Haerses Road Sand Quarry
Extraction Area Expansion Modification
(DA 165-7-2005 MOD 1)

Environmental Assessment Report

Section 75W of the *Environmental Planning and Assessment Act 1979*

1. BACKGROUND

Dixon Sand (Penrith) Pty Ltd (Dixon Sand) operates the Haerses Road Sand Quarry (HRSQ) at Maroota, in the Hills Shire local government area (see **Figure 1**). The site operates in conjunction with Dixon Sand's Old Northern Road Quarry (ONRQ), which is located approximately 2 kilometres (km) north of the site (see **Figure 2**).

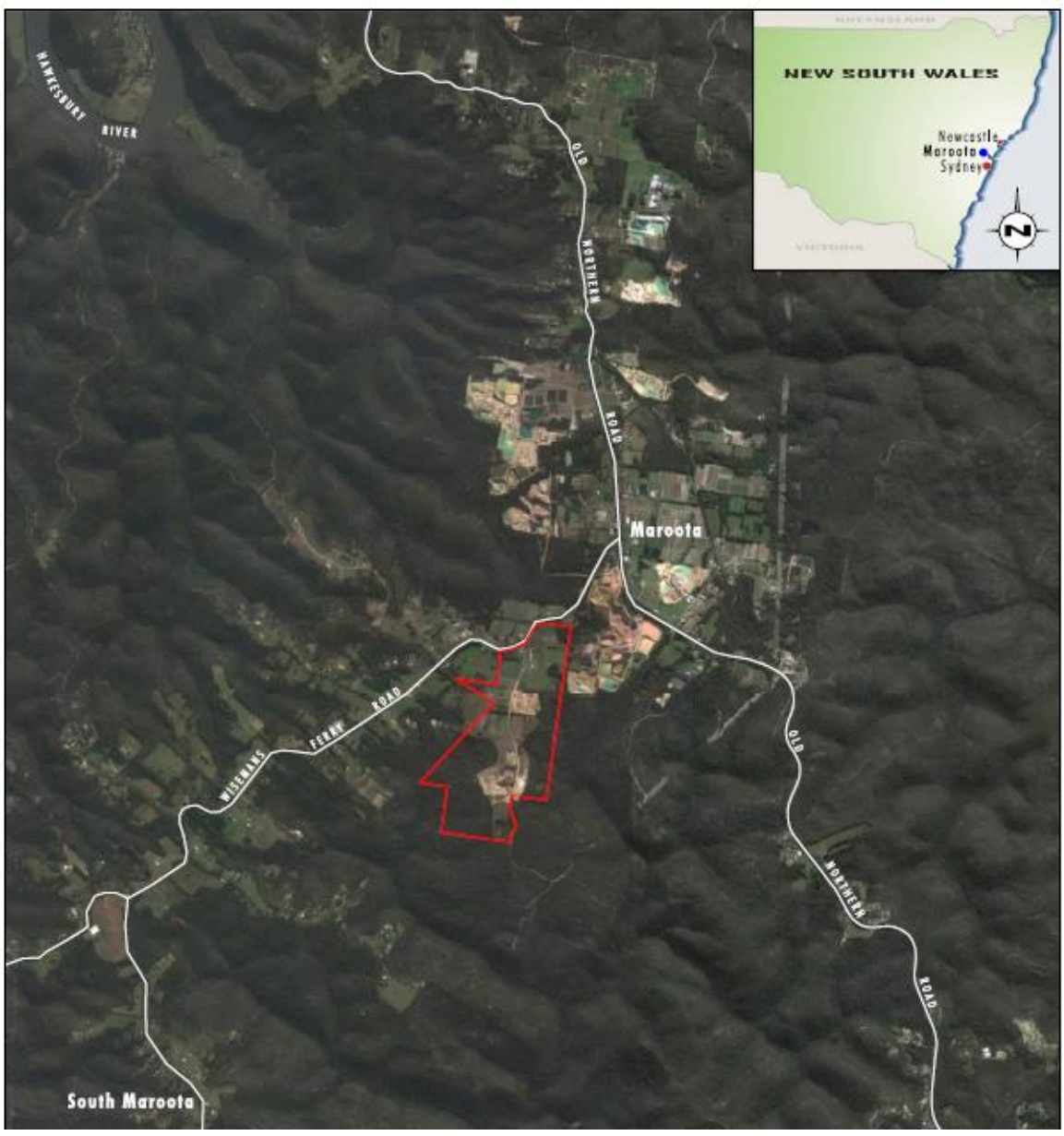

Figure 1: *Locality map*

The HRSQ currently operates under DA 165-7-2005, which was approved by the Minister for Planning under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 14 February 2006.

The development consent allows the extraction of up to 7 million tonnes of sand over a 25-year period, with a maximum extraction rate of 250,000 tonnes per annum (tpa). Under this consent, Dixon Sand is permitted to haul up to 190,000 tpa of screened sand to the ONRQ for processing. The remaining 60,000 tpa is transported directly to market. Up to 56 truck movements are permitted at the HRSQ per day, comprising 28 inbound and 28 outbound movements. Haerses Road, while a public road, principally operates as the HRSQ's access road.

The ONRQ currently operates under a separate ministerial consent (DA 250-09-01). However, as the two facilities are interlinked, DA 250-09-01 imposes overall limits on annual production and daily traffic movements for the ONRQ and HRSQ collectively. Condition 6 of Schedule 2 states that total production at ONRQ, including all incoming product from HRSQ, must not exceed 495,000 tpa. Condition 7 of Schedule 2 limits the total number of truck movements at ONRQ, including both inbound and outbound truck movements, to a maximum of 180 per day. This includes up to 28 inbound trucks from HRSQ.

Figure 2: *Location of the Haerses Road and Old Northern Road quarries*

2. PROPOSED MODIFICATION

On 27 September 2016, Dixon Sand lodged a modification application under section 75W of the EP&A Act. The proposed modification involves:

- clearing 18.89 hectares (ha) of native vegetation;

- establishing a new extraction area in the south-western portion of the site (see **Figure 3**);
- extending the life of the quarry until 2046;
- use of two mobile crushers (one jaw crusher and one rotary crusher) and a mobile wet plant (see **Figure 3**);
- converting an existing dwelling to a site office and constructing ancillary structures and infrastructure including a workshop and weighbridge, car parking facilities, internal haul roads, water management structures and acoustic bunds;
- allowing up to 100 percent of product to be transported directly to market;
- allowing trucks to travel to the site from the north-east or south-west; and
- importing up to 100,000 tpa of clean recycled Virgin Excavated Natural Material (VENM) and Excavated Natural Material (ENM).

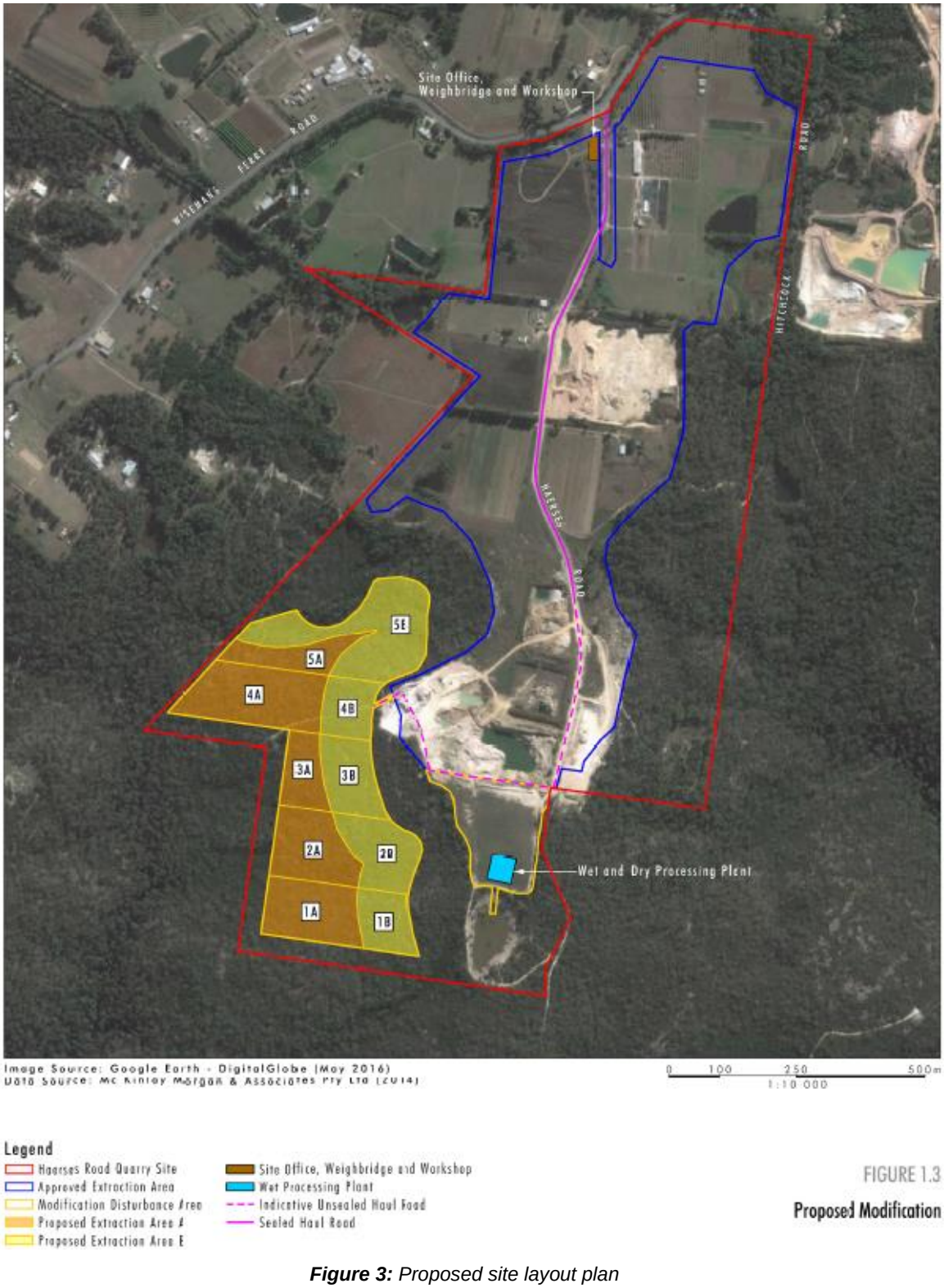

Figure 3: *Proposed site layout plan*

A full description of the proposed modification is provided in the Environmental Assessment (EA – see **Appendix A**).

The modification would allow the extraction of the friable sandstone resource on site, in addition to the Tertiary sand deposit which is currently approved for extraction. The total size of this sandstone resource is estimated to be 15 million tonnes. The proposed mobile crushers and wet plant would allow the sandstone to be broken down and washed at the HRSQ, rather than being transported through the Maroota township to ONRQ for processing.

As the extraction of the Tertiary sand deposit and the friable sandstone would utilise the same plant and equipment, only one of these resources would be extracted at any one time. The annual extraction limit would remain at 250,000 tonnes per year. The overall number of truck movements would also remain at 28 inbound and 28 outbound movements per day. However, the modification would allow all 28 outbound trucks to bypass the ONRQ, and travel direct to market via Wisemans Ferry Road to the south-west, or Old Northern Road to the south-east. For operational flexibility, Dixon Sand would also retain the option to transport sand to ONRQ, at a rate of up to 28 trucks per day.

The imported VENM and ENM would be blended with the excavated product prior to sale. This imported material would also be used in the progressive rehabilitation of the site, where overburden and fines are insufficient to achieve the final landform.

Dixon Sand submits that the proposed modification is necessary to meet the current demand for sand products within the Sydney region. The modification would enable the HRSQ to produce a wider range of specialist products, and assist in satisfying current market demands. The company contends that the modification would also yield positive local benefits, including the creation of four additional full-time jobs and a decrease in the number of trucks travelling through the Maroota township, and past the nearby public school.

3. STATUTORY CONTEXT

3.1 Section 75W

The development consent was granted under Part 4 of the EP&A Act. In accordance with clause 8J(8)(d) of the *Environmental Planning and Assessment Regulation 2000*, and the transitional arrangements under Schedule 6A of the EP&A Act, the modification must be determined under the former section 75W of the EP&A Act.

While the modification involves a substantial expansion of the approved extraction area, the nature and intensity of proposed activities on site would remain generally consistent with the approved development. Consequently, the Department is satisfied that the proposed modification is within the scope of section 75W, and may be determined accordingly.

3.2 Approval Authority

The Minister for Planning is the approval authority for the application. However, the Director, Resource Assessments may determine the application under the Minister's delegation of 11 October 2017, as there were no public objections, Hills Shire Council did not object to the proposal, and no political donations have been reported by Dixon Sand.

3.3 Environmental Planning Instruments

A number of environmental planning instruments apply to the modification, including:

- *State Environmental Planning Policy (SEPP) (Mining, Petroleum Production and Extractive Industries) 2007;*
- *SEPP (Infrastructure) 2007;*
- *SEPP (State and Regional Development) 2011;*
- *SEPP No. 33 – Hazardous and Offensive Development;*
- *SEPP No. 44 – Koala Habitat Protection;*
- *SEPP No. 55 – Remediation of Land;*
- *Sydney Regional Environmental Plan No. 9 – Extractive Industry (SREP 9);* and
- *The Hills Local Environmental Plan 2012.*

The Department has assessed the proposed modification against the relevant provisions of these instruments. Based on this assessment, the Department is satisfied that the proposed modification

can be carried out in a manner that is consistent with the aims, objectives and provisions of these instruments.

In particular, the Department has undertaken a detailed assessment of the proposal in accordance with the special requirements for extractive industries at Maroota under Clause 11 of SREP 9. Clause 11 states that consent must not be granted for the carrying out of an extractive industry unless the consent authority is satisfied that the development:

(a) is unlikely to have a significant adverse impact on the Maroota groundwater resource or on other groundwater users in the region;
(b) will conserve the environmentally sensitive and significant areas and features of the Maroota locality, including the environment of threatened species, populations and ecological communities;
(c) will involve controlled and limited access points to main roads; and
(d) will result in a final landform capable of supporting sustainable agricultural production or other post-extraction land uses compatible with the established character and the landscape and natural quality of the Maroota locality.

The Department has carried out a detailed assessment of the likely impacts of the modified development on groundwater resources, biodiversity, the regional road network, and the local landscape. The findings of this assessment are summarised in **Section 5**.

3.4 Commonwealth Approval

On 28 January 2016, the Commonwealth Department of Environment and Energy (DoEE) determined the proposed modification to be a 'controlled action' under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due its potential impacts on Matters of National Environmental Significance (MNES).

In making its determination, DoEE advised that the proposal is likely to have a significant impact on listed threatened species and communities (under section 18 and 18A of the Act), including *Darwinia biflora* and *Coastal Upland Swamps in the Sydney Basin Bioregion.* DoEE issued environmental assessment requirements for the project which were subsequently incorporated into the Secretary's Environmental Assessment Requirements (SEARs) issued on 12 February 2016.

Under the current Bilateral Agreement between the Commonwealth and NSW Governments, the Commonwealth has accredited the NSW assessment process under Part 4 of the EP&A Act, for the purposes of the EPBC Act, thereby enabling a single integrated assessment of the project by the Department for both State and Commonwealth purposes.

The Department has assessed the potential impacts of the project on the relevant MNES in accordance with the requirements of the Bilateral Agreement. This assessment is provided in **Section 5.1** and **Appendix E**.

Following the State's determination of the application, the Department will make a recommendation to the Commonwealth Minister for the Environment in relation to the acceptability of the impacts to MNES for separate determination by the Commonwealth under the EPBC Act.

4. CONSULTATION

After accepting the EA for the proposed modification, the Department:

- publicly exhibited the EA from 12 October 2016 to 10 November 2016 on the Department's website and at:
  - the Department's Information Centre;
  - The Hills Shire Council's Administration Centre; and
  - the Nature Conservation Council's office;
- advertised the exhibition of the EA in *The Hills Shire Times;*
- notified adjoining landowners; and
- notified the Commonwealth, relevant State Government authorities and The Hills Shire Council.

4.1 Agency Submissions

The Department received a total of eight submissions from Government agencies (see **Appendix B**).

The **Environment Protection Authority** (EPA) did not object to the proposed modification. However, EPA requested additional information with respect to noise and air quality impacts. Following Dixon Sand's submission of further information, EPA advised that its concerns had been addressed and provided recommended conditions of consent. Noise and air quality impacts are discussed in **Sections 5.2** and **5.3**, respectively.

The **Crown Lands and Water Division** (CLWD) of the NSW Department of Industry (formerly Department of Primary Industries – Water) expressed concern that the hydrogeology of the site had not been adequately investigated, and that there was significant uncertainty regarding potential impacts on groundwater. Following subsequent discussions with CLWD, Dixon Sand committed to further investigation and management measures to protect regional groundwater resources. In response, CLWD indicated that it was generally satisfied with the proposal and provided recommended conditions of consent. Potential groundwater impacts are discussed in **Section 5.5**.

The **Division of Resources & Geoscience** (DRG) of the Department raised no objections regarding the proposed modification, and expressed its support for Dixon Sand maximising resource recovery at the HRSQ. Following subsequent consultation, DRG noted that Dixon Sand's proposed Biodiversity Offset Strategy (BOS) would sterilise a portion of the sand resource on site. However, as this strategy would assist in the conservation of biodiversity values on site, DRG raised no objections in this regard.

The **Heritage Council of NSW** (Heritage Council) initially raised concerns that potential impacts on historic heritage were not adequately addressed in the EA. However, following the submission of a more detailed desktop historic heritage assessment, the Heritage Council advised that it had no further concerns. The impacts of the development on European heritage are discussed in **Section 5.6**.

The **NSW Rural Fire Service** did not raise any objections regarding the proposed modification. However, the RFS requested that Dixon Sand provide a detailed bushfire assessment report to demonstrate compliance with *Planning for Bush Fire Protection 2006*. In response, Dixon Sand provided a copy of its existing site Bushfire Management Plan (BMP). RFS subsequently advised that it has no further concerns, and recommended that the BMP be updated following the determination of Modification 1 (MOD 1). The Department has recommended conditions to this effect.

The **Office of Environment and Heritage** (OEH) did not object to the proposed modification. However, OEH expressed concerns that the biodiversity assessment included in the EA did not satisfy the requirements of the *Framework for Biodiversity Assessment, NSW Biodiversity Offsets Policy for Major Projects* (FBA). In particular, concerns were raised regarding the calculation of credits and the lack of detail in the BOS. In response, Dixon Sand submitted a revised BOS. OEH subsequently advised that its concerns had been addressed and provided advice regarding recommended conditions. Biodiversity impacts are addressed in **Section 5.1**.

OEH also provided comments with respect to Aboriginal cultural heritage, and recommended conditions in the event that Aboriginal sites are discovered during works. This issue is discussed in **Section 5.6**.

Roads and Maritime Services (RMS) raised no objections regarding the proposed modification. However, RMS recommended conditions requiring the upgrading of the intersection of Wisemans Ferry Road and Haerses Road. This issue is discussed in **Section 5.4**.

The Hills Shire Council (Council) initially objected to the proposed importation of VENM and ENM. Council expressed concern that the importation of waste material would significantly alter the nature of approved operations at the site. This issue was subsequently addressed by Dixon Sand, and no further concerns were raised. Further detail is provided in **Section 5.6**.

4.2 Public Submissions

The Department did not receive any public submissions.

4.3 Response to Submissions

On 29 June 2017, Dixon Sand provided a Response to Submissions (RTS) report (see **Appendix C**). The RTS was made available on the Department's website, and provided to the relevant Government agencies for comment. Following further requests for additional information, a supplementary RTS was provided on 18 October 2017 (see **Appendix D**).

5. ASSESSMENT

The Department has assessed the merits of the proposed modification in accordance with the relevant objects and requirements of the EP&A Act. In assessing these merits, the Department has considered the:

- Environmental Impact Statement (EIS) for the original development application;
- conditions of consent for the original development application;
- the modification application (MOD 1) and associated EA, RTS and supplementary RTS; and
- relevant environmental planning instruments, policies and guidelines.

The Department considers that the key considerations for the modification relate to biodiversity, noise, air quality, traffic and transport, and water resources.

5.1 Biodiversity

The EA included a Biodiversity Assessment Report (BAR), which assessed the biodiversity impacts of the project in accordance with the FBA and the *NSW Biodiversity Offsets Policy for Major Projects* (Offsets Policy).

The BAR focussed on a study area of 43.75 ha, which was identified as the "modification area" (see **Figure 4**). However, the proposed modification would have an actual development footprint of 22.35 ha, comprising the proposed extraction and processing areas. This footprint is identified as the "development site" (see **Figure 4**).

5.1.1 Commonwealth Requirements

On 28 January 2016, the Commonwealth DoEE determined the project to be a 'controlled action' under the EPBC Act, on the basis that it is likely to have a significant impact on the following MNES:

- *Darwinia biflora*, listed as vulnerable under the EPBC Act; and
- *Coastal Upland Swamps in the Sydney Basin Bioregion* (Coastal Upland Swamp), an Endangered Ecological Community (EEC), listed under the EPBC Act.

DoEE also advised that the proposal may have a significant impact on 14 EPBC-listed threatened fauna species, including the Large-eared Pied Bat and Dural Land Snail.

The supplementary RTS included an assessment of potential impacts on MNES. The Offsets Policy and FBA are endorsed under the Bilateral Agreement between the Commonwealth and NSW Governments as providing a basis for undertaking biodiversity assessment of MNES.

5.1.2 Threatened Flora

Four vegetation communities were mapped within the proposed modification area. One of these communities is commensurate with the Coastal Upland Swamp EEC, which is listed under the *Threatened Species Conservation Act 1995* (TSC Act), as well as the EPBC Act.

Four threatened flora species were also recorded during field surveys of the modification area. These species, and their current listing status, are as follows:

- *Darwinia biflora*, listed as vulnerable under the TSC Act, as well as the EPBC Act;
- *Grevillea parviflora* subsp. *supplicans* and *Hibbertia superans*, both listed as endangered under the TSC Act; and
- *Tetratheca glandulosa*, listed as vulnerable under the TSC Act.

5.1.3 Threatened Fauna

Four threatened fauna species listed under the TSC Act and/or EPBC Act were recorded during field surveys of the modification area. These species, and their current listing status, are:

- Little Bentwing-Bat and Eastern Pygmy-Possum, both listed as vulnerable under the TSC Act;
- Large-eared Pied Bat, listed as vulnerable under the TSC Act and EPBC Act; and
- Dural Land Snail, listed as endangered under the EPBC Act.

The BAR also identified a further 16 vulnerable ecosystem credit species which were predicted to occur within the site.

5.1.4 Assessment of Direct Biodiversity Impacts

The modification would involve the clearing of 18.89 ha of native vegetation within the proposed extraction area. The direct impacts of the modification on existing vegetation communities are

summarised in **Table 1** below. Of the total vegetation to be disturbed, only a small proportion (0.08 ha) comprises an EEC.

Table 1: *Direct impacts of the modification by Plant Community Type (PCT)*

Biometric Vegetation Types	Area of Disturbance (ha)
HN560 *Needlebush – Banksia Wet Heath on Sandstone Plateaux of the Sydney Basin Bioregion* (Moderate/Good)*	0.08
HN566 *Red Bloodwood – Scribbly Gum Heathy Woodland on Sandstone Plateaux of the Sydney Basin Bioregion* (Moderate/Good)	6.67
HN582 *Scribbly Gum – Hairpin Banksia – Dwarf Apple Heathy Woodland on Hinterland Sandstone Plateaux of the Central Coast, Sydney Basin Bioregion* (Moderate/Good)	11.15
HN586 *Smooth-barked Apple – Red Bloodwood – Sydney Peppermint Heathy Open Forest on Slopes of Dry Sandstone Gullies of Western and Southern Sydney, Sydney Basin Bioregion* (Moderate/Good)	0.99
Total	**18.89**

* Note: This community is commensurate with Coastal Upland Swamps EEC.

The direct impacts of the proposal on listed threatened species and communities are discussed below. The Department considers that all threatened species and communities protected under Part 3 of the EPBC Act have been adequately documented and assessed in the EA and the supplementary RTS (see **Appendices A** and **D**).

- *Coastal Upland Swamps EEC*

The Coastal Upland Swamp EEC is endemic to NSW. It occurs within the eastern part of the Sydney Basin. The extent of Coastal Upland Swamp within the modification area is shown in **Figure 4**.

After the proposed modification was determined to be a controlled action, the proposal was amended to reduce direct impacts on the EEC. The amended development site boundary provides a 50 metre (m) buffer around the large patch of Coastal Upland Swamp to the north of the now-proposed extraction area. However, a small area of approximately 0.08 ha located on the north-eastern boundary of the development site would be removed (see **Figure 4**).

The supplementary RTS included a detailed assessment of the likely impacts of the development on the EEC, having regard to the Commonwealth's Approved Conservation Advice (including listing advice). The current extent of Coastal Upland Swamp EEC is estimated to be approximately 5,360 ha, nationally. The proposed modification would reduce the overall extent of the EEC by 0.0015 percent. The area to be removed is therefore not considered critical to the survival of the EEC.

Dixon Sand has committed to offset the impacts of the development in accordance with the NSW Offsets Policy, and has proposed a BOS which includes the establishment of two offset sites. These sites would provide a 'like for like' offset for the equivalent PCT, HN560. These offsets would provide 239.04 percent of the HN560 ecosystem credits required for the proposed modification.

Given the small area of proposed disturbance, the Department is satisfied that the modification would have a very minor impact on Coastal Upland Swamp EEC, which would be suitably managed under the recommended conditions of consent (see **Section 5.1.6**) and/or offset in accordance with the FBA and Offsets Policy (see **Section 5.1.7**).

- *Darwinia biflora*

Darwinia biflora is a shrub which occurs across the Hornsby Plateau area in north-western Sydney. It is found along the edges of weathered shale-capped ridges and Hawkesbury Sandstone. Maroota is located at the northern extreme of this distribution area. Populations in the north and west of the distribution area have been impacted by urban development. Consequently, in the Maroota area, *Darwinia biflora* populations are generally isolated.

The species has an area of occupancy of approximately 115 km^2. According to 2004 data, there are recorded *Darwinia biflora* populations at 241 locations, with seven locations containing more than 5,000 individual plants. The Department notes, however, that this data is dated, and that individual plant numbers are known to vary significantly in response to bushfire.

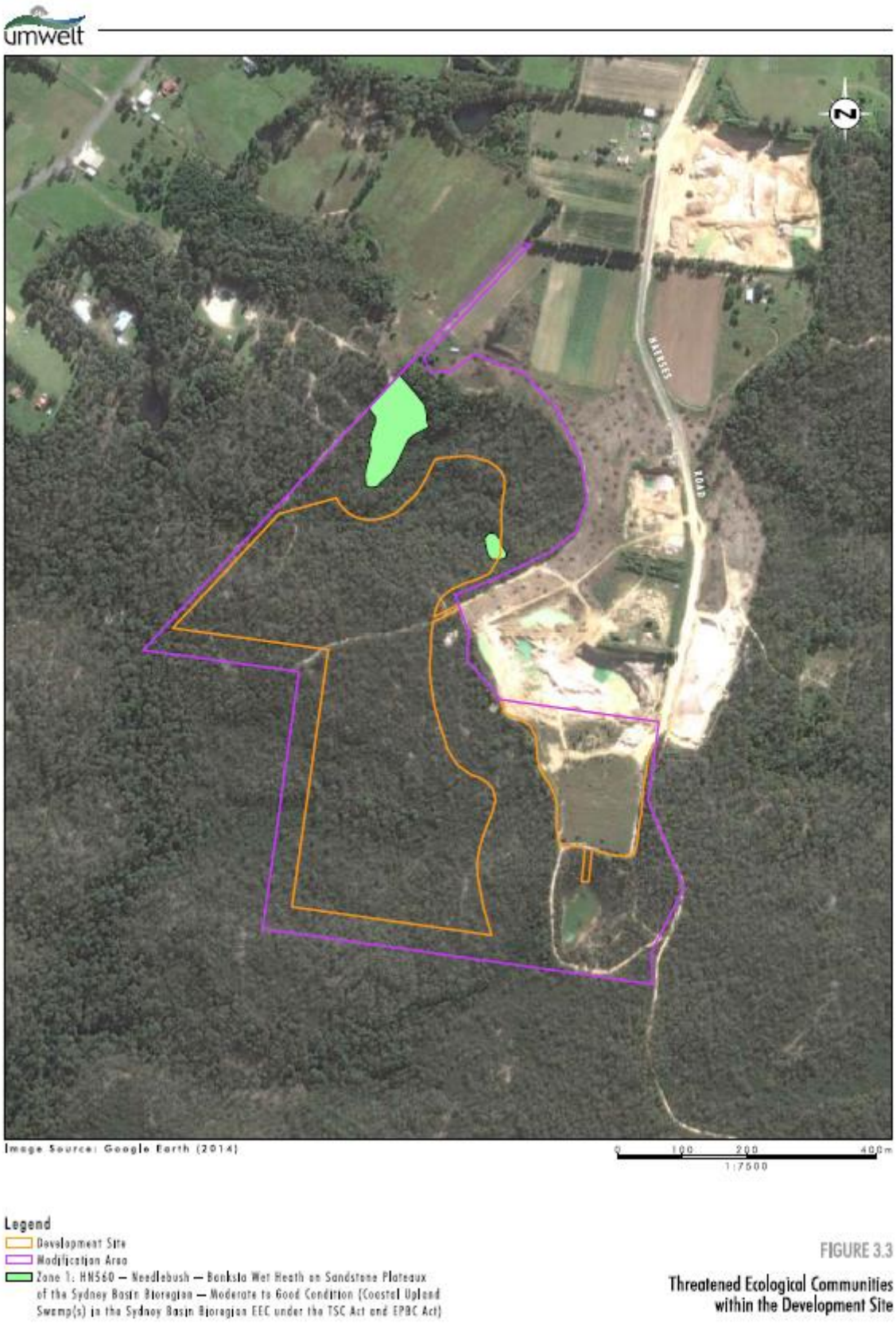

Figure 4: *Extent of Coastal Upland Swamps in the Sydney Basin Bioregion EEC*

The proposed modification would remove up to 17.82 ha of likely habitat for *Darwinia biflora.* The supplementary RTS includes a detailed assessment of the likely impacts of the development on *Darwinia biflora*, having regard to the Commonwealth's Approved Conservation Advice. This assessment concluded that, while the site contains an important population of *Darwinia biflora,* the established habitat within the development site is not critical to the survival of the species.

Dixon Sand has committed to offset the impacts of the proposed modification in accordance with the NSW Offsets Policy. The proposed offset sites would provide 214.63 percent of the total species credits required for *Darwinia biflora* under the FBA.

The Department therefore considers that the predicted impacts on Darwinia biflora are acceptable, and would be suitably managed under recommended conditions of consent (see **Section 5.1.6**) and/or offset in accordance with the FBA and Offsets Policy (see **Section 5.1.7**).

- *Dural Land Snail*

The Dural Land Snail is endemic to the Sydney Basin Bioregion. This species was recorded within the modification area during field surveys in December 2015 and May/July 2017. Initial estimates in the BAR indicated that the proposal would remove 17.82 ha of potential habitat for the species. However, revised habitat mapping was prepared following targeted surveys in July 2017.

The supplementary RTS indicates that the proposal would remove 2.99 ha of core habitat for the Dural Land Snail (see **Figure 5**). This represents a 0.005 percent reduction in the area of occupancy for the species. It is estimated that this would result in the loss of up to nine individuals, or 0.004 percent of the known population.

Given the relatively small area of potential habitat to be removed, and the availability of other suitable habitat in the locality, the Department is satisfied that the modification is unlikely to have a significant impact on the species. The Department is also satisfied that the impacts of the development would be suitably offset in accordance with the FBA and Offsets Policy (see **Section 5.1.7**).

- *Large-eared Pied Bat*

The Large-eared Pied Bat was recorded within the modification area during field surveys. However, the site does not constitute critical habitat, or contain an 'important population' of the species, having regard to the Commonwealth's *Matters of National Environmental Significance - significant impact guidelines 1.1* (Significant Impact Guidelines) and the species' National Recovery Plan.

While the proposed modification would remove approximately 19 ha of marginal foraging habitat, there are substantial areas of suitable habitat for the species in nearby national park to the east and north-east of the site. Dixon Sand has also proposed management measures to minimise potential impacts on arboreal species during clearing activities (see **Section 5.1.6**). On this basis, the Department considers that the proposed modification is unlikely to have a significant impact on the species.

- *Other Threatened Species*

The impacts of the proposed modification on threatened species listed only under the TSC Act are discussed below.

- *Grevillea Parviflora* subsp. *supplicans*

Grevillea Parviflora subsp. *supplicans* is a small shrub, with a limited distribution within the Arcadia, Maroota and Marramarra Creek areas. A total of 219 individual plants were identified in the modification area during field surveys. However, only 13 plants are proposed to be removed. Dixon Sand proposes to offset this impact in accordance with the FBA and Offsets Policy, with the great majority of existing plants to be retained within the proposed on-site offset area (see **Section 5.1.7**).

- *Hibbertia superans*

All known *Hibbertia superans* plants occur outside of the development site. However, given their proximity to the proposed extraction boundary, care would need to be taken in order to avoid incidental impacts during extraction. The Department has recommended conditions to this effect.

- *Tetratheca glandulosa*

Tetratheca glandulosa is a small spreading shrub which is found in shale-sandstone transition habitat. Due to the cryptic nature of the species, the impacts of the modification were assessed based on the extent of likely habitat within the development site. The proposal would disturb up to 17.82 ha of likely *Tetratheca glandulosa* habitat. These impacts would be offset in accordance with the FBA and Offsets Policy (see **Section 5.1.7**).

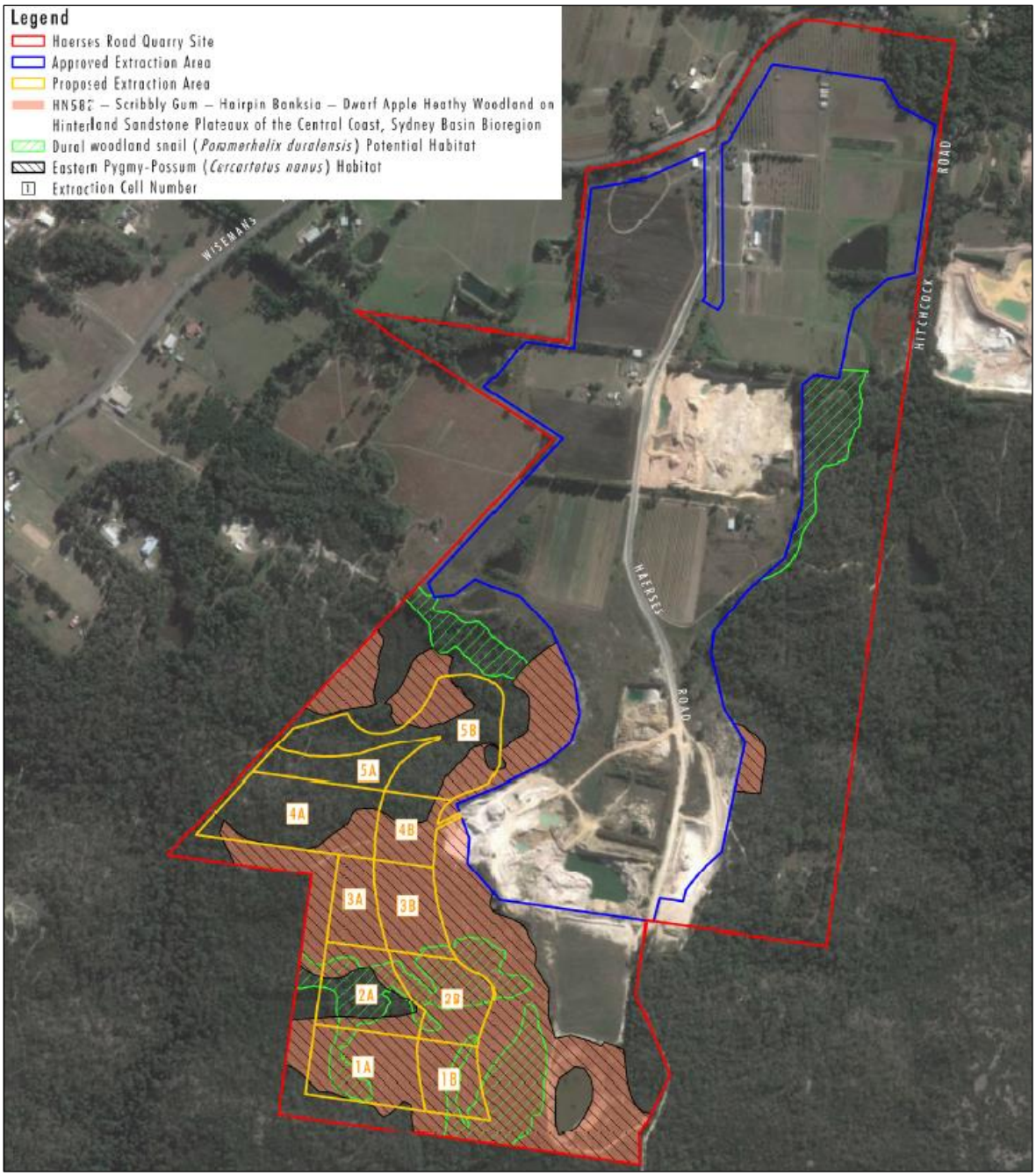

Figure 5: *Distribution of Dural Land Snail and Eastern Pygmy-Possum habitat and PCT HN582*

- Eastern Pygmy-Possum

This species was recorded at two locations within the modification area during targeted remote camera surveys. The proposal would disturb 11.15 ha of suitable habitat (see **Figure 5**). These impacts would be offset in accordance with the FBA and Offsets Policy (see **Section 5.1.7**).

- Little Bentwing-Bat

The proposed modification would remove approximately 19 ha of marginal foraging habitat for the Little Bentwing-Bat. The Department notes that this species is highly mobile and there are substantial areas of suitable habitat in nearby national parks. Dixon Sand has proposed avoidance and mitigation measures to manage potential impacts on arboreal species during clearing activities (see **Section 5.1.6**). On this basis, the proposal is unlikely to have a significant impact on the species.

- *Other Matters of National Environmental Significance*

The supplementary RTS also included detailed assessments of the remaining 12 potentially-impacted fauna species identified by DoEE (see **Section 5.1.1**) in accordance with the Significant

Impact Guidelines. None of the 12 species were recorded within the modification area and the development is not predicted to have a significant impact on them.

Appendix E sets out additional EPBC Act considerations, including the Commonwealth's international obligations, consideration of relevant Approved Conservation Advices, Threat Abatement Plans and Recovery Plans.

5.1.5 Assessment of Indirect Biodiversity Impacts

The proposed modification may cause a number of indirect impacts on biodiversity values. These include noise and dust generation during the construction and operation of the new extraction area, increased erosion and associated impacts on downstream water quality, and potential incursion of weeds and feral animals into the modification area.

The Department has recommended a range of conditions to minimise the noise, dust and water quality impacts of the modified development. These conditions are discussed in **Sections 5.2**, **5.3** and **5.5**, respectively. Potential pest and weed mitigation measures are discussed in **Section 5.1.6**.

5.1.6 Avoidance and Mitigation Measures

The Department is satisfied that Dixon Sand has made all reasonable and feasible efforts to avoid, minimise and manage the biodiversity impacts associated with the proposed modification. In particular, the Department notes that extraction activities would avoid the great majority of *Grevillea Parviflora* subsp. *supplicans* and Coastal Upland Swamp EEC located within the modification area.

Where direct impacts cannot be avoided, Dixon Sand has proposed a range of mitigation and management measures, including:

- a tree-felling procedure to minimise the impact of clearing activities on arboreal species, including pre-clearance surveys and supervision of all tree-felling activities by a person suitably qualified in the capture, transport and housing of native fauna; and
- weed and pest control programs.

The Department has recommended that the existing consent's biodiversity management conditions be comprehensively updated to align with the Department's current drafting standards. The recommended conditions require Dixon Sand to prepare a Biodiversity and Rehabilitation Management Plan (BRMP) for the site, in consultation with OEH. This plan would have to include detailed procedures to manage remnant vegetation and habitat on site and monitor the effects of the development on native flora and fauna. This plan would also have to include detailed procedures for the management of erosion, weeds and feral pests.

5.1.7 Biodiversity Offset Strategy

The supplementary RTS includes a revised BOS prepared in accordance with the *BioBanking Assessment Methodology 2014* (BBAM). The proposed modification requires a total 962 ecosystem credits and 1,439 species credits (see **Table 2** below).

To satisfy these requirements, Dixon Sand currently proposes to establish two offset areas which would be secured under a BioBanking Agreement. The first would be located within the HRSQ project boundary, and include the undisturbed land immediately surrounding the development site and a further undisturbed area east of the approved extraction area (see **Figure 6**). The onsite offset would have a total area of 28.18 ha. A second 54.7 ha offset area is proposed at Porters Road, approximately 20 km south of the HRSQ (see **Figure 7**). Both sites are currently owned by Dixon Sand.

Dixon Sand has undertaken detailed floristic and vegetation mapping surveys at both sites in accordance with the BBAM methodology, and in consultation with OEH. The credits generated at both offset sites are summarised in **Table 2** below.

As indicated in **Table 2**, the two offset areas would not provide all credits required for the proposed modification. A shortfall is expected for the Dural Land Snail (132 credits), Eastern Pygmy-Possum (75 credits) and PCT HN582 (357 credits).

Table 2: *Summary of credit requirements and offsetting proposals*

Ecosystem Credits	**Credits Required**	**Credits generated at Porters Road offset**	**Credits generated at Haerses Road offset**	**Total Offsets**	**Credit Balance**
HN560 *Needlebush – Banksia Wet Heath on Sandstone Plateaux of the Sydney Basin Bioregion* (Wet Heath)*	3	0	11	11	8
HN566 *Red Bloodwood – Scribbly Gum Heathy Woodland on Sandstone Plateaux of the Sydney Basin Bioregion* (Sydney Sandstone Ridgetop Woodland)	377	276	118	394	17
HN582 Scribbly Gum – Hairpin Banksia – Dwarf Apple Heathy Woodland on Hinterland Sandstone Plateaux of the Central Coast, Sydney Basin Bioregion (Sydney Sandstone Heath)	538	89	92	181	**-357**
HN586 *Smooth-barked Apple – Red Bloodwood – Sydney Peppermint Heathy Open Forest on Slopes of Dry Sandstone Gullies of Western and Southern Sydney, Sydney Basin Bioregion* (Sydney Sandstone Gully Forest)	44	125	29	154	110
HN596 *Sydney Blue Gum - Blackbutt - Smoothbarked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion* (Blue Gum Forest)	0	18	0	18	18
Species Credits	**Credits Required**	**Credits generated at Porters Road offset**	**Credits generated at Haerses Road offset**	**Total Offsets**	**Credit Balance**
Darwinia biflora	360	270	163	433	73
Eastern Pygmy-Possum (*Cercartetus nanus*)	223	56	92	148	**-75**
Grevillea parviflora subsp. *supplicans*	338	0	1448	1448	1110
Dural Land Snail (*Pommerhelix duralensis*)	230	60	38	98	**-132**
Tetratheca glandulosa	288	270	163	433	145

* Note: This community is commensurate with *Coastal Upland Swamps* EEC.

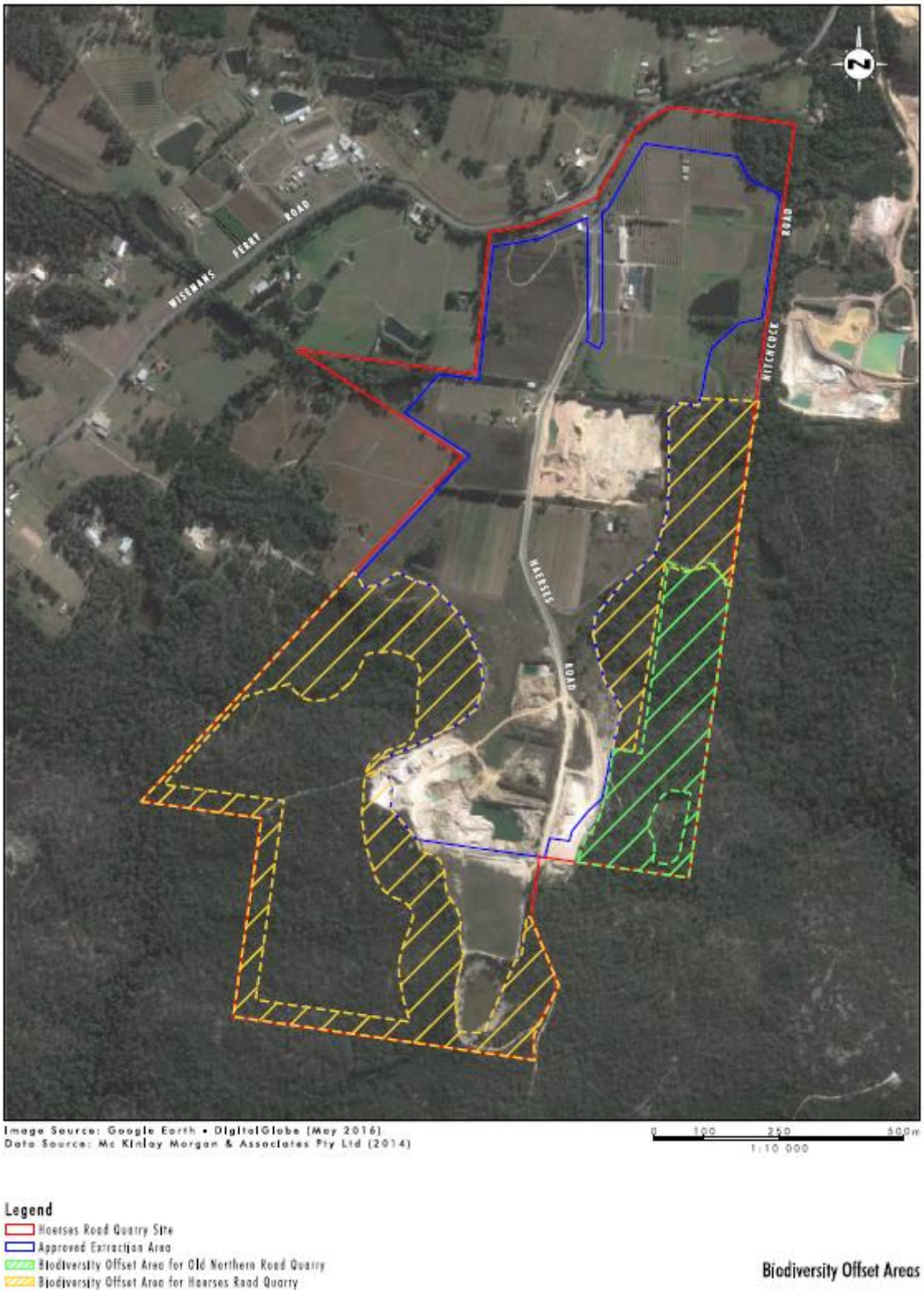

Figure 6: *Location of Haerses Road offset area*

Dixon Sand initially proposed to retire all of the required credits on a progressive basis, to align with the staging of extraction. This would provide a degree of flexibility in securing the balance of the required credits, allowing Dixon Sand to utilise one or more of the offsetting options permitted under the FBA, including purchasing credits on the open market, acquiring an additional land-based offset, or contributing to the newly established Biodiversity Conservation Fund.

Figure 7: *Location of Porters Road offset area*

While the Department and OEH do not object, in principle, to the progressive retirement of credits, DoEE has expressed a strong preference for credits to be retired in full prior to any impacts on MNES.

The modification would allow Dixon Sand to carry out quarrying operations at the HRSQ for up to 29 years. The extraction of each stage is expected to last more than 2 years, depending on market demands, and the shifting of operations between the Tertiary sand and friable sandstone resources. Given that biodiversity impacts would be incremental, with the majority of disturbance occurring well

into the future, the Department considers that an incremental approach to the retirement of credits is appropriate.

The Department recommends a three-step approach to the retirement of credits. The first step would require Dixon Sand to secure both proposed offset areas prior to clearing any vegetation in the modification area. This would fulfil the majority of the credit requirements for the proposal. On this basis, Dixon Sand would be permitted to undertake extraction in Stages 1A and 2A. The second step would require Dixon Sand to retire the remaining 132 Dural Land Snail credits prior to any vegetation clearing in Stages 1B, 2B or 3B (which contain the balance of snail habitat within the development site). Finally, the balance of credits for the Eastern Pygmy-Possum and PCT HN582 (neither of which is listed under the EPBC Act) would be retired on a progressive basis, prior to the commencement of clearing in relevant future stages (see **Figure 5**).

This would ensure that the majority of credits for MNES are secured prior to the commencement of the development. The remaining credits for the Dural Land Snail would then be retired prior to disturbing the remaining area of affected habitat (see **Figure 5**). While the Department acknowledges the Commonwealth's preference for the upfront retirement of credits, the proposed approach would ultimately achieve the same outcome. That is, the required credits would all be retired prior to impacts occurring.

To provide additional flexibility, Dixon Sand is seeking the option to provide alternative offsets, in lieu of the proposed Haerses Road and Porters Road offset areas. This would provide additional flexibility in the event that Dixon Sand can secure a single offset site that fully satisfies the offset requirements for the proposal. The Department accepts that this flexibility would not diminish biodiversity offsetting outcomes.

OEH did not object to the proposed BOS. However, OEH recommended that Dixon Sand be required to enter into a Voluntary Planning Agreement (VPA) to progressively retire the required credits. The Offsets Policy requires proponents to enter into a VPA in cases where offsets will not be fully secured prior to commencing the development. The purpose of the VPA is to provide security to ensure that offset requirements are fulfilled.

However, the Department notes that the transitional arrangements for the Offsets Policy allow the consent authority to waive this requirement, where the prospects of finding appropriate offsets are high. The Department is satisfied that Dixon Sand can secure sufficient credits to undertake the first five years of extraction (ie Stages 1A and 2A). The Department has also recommended conditions to prevent Dixon Sand from commencing subsequent stages until the remaining credits have been retired. The Department considers that the recommended conditions provide a more effective enforcement mechanism than a VPA to ensure the retirement of credits. On this basis, the Department is satisfied that a VPA is not warranted.

5.1.8 Conclusion

The Department is satisfied that the modification has been designed to avoid, minimise and manage biodiversity impacts to the greatest extent practicable. However, the modification would result in impacts on biodiversity, including threatened ecological communities and flora and fauna species listed under the TSC Act and EPBC Act.

The Department has carefully considered the potential impacts on biodiversity values, and is satisfied that these impacts could be suitably managed, mitigated and/or offset under the recommended conditions of consent, and that the modified development could be undertaken in a manner that would maintain or improve biodiversity values within the locality. Overall, the Department considers the impacts of the project on biodiversity, including MNES, are acceptable.

5.2 Noise

The EA includes a Noise Impact Assessment (NIA) prepared by Umwelt. The NIA identifies 14 key receivers surrounding the site (see **Figure 8**). Four of these receivers (R2 and three un-numbered receivers located to the north-east) are subject to private agreements which permit Dixon Sand to exceed the existing noise criteria under DA 165-7-2005. The three un-numbered receivers are associated with the nearby Hitchcock Road Quarry.

Dixon Sand has proposed a series of mitigation and management measures to reduce the noise impacts of the proposal. These measures include construction of a seven-metre high acoustic bund or fence along the western and northern boundaries of Stage 4A, and the western boundary of Stage

5A, prior to extraction of those stages. Management controls would also be implemented during early extraction of Stages 4 and 5 in order to minimise the noise generated. Only one dozer or front-end loader would be used at any one time, and stockpiling and product haulage would occur at separate times. Noise modelling was conducted based on a worst-case operating scenario, with the proposed mitigation measures in place.

5.2.1 Noise Assessment Criteria

The NIA establishes impact assessment criteria for construction, operational and road traffic noise from the project. These criteria are shown in **Tables 3** to **5** below.

The construction noise criteria (see **Table 3**) are based on the *Interim Construction Noise Guideline* (ICNG). The 'standard hours' referred to in **Table 3** are defined as 7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm Saturday.

Table 3: *Construction noise impact assessment criteria*

Receiver	**Management Level – dB(A) $L_{Aeq\ (15\ minute)}$**	
	Standard hours RBL+ 10dB	**Outside standard hours RBL + 5dB**
R1, R3 & R4	44	39
All other receivers without private agreement	40	35

The operational noise criteria (see **Table 4**) are based on the existing noise limits imposed under DA 165-7-2005. The original noise assessment presented in the EIS established Project Specific Noise Levels (PSNLs) of 39 dB(A) L_{eq} for affected receivers during the daytime period, due to their proximity to Wisemans Ferry Road. The criteria in **Table 4** were based on operational noise predictions in the EIS, which fell well below the PSNLs. As receivers R5 to R11 were located a considerable distance from the approved extraction area, they were predicted to experience daytime noise levels below 35 dB(A).

Table 4 also specifies separate criteria for the morning shoulder period, which occurs from 6.00 am to 7.00 am. Noise generating activities during the morning shoulder would be limited to truck loading and haulage.

Table 4: *Operational noise impact assessment criteria*

Receiver	**Day**	**Shoulder Period (6.00 am to 7.00 am)**	
	dB(A) $L_{Aeq\ (15\ minute)}$	**dB(A) $L_{Aeq\ (15\ minute)}$**	**dB(A) $L_{A(max)}$**
R1	37	37	45
R2	40	40	
R3	38	38	
R4	37	37	
All other receivers without private agreement	35	35	

The NIA also established road traffic noise criteria in accordance with the *NSW Road Noise Policy* (see **Table 5**).

Table 5: *Road traffic noise impact assessment criteria*

Type of Project/Land Use	**Assessment Criteria dB(A)**	
	Day (7.00 am – 10.00 pm) $L_{Aeq\ (15\ hour)}$	**Night (10.00 pm – 7.00 am) $L_{Aeq\ (9\ hour)}$**
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads	60 (external)	55 (external)

5.2.2 Assessment of Impacts

Construction Noise Impacts

Construction activities would be limited to the establishment of the proposed weighbridge, office and maintenance sheds. As such, construction noise is expected to be low-intensity and predicted to remain well within the limits specified in **Table 3**.

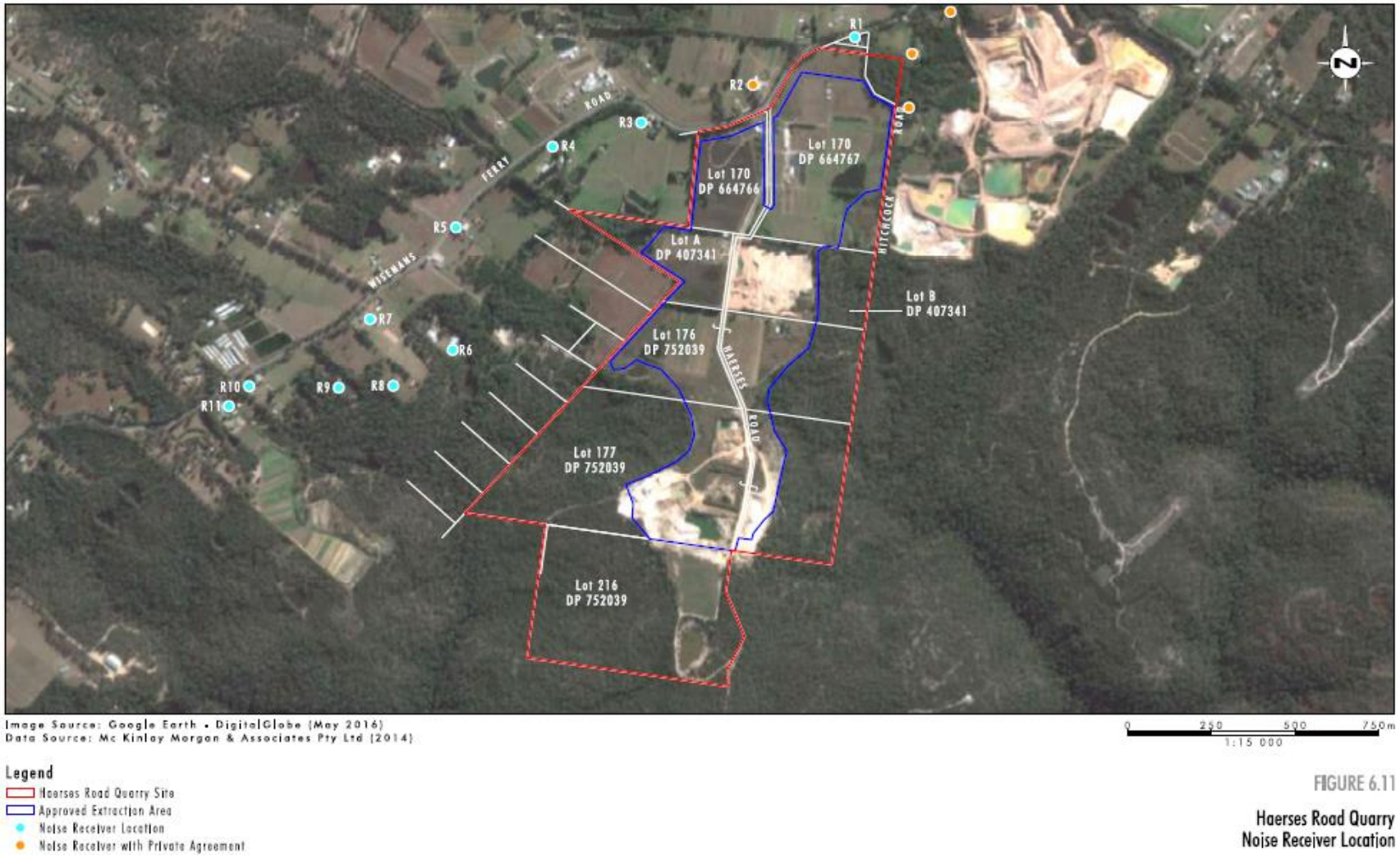

Figure 8: *Location of noise receivers*

Operational Noise Impacts
The NIA indicates that the development would comply with the noise criteria for the morning shoulder period at all receivers, with the exception of R2. The Department notes that Dixon Sand has a private agreement in place with the landowner to permit such exceedances.

5.2.3 Management and Mitigation
The EA outlines a series of proposed mitigation and management measures to further reduce likely noise impacts of the modified development. These measures include the development of an updated Noise Management Plan (NMP), which would provide additional monitoring at the worst-affected receivers (R6 and R8) and procedures for consulting with affected landowners.

The Department has recommended updated noise conditions for the project, which reflect current drafting standards. These conditions require Dixon Sand to implement best practice measures to minimise the noise impacts of its operations, and to adapt its day to day operations in response to adverse meteorological conditions and/or elevated noise levels.
There are existing conditions regarding acoustic bund construction around the approved extraction area. These conditions require Dixon Sand to prepare an Acoustic Bund Construction Noise Management Plan, which includes landowner consultation and complaints handling procedures. Existing conditions also restrict acoustic bund construction to a maximum of three weeks in any calendar year. The recommended amendments to conditions would limit bund construction to a maximum of four weeks per calendar year.

The Department has also recommended revised noise criteria for the modified development. This includes amended daytime criteria for R6, R7 and R8. However, no changes to criteria for R2 are recommended, as it is expected that noise impacts would continue to be managed under a private agreement.

5.2.4 Conclusion
The Department is satisfied that the construction and road noise impacts of the development would comply with specified criteria. While the NIA predicts a number of exceedances of the existing operational noise criteria at R6-R8, these exceedances would be of a minor nature (between 1 and 2 dB(A)). The Department also notes that the modified noise criteria for these receivers remain below the established PSNLs.

The Department also notes that noise impacts are predicted during construction of the proposed acoustic bunds. However, these impacts would be of a temporary nature, and would be strictly managed under the recommended conditions of consent.

Overall, the Department is satisfied that the noise impacts of the modified development would be low, and would be suitably managed under the recommended conditions and an updated NMP.

5.3 Air Quality
The EA included an Air Quality Assessment (AQA) prepared by Pacific Environment Limited. As the modification application was lodged prior to 20 January 2017, the AQA was prepared in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2005). Revised assessments were subsequently provided as part of the RTS and supplementary RTS (see **Appendices C** and **D**).

5.3.1 Existing Environment
The AQA identified 20 key receivers in the surrounding locality (see **Figure 9**). The AQA also identified four additional quarry-owned receivers. Three of these receivers are associated with the Hitchcock Road quarry (PF1, PF2 and PF3) and one receiver (D1) is owned by Dixon Sand.

The existing air quality criteria for the HRSQ are shown in **Table 7**.

***Table 7**: Existing air quality criteria*

Pollutant	Averaging Period	Criterion	
Particulate matter < 10 µm (PM_{10})	Annual	30 µg/m^3	
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3	
Total suspended particulates (TSP)	Annual	90 µg/m^3	
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

5.3.2 Assessment of Impacts

The AQA utilised atmospheric dispersion modelling, incorporating local meteorological data and previous monitoring data from the quarry and nearby EPA monitoring sites. The AQA modelled the proposal's worst-case impacts based on two separate operating scenarios. Scenario 1 involved all wet and dry processing occurring within the designated processing area (see **Figure 3**). Scenario 2 involved wet processing within the designated processing area, and dry processing within the extraction area. Scenario 2 would only occur when the pit reaches sufficient depth to provide acoustic screening for nearby receivers. Annual dust emissions were calculated conservatively, on the basis that the quarry would operate 7 days per week. However, under the existing conditions of consent, operations would be limited to 6 days per week.

The AQA predicts that, under both scenarios, the incremental air quality impacts of the proposal would comply with the criteria in **Table 7**. The AQA also included an assessment of $PM_{2.5}$ emissions.

There are currently no impact assessment criteria for $PM_{2.5}$ under the consent. However, the AQA indicates that $PM_{2.5}$ concentrations would remain well within the criteria specified in the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2017).

The AQA also provided an assessment of the cumulative air quality impacts of the proposal, which identified a number of additional exceedances of the air quality criteria. However, these exceedances resulted from errors in the dispersion modelling, which were subsequently corrected in the RTS and supplementary RTS. The supplementary AQA indicates that no additional exceedances of the assessment criteria are predicted.

5.3.3 Management and Mitigation

Dixon Sand has proposed a number of management and mitigation measures to be employed at the site. These measures include water spraying of unsealed internal roads, minimising drop heights during loading and unloading, and progressive rehabilitation of disturbed areas.

Existing conditions require Dixon Sand to maintain a real-time air quality monitoring station at the nearby Maroota Public School to monitor the combined air quality impacts of HRSQ and ONRQ. In the event that 24-hour average PM_{10} concentrations exceed specified trigger levels, Dixon Sand is required to modify its activities, or cease operations, to ensure compliance with the air quality criteria in **Table 7**.

The Department has also recommended conditions requiring Dixon Sand to implement best practice measures to minimise its dust emissions, to manage its day to day activities in response to adverse weather conditions, and to prepare an updated Air Quality Management Plan (AQMP) for the site.

The EPA also provided recommended air quality conditions, including a number of prescriptive requirements regarding the size of stockpiling areas, internal speed limits on haul roads, and the use of specific dust control measures and practices. While the Department has considered the EPA's recommendations, it is the Department's preference to impose outcome-based conditions, which require Dixon Sand to develop its own site-specific procedures and practices to achieve those outcomes.

5.3.4 Conclusion

The Department is satisfied that the air quality impacts of the proposal would be minimal, and that the modified development could continue to operate in compliance with all existing air quality criteria. The Department is satisfied that any air quality impacts would be suitably managed under the recommended conditions of consent and an updated AQMP.

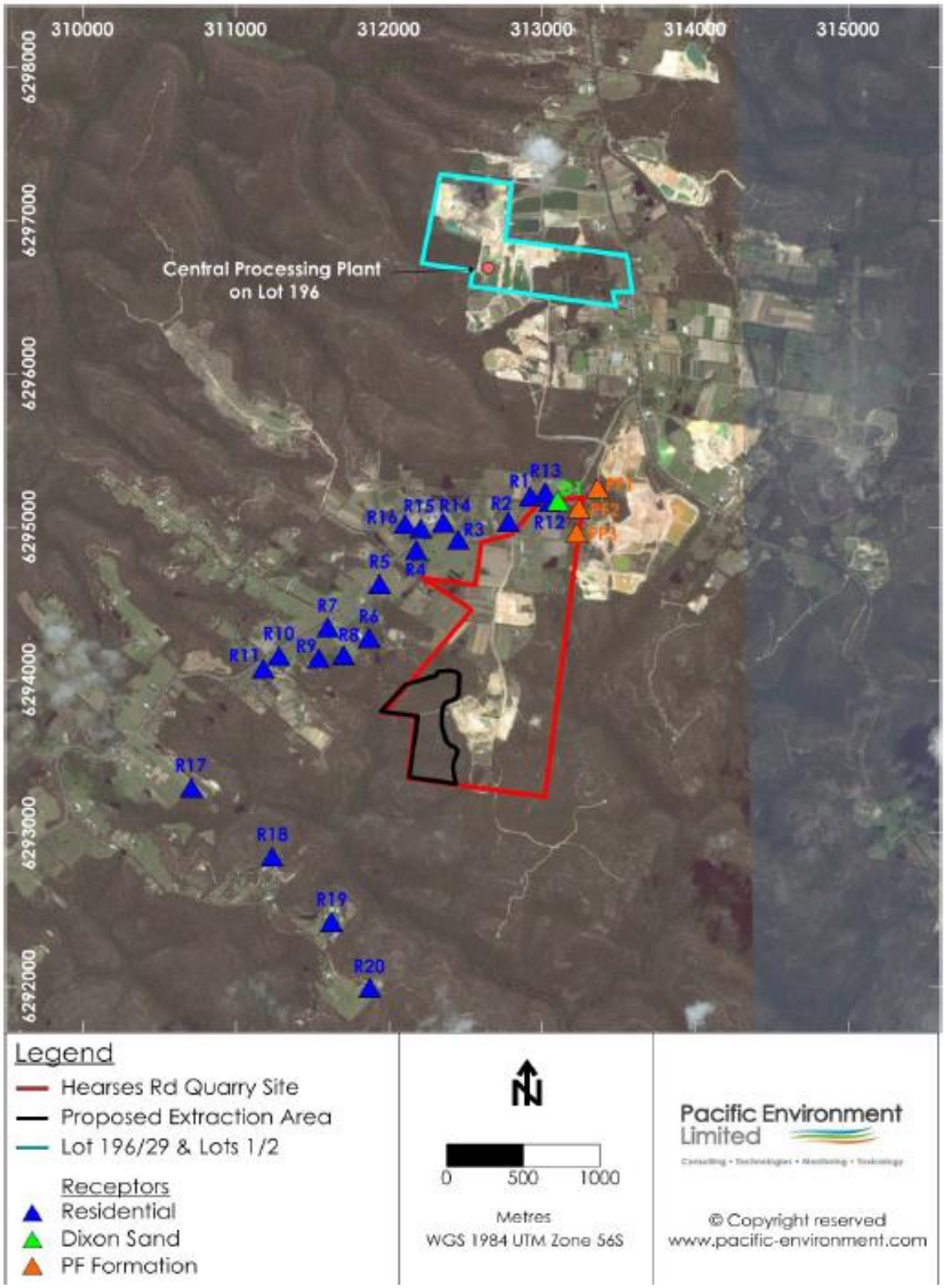

Figure 9: *Location of air quality receivers*

5.4 Traffic and Transport

The EA included a Traffic Impact Assessment (TIA) prepared by SECA Solution. The two key local roads affected by the proposal are Wisemans Ferry Road and Old Northern Road (see **Figure 1**).

At present, the quarry generates up to 56 truck movements per day (28 inbound and 28 outbound). Under the conditions of DA 165-7-2005, Dixon Sand has a production limit of 250,000 tpa. Conditions 7 and 8 of Schedule 2 require that no more than 60,000 tpa may be transported directly to regional and local markets, and that no more than 190,000 tpa may be transported to the ONRQ for processing.

Currently, no more than 7 of the 28 trucks leaving the site turn left on to Wisemans Ferry Road. All other outgoing trucks turn right, travelling towards Old Northern Road. The proposal would allow Dixon Sand to process the majority of product at the HRSQ. Consequently, Dixon Sand is seeking to delete condition 7, thereby allowing up to 100 percent of product to be transported directly to market. However, for operational flexibility, condition 8 would be retained.

Condition 9 of Schedule 2 restricts all inbound truck movements to right-hand turns into Haerses Road from Wisemans Ferry Road. This means that inbound traffic must come from the south-west, travelling north-east along Wisemans Ferry Road. Dixon Sand is also seeking to remove this restriction.

The modification would also permit the importation of VENM and ENM to the site. This material would be imported using incoming vehicles which currently arrive at the site empty.

While the proposal would not increase truck movements at the HRSQ, it would remove any limitations on the direction of travel for incoming and outgoing trucks. The proposal would allow trucks to enter Haerses Road via a right or left-hand turn. It would also allow all 28 outbound vehicles to turn left, and travel to the south-west along Wisemans Ferry Road. Alternatively, trucks would be also able to turn right on to Wisemans Ferry Road, then turn right on to Old Northern Road and travel to the south-east.

The TIA concluded that increasing the proportion of trucks travelling direct to market is unlikely to have a significant impact on the road network. Existing traffic flows on Old Northern Road are estimated to be about 1,500 vehicles per day. Daily traffic flows to the south-east on Wisemans Ferry Road are estimated to be about 2,100 vehicles per day. The TIA also included a SIDRA analysis of the intersection of Old Northern Road and Wisemans Ferry Road, to assess the impact of additional traffic travelling south-east. This analysis indicated that the intersection currently functions well, with minimal delays. The modification is not expected to result in any decline in the current level of service at this location. Consequently, the TIA concluded that the direct impacts of the modification would be minimal.

However, the proposal would have an indirect impact on overall local traffic movements. Existing conditions of consent for the ONRQ impose a combined limit for all truck movements, including incoming trucks from the HRSQ. At present, this limit is set at 180 trucks per day (comprising both inbound and outbound movements). The proposed modification would allow 100 percent of trucks leaving the HRSQ to travel directly to market, bypassing the ONRQ. As such, the ONRQ could potentially generate an additional 56 truck movements per day (28 inbound and 28 outbound), while remaining in compliance with the existing conditions. Therefore, the Department requested an amended TIA, which considered the potential impacts of those additional 56 truck movements on the local road network. The amended TIA was provided in the RTS.

The amended TIA indicates that the potential increase in truck movements would represent less than a four percent increase in daily traffic movements in the locality. The TIA indicates that this relatively minor increase is well within the capacity of the existing road network. The Department notes that this increase would only occur under a worst-case scenario, in which 100 percent of outgoing HRSQ trucks travel directly to market, while the ONRQ is operating at maximum capacity. The Department also notes that the overall impact on the Maroota township (particularly the Maroota Public School) would be negligible, as the total number of Dixon Sand trucks travelling through the village would likely remain the same following the modification (ie no more than 180 per day).

Similarly, Dixon Sand contends that there is ample capacity within the existing road network to accommodate left-hand turns into Haerses Road from Wisemans Ferry Road. The Department understands that the restriction on the direction of incoming traffic was primarily intended to limit impacts on the Maroota Public School, located to the north on Old Northern Road. The original proposal envisaged that empty trucks would travel to the HRSQ from the south-west, pick up a load of sand, and transport it to ONRQ for processing. As the modification would allow HRSQ to operate autonomously, such restrictions are no longer appropriate. The Department recognises the need for operational flexibility, in response to both market demands, and the regional availability of VENM/ENM.

The Department also notes that the overall number of traffic movements from both the ONRQ and HRSQ are limited under their respective consents, and that Dixon Sand would be required to manage its operations so as not to exceed its daily trucking limits. Consequently, the modification is unlikely

to have any noticeable impact on the school. RMS expressed support for allowing left-hand turns into Haerses Road, as this would reduce the need for right-hand turns at the intersection.

The TIA also noted that sight distance is limited at the intersection of Wisemans Ferry Road and Haerses Road, due to the curvature of the road and roadside vegetation. The required safe sight distance, based on a design speed of 80 km per hour, is 160 m. The intersection currently has a sight distance of 140 m in each direction.

In response, RMS recommended that the intersection be upgraded to include a channelized right turn treatment (CHR), with appropriate line-marking, in order to safely guide through traffic around quarry vehicles turning right into Haerses Road. Dixon Sand has accepted this recommendation, and has committed to upgrade the intersection before product from the MOD 1 extraction area is transported from the site. The Department has recommended conditions to this effect.

The Department has also recommended updated conditions to manage traffic impacts associated with the development, including preparation of an updated Traffic Management Plan (TMP) with a Driver's Code of Conduct.

Overall, the Department is satisfied that the traffic impacts associated with the proposal would be minimal, and would be suitably managed under the recommended conditions of consent and an updated TMP.

5.5 Water Resources

5.5.1 Groundwater

The EA included a Groundwater Assessment (GA) prepared by Australian Groundwater Technologies. The GA identified two significant aquifers located within the proposed modification area: the Sydney Central Basin Groundwater Source (SCBGS) and the Maroota Tertiary Sands Groundwater Source (MTSGS).

Sydney Central Basin Groundwater Source

The SCBGS incorporates the Hawkesbury Sandstone, a regional fractured rock aquifer. The Hawkesbury Sandstone has limited primary porosity and secondary fracturing accounts for the majority of groundwater flow within the aquifer. The proposed extraction area overlays the SCBGS. However, Dixon Sand has committed to maintain a 2 m buffer above the highest recorded wet weather groundwater level (WWGL) of the SCBGS for the duration of quarrying operations.

Above the regional water table, there are also perched aquifer systems located within the Hawkesbury Sandstone. These systems provide temporary storage for the SCBGS below, and have limited value as a groundwater resource. These perched systems would be intercepted by quarrying operations.

Maroota Tertiary Sands Groundwater Source

The MTSGS comprises the Maroota Tertiary Sands unit and weathered sandstone which overlays the SCBGS. It is characterised by thin layers of gravel, thick layers of clay and interbedded sands. The proposed extraction area is located immediately adjacent to the MTSGS (see **Figure 10**).

The proposed extraction area incorporates a 100 m wide horizontal buffer zone, adjacent to the western boundary of the MTSGS. This area contains proposed Stages 1B to 5B (see **Figure 3**). Within this buffer zone, there are number of perched aquifers associated with the SCBGS below.

Prior to undertaking any extraction within Stages 1B to 5B, Dixon Sand proposes to undertake further investigation to determine whether there is any hydraulic connectivity between the perched aquifers and the MTSGS. This investigation would confirm whether extraction can be safely undertaken within the buffer zone without causing incidental water take from the MTSGS.

If the investigation confirms that quarrying may be undertaken within Stages 1B to 5B, Dixon Sand would limit the depth of extraction to least 2 m above the WWGL of the adjacent MTSGS.

Maximum Extraction Depth

The GA reviewed historical groundwater data collected from the monitoring bore network on site. This data was then used to establish the maximum extraction depths permitted within Stages 1A

to 5A and 1B to 5B. The maximum extraction depths are based on the highest recorded WWGL for the SCBGS and MTSGS, and incorporate the proposed buffers outlined above.

Within Stages 1A to 5A, the maximum extraction depth would range between 118.15 m and 133.5 m Australia Height Datum (AHD). Within Stages 1B to 5B, it is estimated that the maximum extraction depth would range between 176 m and 180 m AHD (see **Figure 10**). These extraction depths would be confirmed following the collection of comprehensive baseline monitoring data.

Relevant Policy Considerations
The EA includes an assessment of the proposed modification against the *NSW Aquifer Interference Policy* (AIP) and the *Greater Metropolitan Region Groundwater Sources Water Sharing Plan* (WSP). The proposal has been designed to avoid interception of the regional groundwater table. Consequently, the modification meets the minimal impact considerations under the AIP, and no groundwater extraction licences would be required under the WSP.

Impacts on Groundwater Dependent Ecosystems
No impacts on Groundwater Dependent Ecosystems (GDEs) are predicted as a result of the modification. There are two occurrences of Coastal Upland Swamp EEC within the modification area (see **Section 5.1** above). However, the EA indicates that this community is not a GDE. The Department also notes that the proposal incorporates a 50 m buffer zone around the area of Coastal Upland Swamp which is to be retained, in order to minimise any potential impacts.

Mitigation and Management
Following further consultation with CLWD, Dixon Sand has committed to install a series of clustered monitoring bores at four separate locations within the buffer zone. These bore clusters would target both the MTSGS and SCBGS and provide a more comprehensive understanding of the hydrogeology within the buffer zone. Any extraction within the MTSGS buffer zone would be contingent on the outcome of the groundwater investigation, which would be undertaken in consultation with CLWD. Dixon Sand has also proposed to install an additional monitoring bore to the west of Stage 3A (see **Figures 3** and **10**) to monitor the SCBGS.

Dixon Sand has committed to develop a Water Management Plan (WMP) for the site, including a Trigger Action and Response Plan (TARP) to monitor groundwater impacts, and establish a set of triggers for further investigation. The plan would include monitoring of any groundwater seepage through the pit walls and a protocol for obtaining Water Access Licences for any unforeseen inflows to the pit.

Existing conditions prohibit any extraction within 2 m of the established WWGL, and require Dixon Sand to prepare a Maximum Extraction Depth Map (MEDM) for the site based on available monitoring data. Dixon Sand would be required to prepare an updated MEDM following the determination of MOD 1, and to review and update the map every three years.

The Department has also recommended additional groundwater conditions, following consultation with CLWD. These conditions would require Dixon Sand to:
- install one additional monitoring bore in the vicinity of Stage 1A to monitor the SCBGS;
- install data loggers to provide continuous water level monitoring within the extended bore network;
- install water level monitoring loggers for all dams located on site, in order to better establish whether these dams are connected to groundwater;
- carry out an aquifer pumping test within the Hawkesbury Sandstone Aquifer prior to commencing quarrying operations within the modification area;
- conduct monthly monitoring of baseline groundwater levels and quality for at least 2 years prior to commencing quarrying operations in Stages 1B to 5B;
- prepare an updated site WMP in consultation with CLWD prior to commencing quarrying operations within the modification area; and
- cease work and consult with CLWD in the event that groundwater is encountered during quarrying operations.

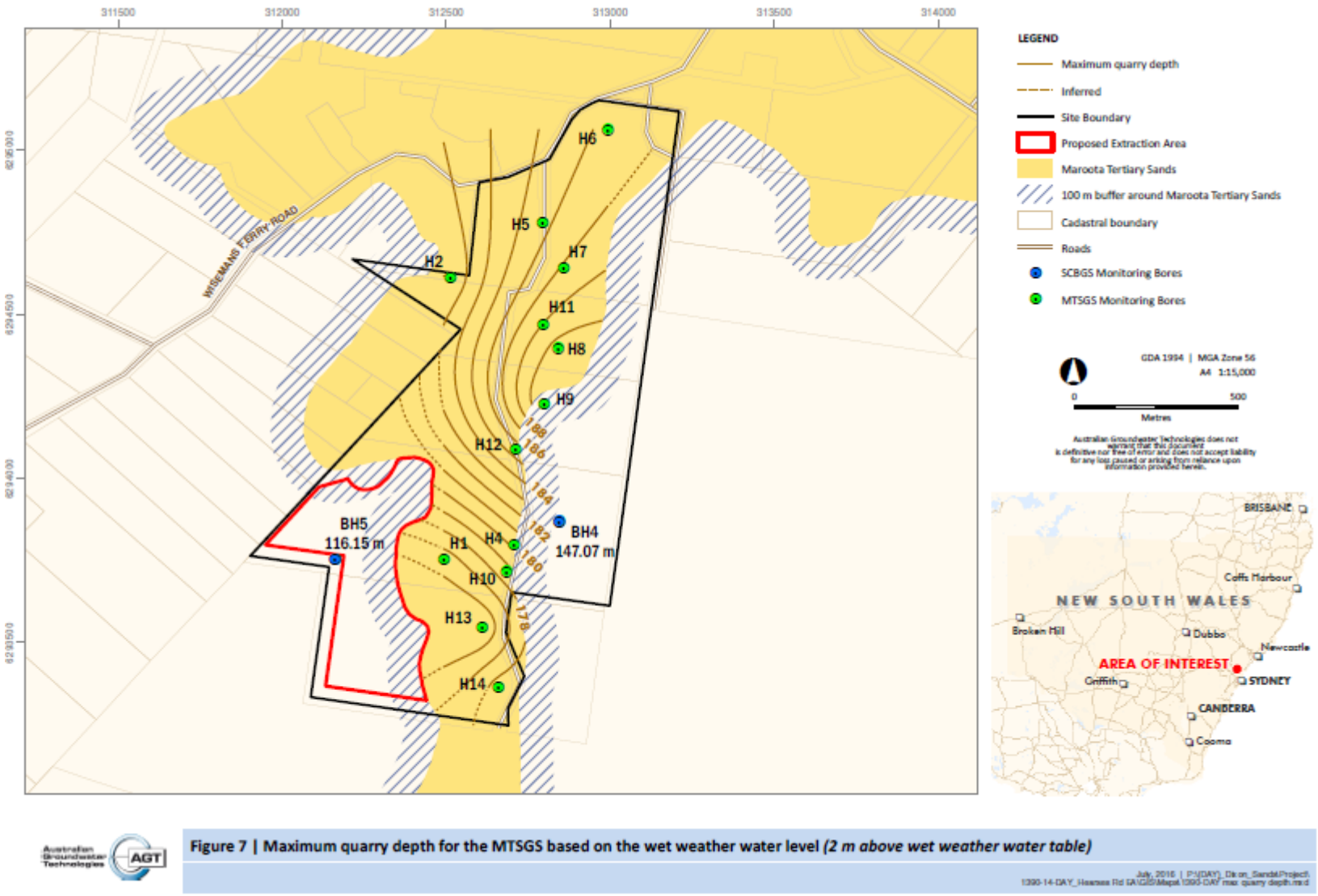

Figure 7 | Maximum quarry depth for the MTSGS based on the wet weather water level *(2 m above wet weather water table)*

Figure 10: *Proposed MTSGS buffer zone and maximum extraction depths*

Conclusion
The Department has carefully considered the findings of the GA and subsequent advice provided by CLWD. The Department is satisfied that the proposal incorporates appropriate safeguards to avoid intercepting the SCBGS and MTSGS regional groundwater tables during quarrying operations.

In addition, the Department has recommended a robust series of conditions to manage the potential groundwater impacts of the modified development. Subject to implementing these monitoring and mitigation measures, the Department is satisfied that the modification is unlikely to have a significant adverse impact on regional groundwater resources, or other groundwater users.

5.5.2 Surface Water

Surface water within the proposed extraction area drains to a tributary of Little Cattai Creek, which flows into the Hawkesbury River, approximately 12 km south-west of the HRSQ. The HRSQ occupies approximately one percent of the total catchment area of Little Cattai Creek. Water usage within the catchment is regulated under the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources* (WSP).

Soil landscapes in the locality are highly permeable, with very little surface water runoff outside of significant rainfall events. However, these soils pose a high to extreme erosion hazard during concentrated surface water flows.

Currently, surface water runoff at the site is managed under Dixon Sand's Site Water Management Plan (SWMP). Dixon Sand has installed a series of diversion banks to convey clean water around disturbed areas of the quarry. Dirty water runoff collects in the base of the quarry floor and is then directed to an existing sediment basin (Basin 4) to the south of the site via a series of catch drains (see **Figure 11**).

The modification would increase the total disturbance area on site by approximately 25 ha. To manage the surface water impacts of its expanded operations, Dixon Sand proposes to install a series of new water management structures. An in-pit sump would be installed in the floor of the new extraction area, to capture and store surface water runoff. Three additional sediment basins would be constructed in the south-west, west and north-west of the new extraction area, to progressively manage dirty water from each extraction stage. Runoff from the processing area would be collected and transferred to Basin 4. Collected water would then be used on site for processing and dust suppression. Clean water drains would also be constructed to divert clean water around the extraction areas. The conceptual surface water management system is shown in **Figure 11** below.

Subject to implementing these measures, the EA indicates that the proposed modification would have a negligible impact on downstream surface water flows or quality. No adverse impacts on downstream water users are anticipated by the Department.

Mitigation and Management
The Department has recommended conditions requiring Dixon Sand to prepare an updated Surface Water Management Plan, as a component of its SWMP. This plan would include details of the proposed water management system outlined in the EA, proposed erosion and sedimentation controls, and a program to monitor downstream surface water flows and quality.

As the proposal would involve quarrying through two first-order streams, Dixon Sand would also need to obtain a controlled activity approval under the *Water Management Act 2000*, prior to commencing extraction.

Conclusion
The Department is satisfied that Dixon Sand could manage surface water on the site, without the need for any off-site discharges. Subject to implementing the proposed mitigation measures and the recommended conditions, the Department is satisfied that the surface water impacts of the modified development would be minimal.

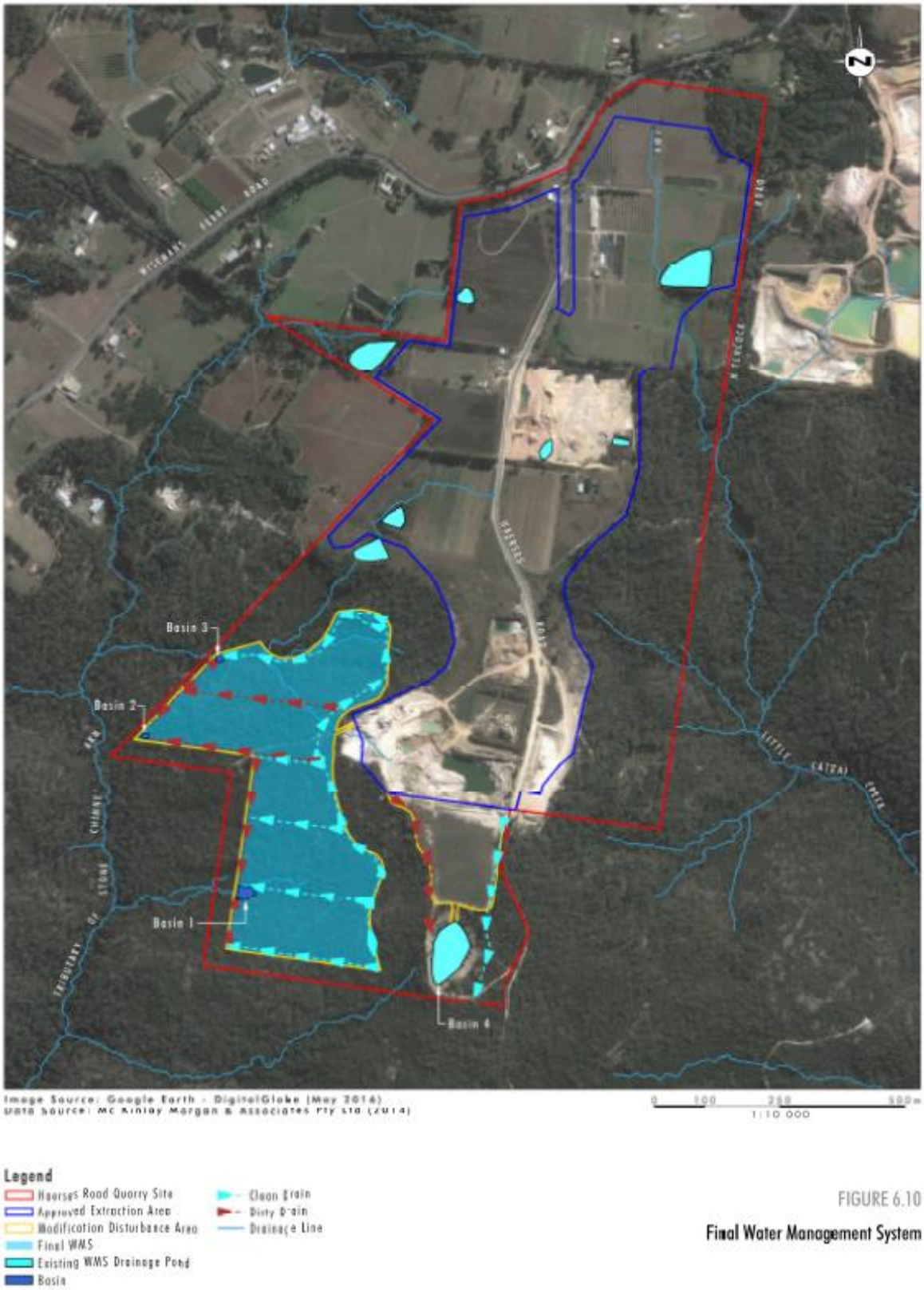

Figure 11: *Conceptual surface water management system*

5.5.3 Site Water Balance

The EA includes a comparative site water balance for existing and proposed operations at the site (see **Table 8**). Currently, the quarry has a net water surplus of 3.9 megalitres (ML) during an average year. The proposed modification is predicted to increase water usage at the HRSQ by approximately 12 ML/year. This increase is mainly attributable to the addition of the proposed wet plant.

***Table 8**: Comparative site water balance*

	Existing (ML/year)	Predicted (ML/year)
Inflows		
Rainfall/runoff	23.5	29.3
Rain on dams	18.4	19.4
Total inflows	*41.9*	*48.7*
Demands/losses		
Evaporation	24.0	25.2
Dust suppression	14.0	18.2
Processing activities	0.0	8.0
Total demand/losses	*38.0*	*51.5*
Water Balance	**3.9**	**-2.9**

The EA indicates that, during an average year, the modified development would have a small shortfall of approximately 2.9 ML. During dry years, Dixon Sand proposes to import water to the site, or adjust its production, so as to reduce its operational water demands.

The Department has recommended conditions requiring Dixon Sand to prepare a detailed site water balance as part of its updated SWMP. This would require Dixon Sand to demonstrate that it has sufficient water supply to support its ongoing operations.

5.5.4 Conclusion

The Department is satisfied that the modification would not significantly increase the impacts of the approved development on water resources. Subject to implementing suitable mitigation and management measures, the Department is satisfied that the proposed modification would not have a significant impact on:

- regional groundwater resources or the health of GDEs; or
- surface water flows or quality.

The Department considers that any incremental impacts associated with the proposal can be suitably managed and mitigated through modified conditions of consent and an updated SWMP.

5.6 Other impacts

The Department is satisfied that the other impacts of the proposal are likely to be minor or negligible. The Department's assessment of other impacts is summarised in **Table 9** below.

***Table 9**: Other impacts*

Issue	Impact and Consideration	Recommendation
Visual Impacts	• The RTS and supplementary RTS included an assessment of the visual impacts of the modified development at key vantage points, including dwellings to the north-west and south-west of the proposed extraction area, and selected locations along Wisemans Ferry Road. • Due to the undulating terrain, and the density of vegetation in the area, neither the proposed extraction area or the associated acoustic bunds would be visible from any of the identified vantage points. • However, minor ancillary structures, including the proposed site office, weighbridge and car parking area, will be visible from Wisemans Ferry Road.	• The Department has recommended a condition requiring Dixon Sand to implement all reasonable and feasible measures to minimise the visual impacts of the development. This may include, for example, tree planting adjacent to Wisemans Ferry Road, in order to screen the proposed weighbridge and carparking areas. • Subject to this condition, the Department is satisfied that the visual impacts of the proposed modification would be negligible.
Aboriginal Cultural Heritage	• The EA included an Aboriginal Cultural Heritage and Archaeological Assessment (ACHAA) prepared in consultation with local Registered Aboriginal Parties (RAPs). • A search of the Aboriginal Heritage Information Management System (AHIMS) identified 64 Aboriginal sites within a 10 km radius of the proposed extension. These sites include art, shelters, grinding grooves, modified trees and stone arrangements. • No Aboriginal archaeological sites were identified within the modification area. This area	• The Department has recommended a condition requiring Dixon Sand to cease work and consult with OEH in the event that any suspected item or object of Aboriginal heritage significance is identified on site. • Subject to this condition, the Department is satisfied the proposed modification would have a negligible impact on Aboriginal cultural heritage.

Issue	Impact and Consideration	Recommendation
	is considered to have low archaeological potential, due to poor soils and the lack of a nearby water supply. • However, OEH noted that there was low ground visibility during the site survey, and that there is potential for grinding features to be present on site. On this basis, OEH recommended the inclusion of a precautionary condition requiring Dixon Sand to cease work in the event that any grinding features are uncovered. The Department supports this recommendation.	
European Heritage	• There are no listed heritage items within the proposed disturbance area or its immediate surrounds. • The EA notes that a survey was conducted as part of the ACHAA, and that no potential historic sites were identified. • In its submission, the Heritage Council raised concerns that the EA did not include a historic archaeological assessment. • In its RTS, Dixon Sand provided a more detailed desktop assessment of historic heritage significance. In response, the Heritage Council advised that it had no further concerns regarding the proposal, and that no additional conditions of consent were warranted. • The Department is satisfied that the proposed modification would have a negligible impact on historic heritage in the locality.	• No additional conditions considered necessary.
Waste	• The proposal involves importation of up to 100,000 tpa of VENM and ENM. These materials would then be blended with excavated materials for resale, or used in progressive rehabilitation of the site. • In its submission, Council raised concerns that the proposal would substantially alter the nature of the development, effectively transforming the site into a 'waste or resource management facility'. However, following submission of the RTS, Council advised that its concerns had been addressed. • The Department notes that extractive industries often import VENM/ENM for blending and rehabilitation purposes, and that this would not significantly alter the nature of approved operations on site. • The EPA did not raise any objections regarding the proposed importation of VENM/ENM. However, in its submission, the EPA noted that an EPL variation would be required.	• The Department has recommended conditions to limit the importation of VENM/ENM to a maximum of 100,000 tpa, and to require Dixon Sand to record and report on all incoming VENM/ENM in its Annual Review. • The Department is satisfied that the importation of waste would be suitably managed under the recommended conditions and the site's EPL.
Rehabilitation	• The EA includes a conceptual final landform for the proposed extraction area. • The extraction area would be rehabilitated progressively, following extraction of each Stage. Each Stage would be backfilled with tailings from the wet plant, overburden, and where required, imported VENM/ENM. Following backfilling, the extraction area would be replanted within native vegetation. • Redundant infrastructure, including the proposed processing plant, would be decommissioned and the affected areas suitably rehabilitated to accommodate an agreed post-closure land use. • Dixon Sand has also committed to prepare an updated Rehabilitation Management Plan and Quarry Closure Plan for the site.	• The Department recommends that existing rehabilitation conditions be amended to reflect current drafting standards. • The recommended conditions establish clear rehabilitation objectives for the site and require Dixon Sand to prepare a BRMP which meets those objectives. The conditions also require Dixon Sand to monitor the performance of rehabilitation works against specified completion criteria. • The Department is satisfied that site rehabilitation would be suitably managed under the

Issue	Impact and Consideration	Recommendation
		recommended conditions and an updated BRMP.
Socio-economic	• The proposed modification would allow the extraction of a friable sandstone resource of up to 15 million tonnes. • The proposed modification would enable Dixon Sand to meet current market demands for coarse sand products within the Sydney region. • The proposed modification would also create four additional full-time jobs at the HRSQ. • The Department is satisfied that the proposal would optimise resource recovery at the site, without substantially increasing the environmental impacts of the approved operations or the demand on local services and infrastructure.	• No additional conditions considered necessary.

6. RECOMMENDED CONDITIONS

The Department has drafted a recommended Notice of Modification (see **Appendix E**) and a consolidated version of the consent as it is proposed to be modified (see **Appendix F**). Given the scale of the proposed modification, the Department has taken the opportunity to undertake a comprehensive update of existing conditions, in consultation with Dixon Sand. The Department considers that the environmental impacts of the project can be appropriately managed through the proposed amended conditions of consent.

Dixon Sand has reviewed and accepted the recommended conditions.

7. CONCLUSION

The Department has assessed the modification application, EA, RTS and supplementary RTS in accordance with the relevant requirements of the EP&A Act. The Department has carefully considered the proposal's potential impacts on the natural and cultural environment and on nearby residents.

The Department has concluded that these impacts can be suitably managed under modified conditions of consent, and a full suite of updated management plans. The recommended conditions of consent would require Dixon Sand to prepare and submit these updated plans within six months of the determination of MOD 1.

The Department considers that the proposal would optimise resource recovery at the HRSQ, without significantly increasing the environmental impacts of the development. The Department is therefore satisfied that the modification is in the public interest and should be approved, subject to conditions.

8. RECOMMENDATION

It is recommended that the Director, Resource Assessments, as delegate of the Minister:

- **considers** the findings and recommendations of this report;
- **determines** that the modification is within the scope of section 75W of the EP&A Act;
- **approves** the modification application under section 75W, subject to conditions; and
- **signs** the attached notice of modification (**Appendix F**).

Recommended by:

22/1/18

Lauren Evans
Senior Planning Officer
Resource Assessments

Recommended by:

JEvans 22/1/18

Jessie Evans
Team Leader
Resource Assessments

9. DECISION

The recommendation is: Approved / Not approved by:

Howard Reed

Howard Reed 22·1·18
Director
Resource Assessments
as delegate of the Minister for Planning

APPENDIX A – ENVIRONMENTAL ASSESSMENT

Refer to the Department's website:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7377

APPENDIX B – SUBMISSIONS

Refer to the Department's website:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7377

APPENDIX C – RESPONSE TO SUBMISSIONS

Refer to the Department's website:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7377

APPENDIX D – SUPPLEMENTARY RESPONSE TO SUBMISSIONS

Refer to the Department's website:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7377

APPENDIX E – CONSIDERATION OF MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

In accordance with the Bilateral Agreement between the Commonwealth and NSW Governments, the Department provides the following additional information required by the Commonwealth Minister, in deciding whether or not to approve a proposal under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

E.1 REQUIREMENTS FOR DECISIONS ABOUT THREATENED SPECIES AND ENDANGERED ECOLOGICAL COMMUNITIES

In accordance with section 139 of the EPBC Act, in deciding whether or not to approve, for the purposes of section 18 or section 18A of the EPBC Act, the taking of an action and what conditions to attach to such an approval, the Commonwealth Minister must not act inconsistently with certain international environmental obligations, Recovery Plans or Threat Abatement Plans. The Commonwealth Minister must also have regard to relevant Approved Conservation Advices.

Australia's International Obligations

Australia's obligations under the *Convention on Biological Diversity* (Biodiversity Convention) include the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding. The recommendations in the Department's Assessment Report are not inconsistent with the Biodiversity Convention, which promotes environmental impact assessment (such as this process) to avoid and minimise adverse impacts on biological diversity. The recommended approval requires avoidance, mitigation and management measures, and offsetting for listed threatened species and communities. All information related to the proposed action is required to be publicly available to ensure equitable sharing of information and improved knowledge relating to biodiversity.

Australia's obligations under the *Convention on Conservation of Nature in the South Pacific* (Apia Convention) include encouraging the creation of protected areas which together with existing protected areas will safeguard representative samples of the natural ecosystems occurring therein (particular attention being given to endangered species), as well as superlative scenery, striking geological formations and regions. Additional obligations include signatories using their best endeavours to protect such fauna and flora (special attention being given to migratory species) so as to safeguard them from unwise exploitation and other threats that may lead to their extinction. While the Apia Convention was suspended with effect from 13 September 2006, Australia's obligations under the Convention have been taken into consideration. The recommendations are not inconsistent with the Convention, which has the general aim of conservation of biodiversity.

The *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) is an international agreement between governments which seeks to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The recommendations are not inconsistent with CITES as the proposed action does not involve international trade in specimens of wild animals or plants.

Recovery Plans

There are currently no National Recovery Plans in place for *Coastal Upland Swamps in the Sydney Basin Bioregion* EEC or *Darwinia biflora*.

Approved Conservation Advices

The Approved Conservation Advices are discussed below:

- Approved Conservation Advice (including listing advice) for *Coastal Upland Swamps in the Sydney Basin Bioregion* EEC

In July 2014, the Commonwealth Minister approved the Conservation Advice for *Coastal Upland Swamps in the Sydney Basin Bioregion.* The Advice identifies clearing for quarries, and altered hydrological processes as key threats to the EEC. The advice also notes that the community is slow to recover from disturbance.

The proposal involves removal of 0.08 ha of Coastal Upland Swamp. However, the majority of Coastal Upland Swamp within the modification area would be retained and protected in perpetuity under a Biobanking Agreement.

The Conservation Advice also emphasizes the importance of buffer zones in protecting the integrity of the EEC. The proposal incorporates a 50 m buffer zone around the majority of Coastal Upland Swamp in the modification area. The Department considers that the proposed buffer zone, and the recommended groundwater management conditions, would provide suitable protection from any adverse hydrological impacts during quarrying operations.

Subject to these recommendations, the Department is satisfied that the proposal is consistent with the Approved Conservation Advice.

- Approved Conservation Advice for *Darwinia biflora*

In April 2014, the Commonwealth Minister approved the Conservation Advice for *Darwinia biflora.* The Advice identifies the main threats to *Darwinia biflora* as habitat loss and degradation, increased fragmentation and inappropriate fire regimes. The Advice also identifies impacts from surrounding development, weed invasion and removal of bush rock as potential threats.

The Advice identifies a series of Regional Priority Actions (RPAs) to address these threats. These RPAs include identifying populations of high conservation priority and ensuring there is no anthropogenic disturbance in areas where *Darwinia biflora* occurs. The Advice also specifies Local Priority Actions (LPAs) to support recovery of the species. These LPAs include minimising adverse impacts from land use at known sites, protecting populations through development of conservation agreements and managing invasive weeds that may threaten the survival of the species.

The proposed modification would remove 17.82 ha of habitat for *Darwinia biflora.* The Department is satisfied that Dixon Sand has minimised the impacts on *Darwinia biflora* to the greatest extent practicable, and that the residual impacts would be suitably offset in accordance with the FBA. The Department has recommended conditions requiring Dixon Sand to protect and enhance the remaining *Darwinia biflora* habitat on site in accordance with a Biobanking Agreement and the site's BRMP. The Department has also recommended conditions regarding ongoing weed management.

Subject to these recommendations, the Department is satisfied that the proposal is consistent with the Approved Conservation Advice.

Threat Abatement Plans
There are no relevant Threat Abatement Plans in place with respect to *Coastal Upland Swamps in the Sydney Basin Bioregion* EEC or *Darwinia biflora.*

E.2 ADDITIONAL EPBC ACT CONSIDERATIONS

Table E1 contains the additional mandatory considerations, factors to be taken into account and factors to have regard to under the Act, additional to those already discussed, which the Commonwealth Minister must consider in determining the proposed action.

Table E1: *Additional considerations under the EPBC Act*

EPBC Act Section	***Considerations***	***Conclusion***
Mandatory considerations		
136(1)(b)	Social and economic matters are discussed in the EA and Section 5.6 of the Department's Assessment Report.	The Department is satisfied that the social impacts of the proposal would be negligible and that it would result in an overall benefit to local and regional economies.
Factors to be taken into account		
3A, 136(2)(a), 391(2)	Principles of ecologically sustainable development (ESD), including the precautionary principle, have been taken into account, particularly: • long-term and short-term economic, environmental, social and equitable considerations that are relevant to this decision; • conditions that restrict environmental impacts and impose monitoring and adaptive management reduce any lack of certainty related to the potential impacts of the project; • conditions requiring the project to be delivered and operated in a sustainable way to protect the	The Department considers that the proposal, if undertaken in accordance with the recommended conditions of consent, would be consistent with the principles of ESD.

	environment for future generations and conserve the affected MNES; • advice provided within this report reflects the importance of conserving biological diversity and ecological integrity in relation to the controlling provisions for the project; and • mitigation measures to be implemented which minimise potential impacts of the proposal on biodiversity within the site area.	
136(2)(e)	Other information on the relevant impacts of the proposed action – the Department is not aware of any relevant information not addressed in this assessment report.	The Department considers that all information relevant to the impacts of the proposal have been taken into account in this assessment. The Department's consideration of key issues is in **Section 5**.
Factors to have regard to		
176(5)	Bioregional plans	There is no relevant bioregional plan.
Considerations on deciding on conditions		
134(4)	Must consider: • information provided by the person proposing to take the action or by the designated proponent of the action; and • the desirability of ensuring as far as practicable that condition(s) are a cost-effective means for the Commonwealth and the person taking the action to achieve the object of the condition.	Documentation is provided by Dixon Sand in Appendix 6 of its EA (see **Appendix A**) and in the supplementary RTS (see **Appendix D**). The Department considers that the proposed conditions are a cost-effective means of achieving their purpose.

E.3 THREATENED SPECIES AND COMMUNITIES (SECTIONS 18 & 18A OF EPBC ACT)

For the reasons set out in **Section 5.1** above, the Department considers that the impacts of the action on threatened species and communities are acceptable, subject to implementation of the avoidance and mitigation measures described in the EA and supplementary RTS, and compliance with the recommended conditions of consent.

The Department believes that draft conditions 30 to 32 and 35 to 37 in Schedule 3 of the modified development consent provide a suitable regulatory framework to manage the risk of impact to listed threatened species from the proposal.

Accordingly, the Department recommends that the Commonwealth Minister require Dixon Sand to implement conditions 30 to 32 and 35 to 37 in Schedule 3 of the modified development consent, where they relate to the management of potential impacts on listed MNES under the EPBC Act.

E.4 OTHER PROTECTED MATTERS

The Commonwealth Department of the Environment and Energy determined that other matters under the EPBC Act are not controlling provisions with respect to the proposed action. These include migratory species, Ramsar Wetlands, World Heritage properties, National Heritage places, Commonwealth marine environment, whether the referring party is a Commonwealth agency or undertaken on Commonwealth land, nuclear action, Great Barrier Reef Marine Park, Commonwealth Heritage places overseas and a water resource in relation to coal seam gas or large coal mining development.

APPENDIX F – NOTICE OF MODIFICATION

APPENDIX G – CONSOLIDATED CONSENT