maroota. These procedures would be followed for the proposal on Lot 198, including:

- biannual liaison and review committee meetings involving three permanent Maroota residents not associated with PF Formation, two Council representatives, one representative each of the Department of Environment and Conservation and the Department of Infrastructure, Planning and natural Resources, representatives of PF Formation and any other persons considered appropriate by Council;
- telephone complaints line open during operating hours with the telephone number advertised locally;
- all complaints/concerns raised by the community/relevant authorities recorded in the Complaints Register retained at the site office on Lot 198. All complaints are brought to the attention of the site manager within 24 hours of receipt. The site manager is responsible for initiating appropriate action in response to the complaint and contacting the complainant to resolve the issue;
- preparation of articles for the local community newspaper (Living Heritage) including discussion of mining issues of interest; and
- preparation of the annual environmental management plan, the audit section of which is available for public inspection.

The community has been involved in the planning stages of the development proposal and the preparation of the environmental assessment. A newsletter outlining the proposal was distributed to the local community providing a telephone information line and email address to provide a channel for the expression of concerns, obtaining information and discussing issues. A public meeting was held in December 2004 to present the proposed development to the local community, discuss concerns and receive feedback.

All adjacent landowners and residents were notified of progress with the application in August 2006 and responses requested. Details have been included on the PF Formation web site including a freecall telephone number and a link to the Major Project application and its supporting documentation on the Department of Planning web site.

#### **4.16.4 Community impacts**

The proposed sand extraction will service the same market as previous operations undertaken by PF Formation at Maroota, will employ the same number of staff and use the same fixed and ancillary plant. Negative effects on local employment and the economy are therefore unlikely.

Socio-economic benefits of the proposal include the continuation of local employment, continuing supply of high quality sand to the Sydney market and continuing flow-on effects to the local and regional economy.

### **4.17 Sustainability**

#### **4.17.1 Assessment method**

Ecologically sustainable development is the use, conservation and enhancement of community resources so that ecological processes, and hence the quality of life, are sustained and improved for present and future generations. It is based on four principles:

- the precautionary principle;
- social equity and intergenerational equity;
- conservation of biological diversity and ecological integrity; and
- improved valuation and pricing of environmental resources.

Applying these principles to the proposed development at Hitchcock Road would involve:

#### **4.17.2 Precautionary principle**

The precautionary principle posits that threats of serious or irreversible damage, which lack full scientific certainty, are not to be used as a reason for postponing measures to prevent environmental degradation (*Environmental Planning and Assessment Regulation, 1994*). In the application of this principle, decisions should be guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment and an assessment of the consequences of various options (*Inter-Government Agreement on the Environment, 1992*).

Emphasis must be placed on anticipation and prevention of environmental damage and the environmental consequences of all site procedures. Any action likely to involve serious or irreversible environmental damage should be avoided and other options assessed.

A team of specialist consultants was engaged to examine the existing environment, predict potential impacts and design mitigation measures to ensure that the environment was protected to the satisfaction of statutory requirements and reasonable community expectations.

In order to avoid serious or irreversible damage to the environment all facets of the development have been carefully evaluated and environmental management techniques proposed. Environmental monitoring has been undertaken over the last six years in compliance with the consent orders for the current development. Environmental safeguards have been planned with a comprehensive knowledge of the existing environment and an appreciation of potentially harmful environmental impacts. Relevant Government authorities were consulted in the preparation of the environmental assessment to enable interested parties to comment on activities with the potential for environment degradation.

Where results may alter over time, influencing the extraction operation, these will continue to be monitored during the operation. For example, groundwater levels will be monitored to ensure that extraction does not reach the groundwater table. Noise and air quality monitoring will continue throughout the life of the development.

#### **4.17.3 Social and intergenerational equity**

Social equity involves fairer distribution of costs and benefits to improve the well being and welfare of the community. Social equity also includes intergenerational considerations which require the present generation to ensure that the health, diversity and productivity of the environment is maintained or enhanced, for the benefit of future generations.

Social equity within the current generation requires that the economic and social benefits of the proposed development are distributed appropriately among all members of the community. It is also necessary that environmental safeguards against degradation of flora and fauna, groundwater, surface water, cultural heritage, socio-economics, visual, acoustic and air amenity be implemented to ensure that no part of the community would be unacceptably disadvantaged.

The potentially adverse impacts on environmental resources likely to affect social equity have been assessed and mitigation measures recommended. These measures relate to erosion and sediment control, surface and groundwater management, air quality controls, noise controls, traffic and waste management. Implementation of the mitigation measures would result in a reduction in effects on social and intergenerational equity.

The proposed development would result in efficient resource recovery and contribute to local and regional economic growth promoting community well being through the provision of income, employment and construction resources. It is anticipated that the development would continue to contribute to the local and regional economy. The final landform would be integrated as far as possible into the local landscape, considering the needs of the future community and fauna populations in the Maroota area.

Social impacts of the proposal are assessed in **Section 4.15** and strategies outlined to ensure that the community is well informed about the project and has an effective means of voicing concerns and receiving feedback.

The sand would be used to produce a high quality product with a wide range of uses in the construction and building industries. The products used in the construction of roads and infrastructure would benefit both present and future generations given the extended life of infrastructure such as roads and buildings. In addition, the conversion of construction materials such as sand into finished infrastructure is a process of value adding to the resource and can be seen as a long-term investment in the material.

#### **4.17.4 Ecological integrity and conservation of biological diversity**

Biological diversity refers to the variety of genes, species, populations, communities and ecosystems and the linkages between them. Biological resources provide food, many medicines, fibres and industrial products. They are also responsible for vital ecological functions such as maintaining soil fertility and the supply of clean and fresh water. Maintenance of biodiversity will ensure life support functions and the provision of environmental resources for future generations.

The quarry plan aims to maximise the protection of biological diversity and ecological integrity by:

- progressive rehabilitation of the extracted areas;
- rehabilitation of the site with native species to maximise native fauna habitats and encourage their return to the site after quarrying;
- implementation of hazard controls to ensure risks such as fire on the site are minimised;
- ongoing monitoring of flora and fauna communities on the site to monitor viability; and
- providing a final landform that integrates elements of the local area.

#### **4.17.5 Valuation of environmental resources**

This principle involves consideration of all environmental resources, which may be affected by the proposal, including air, water, land and living things. It is a component of Intergenerational Equity as improved valuation and pricing of resources is paramount in achieving conservation of the natural environment for future generations. Applying standard methods of valuation and pricing to environmental resources is a difficult process given the intangible nature of much of the natural environment, for example visual amenity, cultural values and the atmosphere's ability to receive gaseous emissions. The environment has conventionally been considered to be a free resource and environmental factors have been excluded from determining the real cost of an activity. The real cost to the environment will become apparent using improved valuation and pricing and can be included in the costs of any development.

The value placed on environmental resources on and around the site is evident in the extent of environmental investigations, planning and design of impact mitigation measures to prevent irreversible damage of those resources. PF Formation currently undertakes environmental monitoring of its existing development and this would continue for the proposed development. The cost of this monitoring, ongoing investigations, planning, design and implementation of the mitigation measures has been factored into the company's economic analysis of the project.

#### **4.17.6 Energy consumption and efficiency**

Energy consumption relates predominantly to the use of machinery and equipment required to extract and process the sand produced on the site and transport it to market. This includes excavators, articulated trucks, bulldozers and pumps of various kinds. Reductions in energy use can be achieved by the introduction of more energy-efficient equipment and the regular replacement of high-use machinery by newer models with greater fuel economy.

Annual electricity consumption is approximately one million kilowatt hours which equates to 985 tonnes of greenhouse gas emissions per year. Approximately 400,000 litres of fuel, mainly diesel is consumed per year. PF Formation regularly updates its equipment and, where possible replaces petrol/diesel pumps with electric models and older equipment with more fuel efficient models.

There is a large maintenance workshop located on Lot 198 and all equipment and vehicles are regularly serviced to ensure that they are operating as efficiently as possible. This is undertaken in compliance with the requirements of the current environmental management plan.

### **4.18 Cumulative impacts**

Cumulative effects of the proposal are those that need to be considered in conjunction with other developments in the Maroota area. The area has a number of sand extraction operations and as other major sources in the metropolitan area are exhausted, more sites in the area defined in Sydney Regional Environmental Plan 9 are likely to be opened up for development. The cumulative effects of extractive industries may include increases in noise and dust generation, decreases in surface and groundwater quality or quantity, reduction in flora and fauna species diversity and habitat, increased traffic, especially heavy trucks and a reduction in visual amenity.

Cumulative impacts would occur as a result of developments of two types:

- contemporary sand extraction operations currently underway. In addition to PF Formation's operations in Baulkham Hill and Hornsby, there are three other operators in the Maroota area: Dixon Sand, Sun-A-Rise (HB Maroota Pty Ltd) and Maroota Mining Pty Ltd (F Vella); and
- future sand extraction proposals either awaiting assessment or under preparation.

The baseline studies necessary for the technical investigations reported in the environmental assessment include the impacts of all sand extraction activities currently undertaken in the Maroota area. These include truck movements, noise, air quality and surface and groundwater quality. It is not, however possible in the context of a single development application to assess potential future cumulative impacts as the extent and location of new sand mining operations is unpredictable. Controls on the extent and scope of future development of this kind in the area are ultimately the responsibility of the Department of Planning.

The purpose of Sydney Regional Environmental Plan 9 is to assist in the development of extractive resources close to the Sydney metropolitan area so that the cost of supplying materials to the community could be kept at a reasonable level. The plan takes precedence over local planning instruments. It is inevitable therefore, that proposals will continue to be submitted for the continuation of existing extraction operations and new ones in the area designated for such activities in Maroota. This area will become increasingly significant as alternative sources become exhausted.

There are currently three sand extraction proposals at various stages in the approval and development process in the Maroota area which could result in cumulative impacts. These are:

- Sand extraction on Lots 1 and 2 DP 547255, Old Northern Road, Maroota using the existing process plant on Lot 196 DP 752025. This development has a life of 18 years from the date of consent and is currently underway. Production from the existing quarry and its extension is not to exceed 495,000 tonnes per year.
- Sand extraction on Lot 198 DP 752025, Wisemans Ferry Road, Maroota. The development application supported by an EIS was recently approved by Baulkham Hills Shire Council and extraction has commenced. Production would be expected to average 35,000 tonnes per year over a ten year life.
- Sand extraction on Lot 170 DP 664767, Lots A and B DP 407341 and Lots 176 and 177 DP 752039, Haerses Road, Maroota. The development application supported by an environmental assessment was recently approved by the Minister for Planning. The development would have a life of 25 years with an annual extraction rate of 250,000 tonnes. The proposal would use empty trucks returning to Lot 196 DP 752025 to transport the extracted material to the process plant. The annual production rate on Lot 196 would be in accordance with the approved maximum of 495,000 tonnes per year.

Each of these proposals has been assessed, in terms of its cumulative impact in relation to existing and future development in the Maroota area. The existing operations at the Hitchcock Road site are included in these assessments. As the proposal described and assessed in this environmental assessment would result in no change to environmental impacts with the exception of the final topography of the site, any additional cumulative impacts can be considered to be minimal.

Existing vehicle movements (quarry movements only) are approximately 160 vehicles per day on both Old Northern Road and Wisemans Ferry Road. This is less than half of approved quarry related movements in the Maroota area (Department of Infrastructure, Planning and Natural Resources 2004). No net increase in truck movements on the road network is expected to result following the approval of the Haerses Road development.