



Our Ref: 1731/PJ/111214

11 December 2014

Carl Dumpleton
Senior Planner, Mining Projects
Major Project Assessments
Department of Planning and Environment
23-33 Bridge Street
SYDNEY NSW 2000

Dear Carl

Re: Response to Office of Environment and Heritage, Department of the Environment and the Greater Blue Mountains World Heritage Advisory Committee Comments on the Tinda Creek Sand Extraction State Significant Development Proposal

Further to our phone conversations, review of further submissions by Office of Environment and Heritage (OEH), Department of the Environment (DoE) and the Greater Blue Mountains World Heritage Advisory Committee (GBMWHAC) and meeting on 8 December 2014, we have further modified the proposed layout of extensions to Tinda Creek Sand Extraction area. As discussed at our meeting on 8 December 2014, these modifications further reduce potential impacts on high conservation value communities, threatened species and Yengo and Wollemi National Parks and Greater Blue Mountains World Heritage Area (GBMWhA).

The proposed changes to the quarry footprint are shown on **Figure 1** and include quarrying in approximately 6.1 hectares of Domain 3 that was disturbed during the November 2013 bushfire and approximately 8.2 hectares in Domain 7. The proposed quarry footprint in Domain 3 avoids the main population of *Grevillea parviflora* on Lot 1, however will disturb three of this species. Proposed quarrying within Domain 7 will avoid all *Grevillea parviflora* on Lot 3. The proposed 106 hectare on-site bio-diversity offset area contains 845 *Grevillea parviflora* individuals that will be protected in perpetuity.

The proposed quarry area on Domain 3 includes 4.6 hectares of Mellong Sandmass Dry Woodland, 0.2 hectares of water body, 0.3 hectares of Mellong Sandmass Sedgeland, 0.7 hectares of Mellong Sandmass Swamp Woodland and 0.3 hectares of Stringybark – Ironbark forest.

The proposed quarry area on Domain 7 avoids the Mellong Sandmass Sedgeland at the eastern end of Domain 7 and includes 4.2 hectares of Mellong Sandmass Swamp Woodland and 4.0 hectares of hectares of Mellong Sandmass Dry Woodland. The proposed Domain 7 quarry footprint has been designed to avoid disturbance of *Grevillea parviflora* subsp. *parviflora* on the northern boundary and provide a 40 metre buffer to known locations of this species.

The proposed modifications to the quarry footprint increase the buffer distance between quarrying and GBMWhA to be in excess of 230 metres along the northern boundary of the proposed Domain 3 quarry area and in excess of 270 metres to the eastern edge of the proposed Domain 7 quarry area. A buffer of in excess of 100 metres is also provided between quarrying and Yengo National Park to the south.

Inspired People.
Dedicated Team.
Quality Outcomes.

Newcastle

75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

Perth

PO Box 8177
Subiaco East WA 6008
33 Ventnor Avenue
West Perth WA 6005

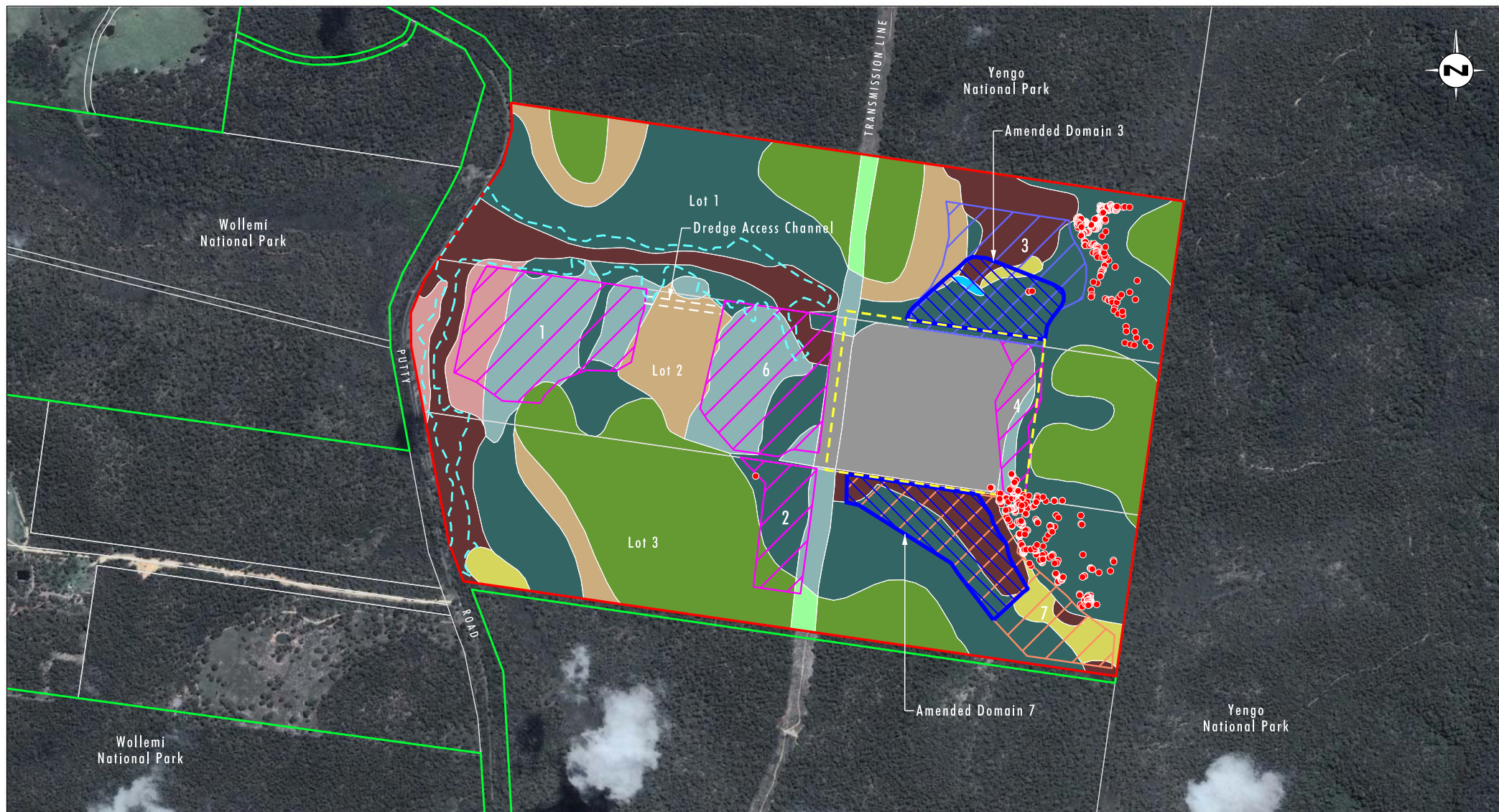
Ph. 08 6260 0700

Canberra

PO Box 6135
56 Bluebell Street
O'Connor ACT 2602

Ph. 02 6262 9484

www.umwelt.com.au



Source: Google Earth (2012), LMPA (2009), LPI NSW (2007)

Legend

- | | | |
|---|---|---|
| Project Area | Stringybark - Ironbark Forest | Hawkesbury Hornsby Plateau Exposed Woodland Derived Native Grassland |
| Proposed Extraction Area | Mellong Sandmass Swamp Woodland | Disturbed Land |
| Domain 3 Extraction Area | Mellong Sandmass Swamp Woodland (Modified - Overstorey Absent) | Water body |
| Domain 7 Extraction Area | Mellong Sandmass Dry Woodland | Wetlands (Hawkesbury LEP 2012 mapping) |
| National Park Boundary | Mellong Sandmass Dry Woodland Derived Native Grassland | ● <i>Grevillea parviflora</i> subsp. <i>parviflora</i> |
| Limit of Approved Extraction (DA 134/95) | Mellong Sandmass Sedgeland | |
| Amended Domains | Hawkesbury Hornsby Plateau Exposed Woodland | |

File Name (A4): 1731_487.dgn

0 250 500 750m
1:15 000

FIGURE 1

Revised Quarry Plan and
Vegetation Communities

The revised quarry plan will result in approximately a 25.5 hectare area of potential Koala habitat being disturbed over the life of the quarry. The proposed 106.6 hectare biodiversity offset area will comprise 101.7 hectares of potential Koala habitat providing an offset ratio of 4.0:1.

The proposed changes to the quarry footprint result in a similar disturbance area (46.8 hectares) to that previously proposed if either Domain 7 or Domain 3 was quarried and will yield approximately the same total resource (7 Mt) as the previous quarry plans maintaining the viability of the quarry. From an operational perspective, the proposed changes will reduce the overall distance that the dredge slurry needs to be pumped, reducing energy requirements over the life of the project and equipment upgrade needs. The proposed changes will also enable the eastern end (i.e. the existing quarry and those sections of Domain 3 and Domain 7) to be quarried, backfilled and rehabilitated while quarrying in Domains 6, 2 and 1 are being undertaken. This will enable sufficient fill material to be incorporated into the final landform to ensure that once suitably rehabilitated, the eastern section of the quarry is free draining and will discharge to the existing Tinda Creek drainage line adjacent to the western extent of the existing quarry.

A conceptual final landform based on the revised quarry plan is shown on **Figure 2**. Cross-Sections of the conceptual final landform are shown on **Figure 3**. The final landform has been designed so that the catchment to the east of the transmission line easement will be free draining with flows from the upstream catchment draining to the existing alignment of Tinda Creek to the west of the transmission line easement. An existing small water body of 0.2 hectares within Domain 3 will be removed during quarrying and will be reconstructed within the existing quarry footprint as shown on **Figure 2** to provide flow and sediment and erosion control for the rehabilitated landform to the east of the transmission line easement.

As shown on **Figure 2**, two off-stream dams will be created within Domain 6 and Domain 1. These will form part of the final landform and will have a combined surface area at top water level of approximately 11 hectares which is approximately 70% of the size of the 16 hectares of dam that was approved under the existing consent. Diversion drains will be constructed upslope of the dams to convey clean upstream runoff to the Tinda Creek drainage system as part of constructing the final landform.

It is proposed that vegetation on the final landform will, where possible, reflect the vegetation communities that are on-site. Conceptual final landform vegetation communities and the location of proposed bio-diversity offset areas are shown on **Figure 4**. As can be seen from **Figure 4**, the final landform will be shaped to facilitate the establishment of significant tracts of Mellong Sandmass Sedgeland and Mellong Sandmass Swamp Woodland communities which are both of high conservation value. It is proposed that, as part of the rehabilitation programme, the area of Mellong Sandmass Sedgeland within the proposed disturbance area will be increased from 0.3 hectares to 3.3 hectares while the area of Mellong Sandmass Swamp Woodland will increase from 6.1 hectares to 13.3 hectares.

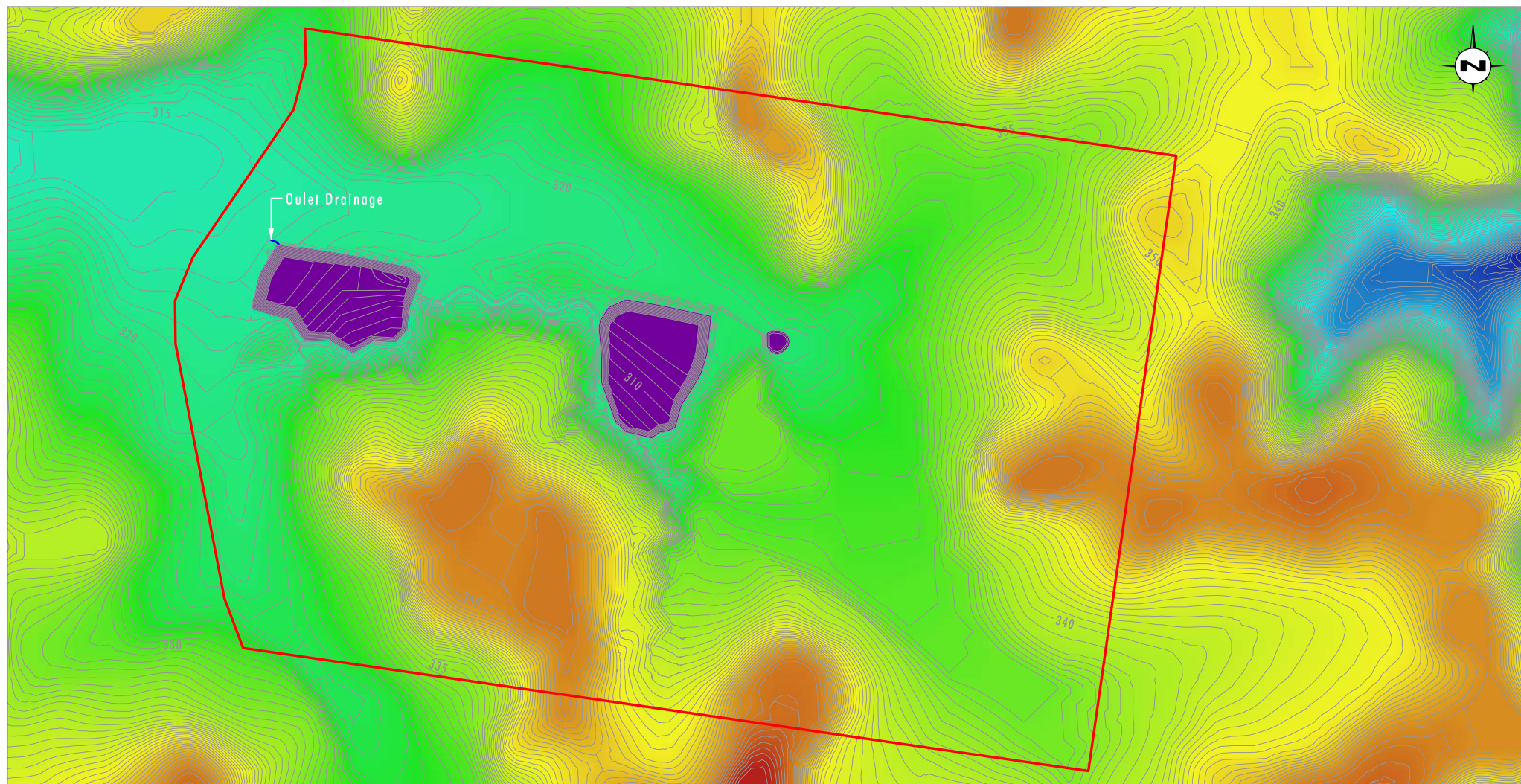
Further comments were also received from TransGrid, Rural Fire Service and one unidentified party. A response was also received from NSW Office of Water on 10 December 2014 and will be addressed separately.

Response to Further Submissions

1.0 TransGrid

The submission from TransGrid dated 1 December 2014 states that Liddell to Sydney West 330 Transmission Line is situated within a 60.96 metre easement that traverse the project area and that any development on the transmission line easement requires prior written approval from TransGrid.

Hy-Tec will obtain written approval from TransGrid prior to undertaking any quarrying within transmission line easement and will comply with *TransGrid Guidelines for Easement Activities and Restrictions* including providing adequate setback from stanchions and ensuring that ongoing access to the transmission line is available at all times.



Legend

- Project Area
- Dam - Maximum Water Height
- Outlet Drainage

Height:

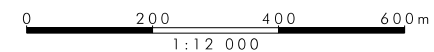
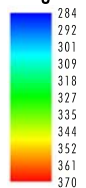
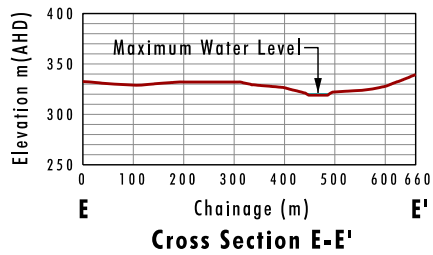
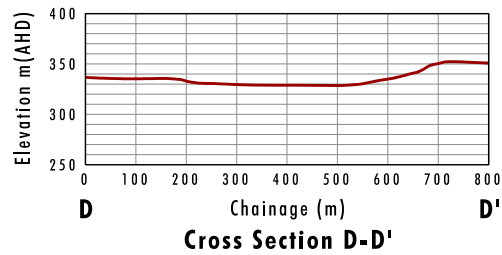
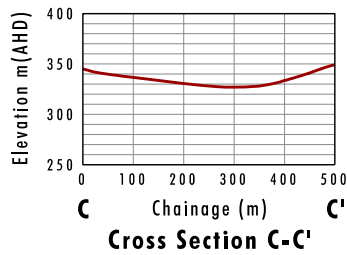
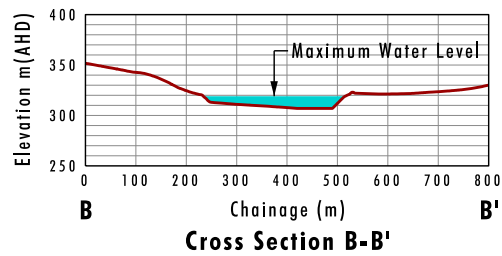
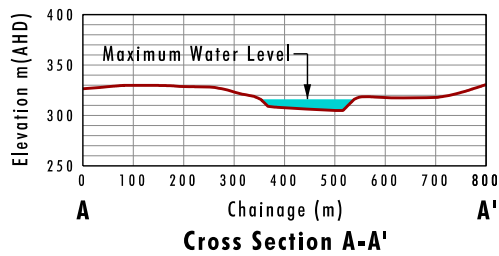
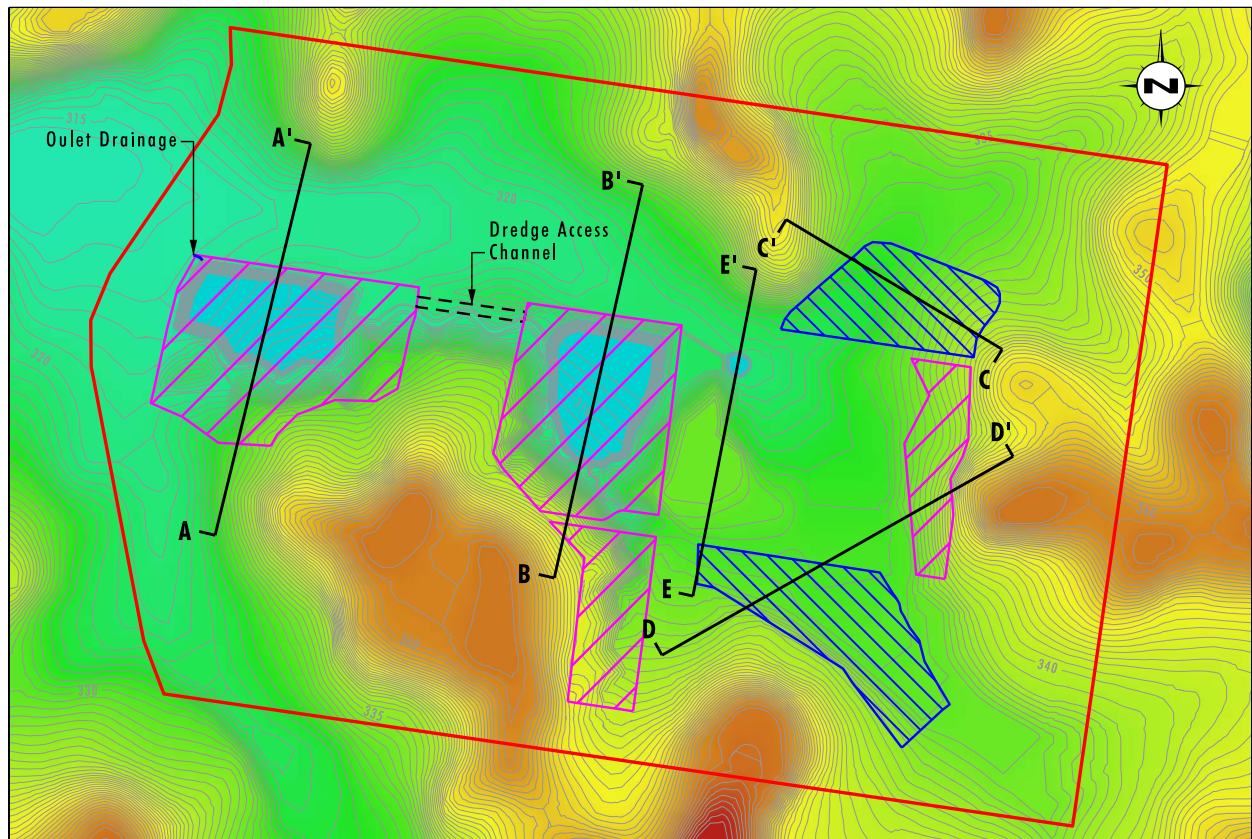


FIGURE 2

Conceptual Final Landform



Legend

- Project Area
- Domain 3 Concept Design
- Cross Section
- ▨ Proposed Extraction Area
- ▨ Revised Domains

Height:

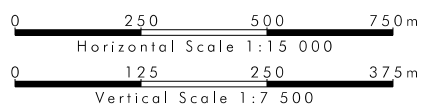
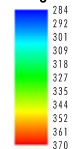


FIGURE 3

**Conceptual Final Landform
Cross-sections**



Source: Google Earth (2012), LMPA (2009), LPI NSW (2007)

0 250 500 750m
1:15 000

Legend

- | | | |
|---|---|---|
| Project Area | Stringybark - Ironbark Forest | Hawkesbury Hornsby Plateau Exposed Woodland |
| National Park Boundary | Mellong Sandmass Swamp Woodland | Hawkesbury Hornsby Plateau Exposed Woodland Derived Native Grassland |
| Bio-diversity Offset Area | Mellong Sandmass Swamp Woodland (Modified - Overstorey Absent) | Water Body |
| Limit of Approved Extraction (DA 134/95) | Mellong Sandmass Dry Woodland | |
| Wetlands (Hawkesbury LEP 2012 mapping) | Mellong Sandmass Dry Woodland Derived Native Grassland | |
| Disturbed Land | Mellong Sandmass Sedgeland | |

File Name (A4): 1731_485.dgn

FIGURE 4

Conceptual Final Landform
Vegetation Communities and
Bio-diversity Offset Area

2.0 Rural Fire Service

Hy-Tec received a letter from Colo Heights Rural Fire Service which provides fire services for an area of approximately 1000 km² surrounding the quarry. A copy of the letter is provided at **Attachment A**.

The letter states that access to a large volume of permanent water at the quarry is invaluable during major fire events such as in 1994, 1997, 2001 and 2013 as this source is the only available large permanent water source that is safe for bucketing into helicopters and to provide an unlimited supply for tanker refills.

The letter also refers to the large open area surrounding the quarry as being invaluable as a safe staging area for fire crews and as a safe area for the refuelling and deployment of helicopters which have become an integral part of modern fire-fighting.

3.0 Confidential Submission

DP&E requested Hy-Tec respond to an undated confidential submission in regard to the quarry. The submission objects to the quarry principally on the grounds of impact on flora and fauna, potential impacts on water quality (algal blooms), surface and groundwater and impacts on the Wollemi National Park and the GBMWHAC.

As set out in the EIS and in the following responses to OEH, DoE and GBMWHAC, the quarry has been designed to minimise impact on the ecological values of the site and surrounding area through:

- avoiding disturbance of high conservation communities where possible;
- providing adequate buffers between the quarry disturbance areas and surrounding National Parks and World Heritage Areas;
- providing on-site biodiversity offset areas at an overall ratio of 2.3 to 1;
- rehabilitating the quarry to achieve a landform that is consistent with the surrounding area and has similar vegetation communities to those that exist on site; and
- diverting clean runoff around the quarry to minimise impacts on downstream flows and operating the quarry with a closed water management system to ensure it does not have adverse impacts on downstream water quality.

4.0 Office of Environment and Heritage

While regional scale mapping of the Mellong Sandmass dates to 1998 (Bell 1998), it is considered that swamp communities mapped in the east of Wollemi National Park provide a more appropriate regional association for the Sedgeland community recorded in the Project area. The Mellong Sandmass Sedgelands are restricted to the Mellong Swamps area in the east of the Park, in deep, perched alluvial sands where soil drainage is very poor (Ryan et al 1996, cited in Bell 1998). The sedges *Lepyrodia scariosa* and *Schoenus brevifolius* clearly dominate the Mellong Sandmass Sedgelands, with herb species also present including *Dichondra repens*, *Gonocarpus micranthus*, *Goodenia paniculata*, and *Drosera pelata*, and the clubmoss *Selaginella uliginosa* (Bell 1998). As identified in **Table 1** below, Mellong Sandmass Sedgeland mapped in the Project area is dominated by *Lepyrodia scariosa* and *Schoenus brevifolius*, along with *Cyathochaeta diandra*. *Gonocarpus micranthus*, *Goodenia paniculata* were also commonly recorded. While recent vegetation mapping of the Mellong Sandmass has not been undertaken, it is considered that the sedgelands recorded in the Project area have greater affinity floristically and geomorphologically with the Mellong Sandmass Sedgelands mapped within Wollemi National Park (Bell 1998).

Coastal Upland Swamp in the Sydney Basin Bioregion - Matters For Consideration

OEH contends that the Response to Submissions report does not convincingly demonstrate that the Mellong Sandmass Sedgeland community recorded in the Project area is not Coastal Upland Swamp EEC. Mellong

Sandmass Sedgeland recorded in the Project area occurs in association with Tinda Creek and its tributaries, in areas of impeded drainage.

As part of the Ecological Assessment preparation, at the request of OEH, Umwelt identified that the Mellong Sandmass Sedgeland recorded in the Project area had some floristic similarity with Sydney Hinterland Sandstone Swamp which is known to occur at two locations within Yengo National Park. Sedgelands occurring in the Project area lack the floristic diversity of both Sydney Hinterland Sandstone Swamp and Coastal Upland Swamp Forest on account of the distribution and rainfall elements that drive delineation of these communities at a regional scale, however a low level of commonality in floristic composition was recorded.

The description of the Sydney Hinterland Sandstone Swamp states that hanging swamps such as Sydney Hinterland Sandstone Swamp are prevalent mostly where rainfall exceeds 1000 millimetres per year and that the majority of Yengo and Parr Reserves are too dry to support this community (DECC 2008). A better fit community for the Mellong Sandmass Sedgeland occurring in the Project area is the Mellong Sandmass Sedgelands mapped within Wollemi National Park to the west of the Project area (Bell 1998), as described above.

Throughout the NSW Scientific Committee determination it refers to Coastal Uplands occurring on plateaus. The Tinda Creek sedgeland site is located in an alluvial valley that is distant from any plateau geomorphology. The Coastal Uplands and Sydney Hinterland Sandstone Swamp are also referred to as hanging swamps. Hanging swamps typically occur in valleys within plateau areas where sandstone on the plateau is underlain by less permeable geological strata such as claystone that outcrop in, or occur beneath the valley floor. In these areas water that infiltrates into the overlying sandstone is conveyed horizontally along the upper surface of the claystone band to the hanging swamp. The geomorphology of the Mellong Sandmass Sedgeland at Tinda Creek does not have these characteristics.

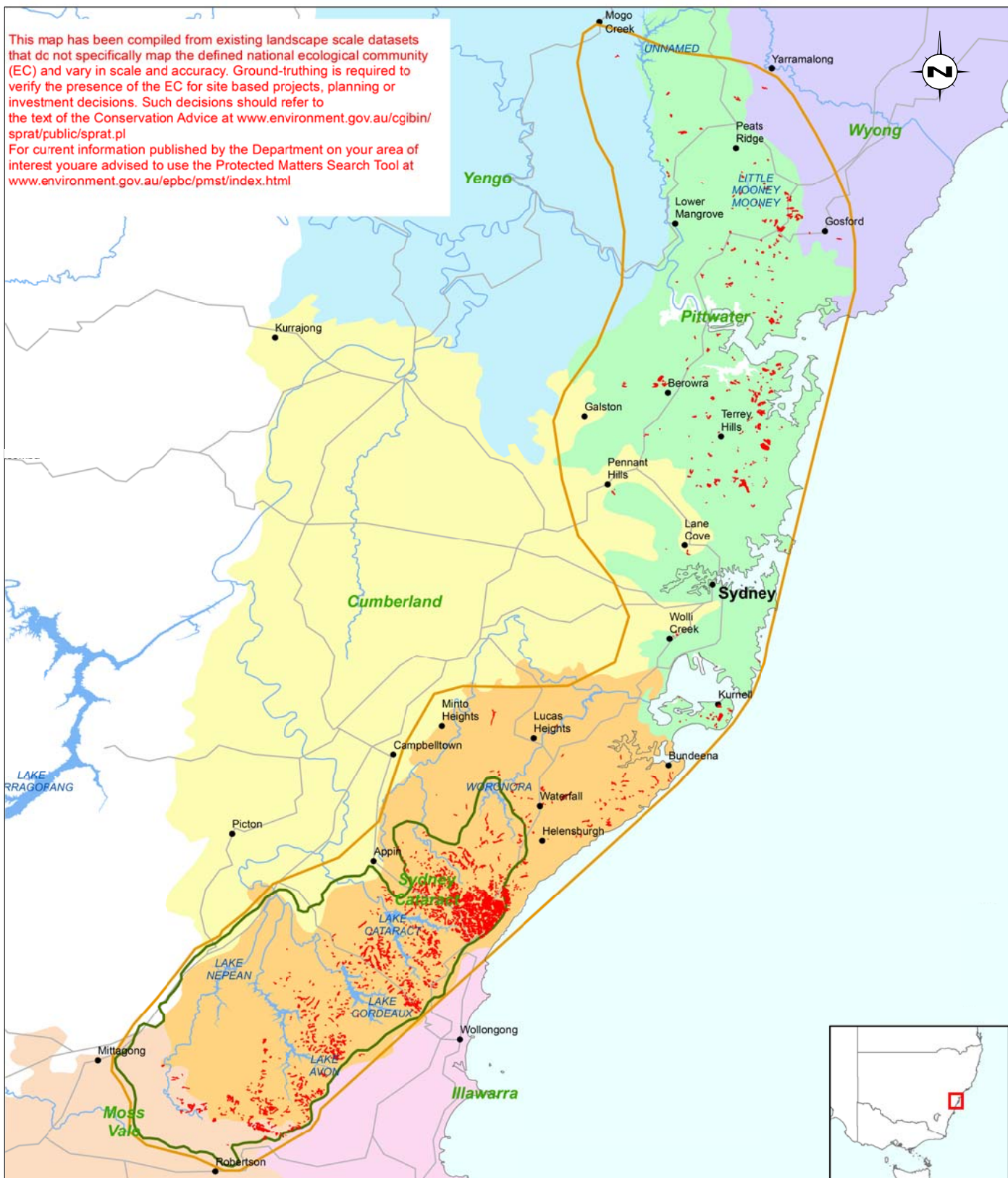
The determination also refers to Coastal Upland Swamps occurring in areas where net rainfall exceeds evaporation with this typically being driven by orographic effects adjacent to escarpments. In these conditions, orographic effects locally increase rainfall and reduce evaporation as a result of cloud cover and associated fogs. In this part of NSW, the coastal escarpment that drives orographic rainfall effects is the Blue Mountains which are located to the west of the site which have an elevation of approximately 1000 metres. Tinda Creek surrounding the Mellong Sandmass Sedgeland has an elevation of approximate 300 mAHD to 360m mAHD and is effectively in a comparative rain shadow. Orographic effects are not a predominant influence on rainfall and evaporation in this area.

The meteorology station with the data set which most closely matches that collected at Tinda Park Quarry is Putty Tea Rooms (Station 061209). Approximately 22 full years of rainfall data are available for Putty Tea Rooms (Station 061209), from 1963 to 1973 and from 2003 to 2013. Average annual rainfall at Putty Tea Rooms for the 22 years of record is approximately 752 millimetres. The lowest rainfall recorded during the period of record was 502 millimetres in 2003 and the highest was 1092 millimetres in 2007. By comparison, average annual rainfall at Colo Heights which is more elevated and approximately 30 kilometres to the south-east is approximately 960 millimetres per year. These rainfall figures support the premise that the Tinda Creek Project area is too dry to conform to Coastal Upland Swamps EEC, as noted by DECC (2008) in relation to Sydney Hinterland Sandstone Swamp.

Floristic Composition Analysis

The Mellong Sandmass Sedgeland within the Project area shares some floristic similarities with the Coastal Upland Swamp EEC (14% species in common with the Final Determination species list), the Scientific Committee determination states that the EEC occurs as far west as the Great North Road in Yengo National Park, which occurs to the east of the Project area. The Commonwealth DoE has recently listed Coastal Upland Swamps under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and include mapping of areas within the Sydney Basin that are *likely* and *may* contain Coastal Upland Swamps (refer to **Figure 5**). The Project area is located well outside this predicted extent, which further supports the assertion that the community occurs where rainfall exceeds 950 millimetres per year. The coastal environments with rainfall exceeding 950 millimetres per year allows for the development of highly diverse swamp communities, as opposed to the much more depauperate Mellong Sandmass Sedgeland which has 14% of flora species in common with the final determination at both the state and Commonwealth level.

This map has been compiled from existing landscape scale datasets that do not specifically map the defined national ecological community (EC) and vary in scale and accuracy. Ground-truthing is required to verify the presence of the EC for site based projects, planning or investment decisions. Such decisions should refer to the text of the Conservation Advice at www.environment.gov.au/cgi-bin/sprat/public/sprat.pl For current information published by the Department on your area of interest you are advised to use the Protected Matters Search Tool at www.environment.gov.au/epbc/pmst/index.html



Source: Australian Government Department of the Environment (July 2014)

0 10 20 40 km
Approximate Scale 1:750 000

Legend

- Locality
- Major roads
- Drainage
- Coastal Upland Swamps in the Sydney Basin - Likely to occur
- Coastal Upland Swamps in the Sydney Basin - May occur
- Woronora Plateau
- Major waterbodies

IBRA sub-region

- Cumberland
- Illawarra
- Moss Vale
- Pittwater
- Sydney Cataract
- Wyong
- Yengo

FIGURE 5

Coastal Upland Swamps
in the Sydney Basin

Table 1 lists the results from the four semi-quantitative 20 metre by 20 metre floristic quadrats. Floristic quadrats transects were sampled to identify potentially occurring threatened flora species and to delineate vegetation communities and their boundaries. **Table 1** demonstrates that the Mellong Sandmass Sedgeland in the Project area has a very low level of commonality with the Coastal Upland Swamps listed under both the *Threatened Species Conservation Act 1995* (TSC Act) and the EPBC Act. Between 3% and 10% of the species recorded in each quadrat are also known to co-occur in the Coastal Upland Swamp EEC Final Determination, with the cumulative total for all quadrats comprising approximately 14% commonality. Those species identified within the Mellong Sandmass Sedgeland community mapped in the study area are denoted in **Table 1** through highlighting.

Table 1 – Floristic Composition of Semi-quantitative Quadrats within Mellong Sandmass Sedgeland

Scientific Name	Common Names	Q7	Q7b	Q8b	Q10
<i>Burchardia umbellata</i>	milkmaids		2		
<i>Baumea articulata</i>	jointed twig-rush				1
<i>Cyathochaeta diandra</i>		4			4
<i>Eleocharis sphacelata</i>	tall spike rush		4		
<i>Eleocharis spp.</i>	spike-rush				3
<i>Lepidosperma laterale</i>	variable sword-sedge		3		2
<i>Schoenus brevifolius</i>			3	4	
<i>Leucopogon microphyllus var. pilibundus</i>					2
<i>Dampiera stricta</i>					2
<i>Goodenia paniculata</i>					2
<i>Gonocarpus micranthus subsp. ramosissimus</i> ¹			2	2	2
<i>Juncus spp.</i>	a rush	3	2	5	
<i>Callistemon spp.</i>					2
<i>Eucalyptus parramattensis subsp. parramattensis</i>		1		1	
<i>Leptospermum arachnoides</i>			2		
<i>Melaleuca thymifolia</i>	thyme honey-myrtle		2		1
<i>Micromyrtus ciliata</i>	fringed heath-myrtle		2		2
<i>Andropogon virginicus</i>	whisky grass			2	
<i>Entolasia stricta</i>	wiry panic		3	3	3
<i>Panicum simile</i>	two-colour panic				2
<i>Conospermum ellipticum</i>		1			1
<i>Conospermum ericifolium</i>			2		
<i>Conospermum taxifolium</i>	variable smoke-bush				1
<i>Persoonia laurina</i>	laurel geebung	1		1	
<i>Persoonia oblongata</i>					1
<i>Leptocarpus tenax</i>		1	3	3	1
<i>Lepyrodia anarthria</i>					3
<i>Lepyrodia scariosa</i>		4	4	4	
<i>Boronia parviflora</i>	swamp boronia				2
<i>Exocarpos cupressiformis</i>	cherry ballart				2
<i>Pimelea curviflora var. gracilis</i>					2
<i>Xanthorrhoea spp.</i> ²			2		1
<i>Xyris operculata</i>					2
Number of Final Determination Species in Quadrat		2 (3%)	7 (10%)	5 (7%)	7(10%)

Note: ¹ *Gonocarpus micranthus* is listed in the Final Determination. Since sub-species have not been denoted in the Final Determination for this species we have assumed the presence of this species in the above analysis.

² The *Xanthorrhoea* species recorded in the community was not assigned to species level on account of a lack of sufficient fruiting material to allow for a positive identification to species level. For the purposes of the above analysis, it has been assumed that *Xanthorrhoea resinosa* occurred in the Mellong Sandmass Sedgeland community of site.

The cover abundance of each species was recorded on a proforma with a cover-abundance value to reflect their percentage cover in the quadrat. A modified Braun-Blanquet 6-point scale was used to estimate cover-abundances of all plant species within each quadrat (Braun-Blanquet 1927), with selected modifications sourced from Poore (1955) and Austin *et al.* (2000). **Table 2** shows the cover-abundance categories used.

Table 2 – Modified Braun-Blanquet Crown Cover-abundance Scale

Class	Cover-abundance*	Notes
1	Few individuals (less than 5% cover)	Herbs, sedges and grasses: <5 individuals Shrubs and small trees: <5 individuals
2	Many individuals (less than 5% cover)	Herbs, sedges and grasses: 5 or more individuals Shrubs and small trees: 5 or more individuals Medium-large overhanging tree
3	5 – less than 20% cover	Applies to all species.
4	20 – less than 50% cover	
5	50 – less than 75% cover	
6	75 – 100% cover	

Note: * Modified Braun-Blanquet scale (Poore 1955; Austin *et al.* 2000)

Particular Area and Supplementary Matters Analysis

In addition to the suite of species occupying a particular area, the delineation of endangered ecological communities under the TSC Act also includes consideration of the particular area in which species of the assemblage (or community) occur. Supplementary matters that assist in the delineation of ecological communities is also discussed below, as they relate to the assessment of whether Coastal Upland Swamps occur within the Project area.

Particular Area

The particular area defines the location(s) at which species of the assemblage co-occur. According to Preston and Adam (2004a), this represents the ‘natural habitat in which the assemblage of species occurs or has historically occurred and is capable of recurring if measures are taken to restore or allow the habitat to recover.’ It therefore excludes captive or cultivated occurrences because they are not within the ‘natural habitat’ of the community (NSW Scientific Committee 2012). In the Final Determination, the particular area of an ecological community is described by identifying the bioregions in which it occurs and the local government areas in which it has been recorded.

Supplementary Descriptors

The NSW Scientific Committee (2012) states that:

Although not legally required, information about ‘supplementary descriptors’ (section 4.2.3) may also assist in the interpretation of the particular area occupied by an ecological community. For example, environmental conditions such as typical climate, terrain, substrates and other abiotic, biotic or ecological factors that influence the community can assist in drawing inferences about its likely occurrence at particular locations (Preston & Adam 2004b).

Regional mapping was undertaken by DECC (2008) included mapping of the Project area, however floristic data was not collected within the boundary of the Project area as part of the regional study and the Project area and vegetation communities were predicted based on aerial photography analysis. Ecological surveys undertaken by Umwelt included the collection of targeted floristic data from 25 quadrats and 21 rapid assessments which allows for a thorough comparison between the mapped vegetation communities and the regional mapping

data and EEC Scientific Committee determinations. Therefore, Umwelt has a high level of confidence in the delineation of vegetation communities in the Project area and the comparison of these communities against both state and Commonwealth Coastal Upland Swamp EEC Final Determinations.

Although Mellong Sandmass Sedgeland is not considered to conform to the NSW Scientific Determination for Coastal Upland Swamp in the Sydney Basin Bioregion EEC or the Commonwealth Coastal Upland Swamps in the Sydney Basin EEC, it has been identified as being of high conservation value and has been avoided where possible, with the extent of disturbance reduced to 0.3 hectares based on the revised Project. The extent of vegetation to be removed as part of the revised Project is included in **Table 3** below and shown on **Figure 1**.

Table 3 – Area of Each Vegetation Community that will be impacted based on Revised Project and the Proposed Biodiversity Offset Area

Vegetation Community	Revised Impact Area (ha)	Revised Biodiversity Offset Area (ha)	Revised Biodiversity Offset Ratio
Forest and Woodland Communities			
Hawkesbury Hornsby Plateau Exposed Woodland	1.6	23.9	15:1
Mellong Sandmass Dry Woodland	16.9	53.3	3:1
Stringybark - Ironbark Forest	0.9	9.2	10:1
Total Forest and Woodland	19.4	86.4	4.5:1
Swamp Forest and Sedgeland Communities			
Mellong Sandmass Swamp Woodland	6.1	14.3	2.3:1
Mellong Sandmass Sedgeland	0.3	2.7	9:1
Total Forest and Sedgeland	6.4	17	2.7:1
Derived and Non-Native Areas			
Hawkesbury Hornsby Plateau Exposed Woodland DNG	0.1	1.4	No Offset Proposed
Mellong Sandmass Swamp Woodland – Over Storey Absent	3.1	0.3	No Offset Proposed
Mellong Sandmass Derived Native Grassland	17.5	1.5	No Offset Proposed
Previously Cleared and Disturbed	0.1	0	No Offset Proposed
Water body	0.2	0	No Offset Proposed
TOTAL	46.8	106.6	2.3:1

Appropriateness of Proposed Offset Strategy

On-site biodiversity offsets are proposed in order to allow for a 'like-for-like' offset to be implemented. The proposed offset has been determined in accordance with the OEH (2013b) NSW Offset Principles for Major Projects (state significant development and infrastructure). In developing a 'like-for-like' offset package vegetation communities and fauna habitats have been used as the main drivers for developing offset areas. The area of vegetation communities and the ratios derived as part of the offset strategy have been used as surrogates for fauna habitat and therefore, the proposed offset strategy provides a 'like-for-like' offset for threatened fauna habitat proposed to be impacted as a result of the Project.

The proposed offset strategy is considered to adequately compensate for the residual significant impacts of the Project, including impacts to threatened fauna species and their habitat.

Long-term Management and Protection of Offset Areas

Hy-Tec has sought to avoid and minimise potential impacts on the ecological values of the Project area throughout the project planning process. This has included avoidance and minimisation of disturbance of key vegetation communities and fauna habitats. In preparing the relevant management plans, consideration will be

given to the 'Guidelines for developments on adjoining land and water managed by the Department of Climate Change and Water' (DECCW, 2010).

An indicative Rehabilitation Plan has been provided to DP&E to clarify the extent and location of vegetation communities that are proposed to be progressively rehabilitated following cessation of quarrying in each domain.

Appropriate Buffer Zones

In response to OEH's concern regarding an appropriate buffer between the proposed operations and the Yengo National Park boundary the Project has been revised and the increased buffer distance between quarrying and GBWHA to be in excess of 230 metres along the northern boundary of the proposed Domain 3 quarry area and in excess of 270 metres to the eastern edge of the proposed Domain 7 quarry area. A buffer of in excess of 100 metres is also provided between quarrying and Yengo National Park to the south.

The proposed buffer zones have been established in order to minimise the potential for in-direct impacts to the conservation and recreational value of Wollemi and Yengo National Parks. Hy-Tec will manage sediment and erosion within the site's closed water management system and will incorporate a weed and feral animal monitoring schedule to minimise the potential for weed ingress from the site into the National Parks.

5.0 Department of the Environment

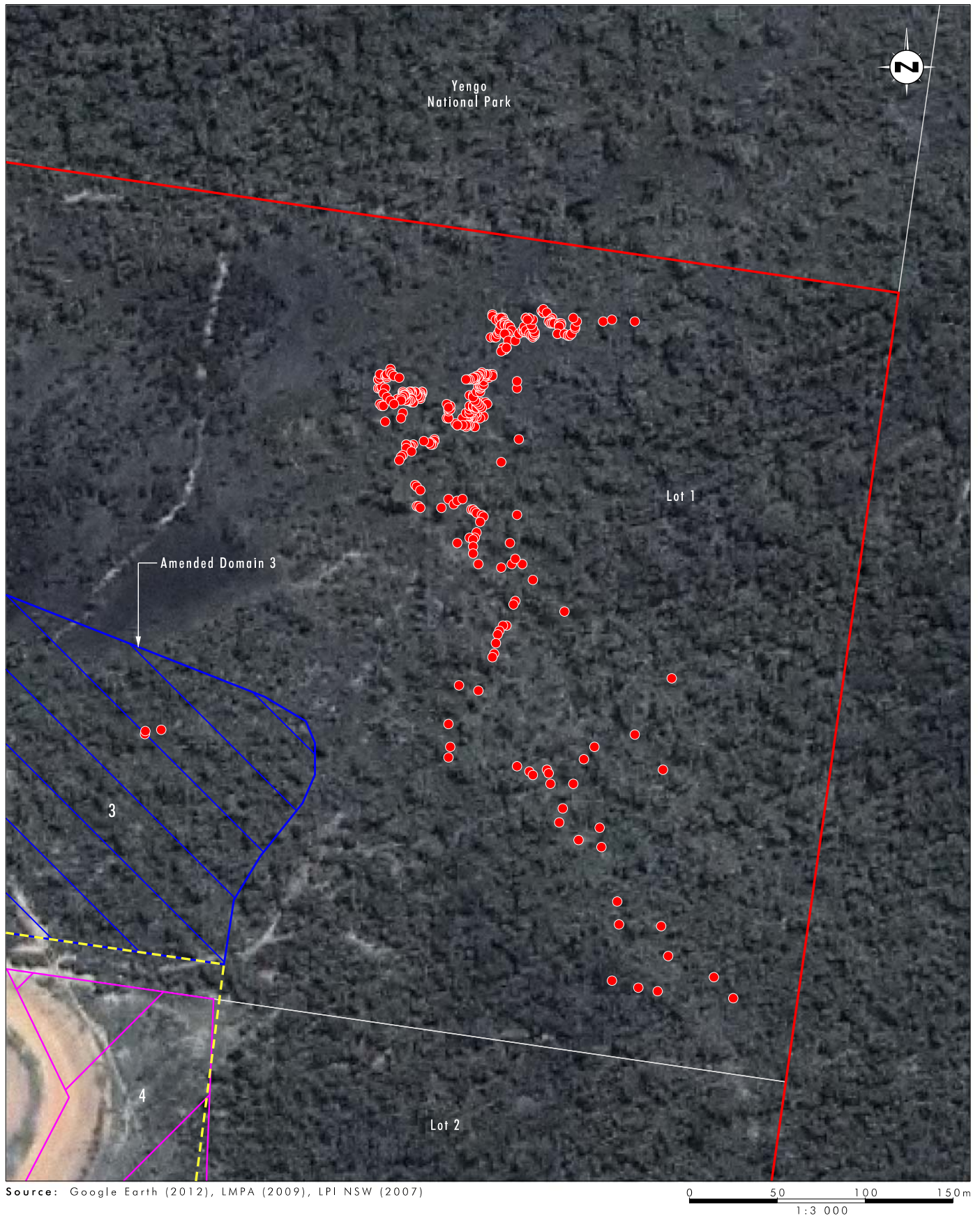
Further information is provided in **Table 4** to address comments additional comments from DoE in relation to the Project.

Table 4 – Response to Comments Received from the DoE in relation to the Tinda Creek Sand Quarry Expansion Project

The Department requests information on management of the proposed offset sites, such as ongoing weed management and whether this would be funded by the proponent.	The Department requests that this information, including key commitments, goal and corrective actions at least be outlined prior to approval. Details of environmental management commitments and costings are set out in Section 6.0 of the Ecological Assessment (Appendix 7 of the EIS). These include (funded by the proponent): • \$10,000 for subdivision of biodiversity offset area • \$10,000 for transfer of land to NPWS • \$10,000 for removal of rubbish from Lot 1 • \$5,000 per year for maintenance of a perimeter fire trail • \$1000 a year for 30 years for weed maintenance • \$50,000 per year for progressive rehabilitation of the site • \$1000 per year for monitoring of tree felling • \$1000 per year for nest box establishment • \$1000 per year for Rosenbergs Goanna pre-clearance surveys in Domain 2. In total Hy-Tec has committed approximately \$1.62 million to ecological management over the 30 year life of the quarry.
The Department requests that information be provided on how the watercourse diversions will be designed to maintain downstream water quality, particularly how erosion from the diversion will be minimised.	As series of diversion drains will be constructed around the southern and northern perimeters of the extraction areas. Each drain will be established and vegetated in advance of quarrying in the respective areas and will be maintained through the life of the operation. As quarrying progresses, the final landform will be shaped to incorporate a series of drainage lines and dams in the final landform to control flow rates and act as silt traps. Runoff from upslope areas will be diverted around these reshaped areas until a stable vegetative cover is achieved. Each of the dams will have significant sediment trapping and settle capacity that will be capable of containing and treating runoff from in excess of a 1% Annual Exceedance Probability storm.

Table 4 – Response to Comments Received from the DoE in relation to the Tinda Creek Sand Quarry Expansion Project (cont)

1. The Department notes that the proponent has revised impact area for the domain 3 option to substantially reduce the impact to the Small-flower Grevillea, compared to the impact proposed in the original referral. The Department requests that the proponent provide a discussion of avoidance measures considered for the domain 7 option.	Since exhibition of the Project and in response to concerns from OEH and the DoE, the proponent has reduced the impact on <i>Grevillea parviflora</i> subsp. <i>parviflora</i> further (refer to Figures 6 and 7). The revised quarry plan avoids all but three (3) known records of <i>Grevillea parviflora</i> subsp. <i>parviflora</i> and has implemented a minimum 40 metre buffer zone between the proposed extraction area and the closest known records of <i>Grevillea parviflora</i> subsp. <i>parviflora</i> to minimise the potential for indirect impacts. The avoidance of impacts will ensure that <i>Grevillea parviflora</i> subsp. <i>parviflora</i> will not be adversely impacted as a result of the Project.
2. The Department requests that further information be provided regarding the possibility of indirect impacts on <i>Grevillea parviflora</i>. Specifically, the Department requests information on: a) The proximity of individuals to existing quarrying activity (while this information has been presented graphically (Figure 4.2 of Ecological Assessment), it is difficult to judge the distance precisely. A higher resolution map is requested, together with a text description. b) The distance between quarrying activities and individuals proposed if Domain 3 is quarried. c) Any additional information that would aid in assessing indirect impacts on the species.	Since exhibition of the Project and in response to concerns from OEH and the DoE, the proponent has reduced the impact on <i>Grevillea parviflora</i> subsp. <i>parviflora</i> further (refer to Figures 6 and 7). The revised Project avoids all known records of <i>Grevillea parviflora</i> subsp. <i>parviflora</i> except for three (3) within Domain 3 and has implemented a minimum 40 metre buffer zone between the proposed extraction area and the closest known records of <i>Grevillea parviflora</i> subsp. <i>parviflora</i>. Further clarification is provided in relation to the possibility of indirect impacts on <i>Grevillea parviflora</i> subsp. <i>parviflora</i>: A minimum 40 metre buffer zone between proposed extraction in Domains 3 and 7 and the closest known records of <i>Grevillea parviflora</i> subsp. <i>parviflora</i>. This buffer zone has been increased from 10 metres to 40 metres. The boundary of the proposed extraction area will be demarcated to prevent unauthorised access to the buffer zones and biodiversity offset areas. Access to the buffer zones and biodiversity offset areas will be limited to actions related to the ongoing management and monitoring of the site and for any corrective actions such as weed management or feral animal control. Restriction of access to these areas will reduce the likelihood of indirect impacts occurring.
3. The domain 7 option provides for a ten metre buffer zone between the quarry and the proposed offsets area (see p7.9 of EIS Appendix 7). The Department requests further information be provided demonstrating that this would be effective in avoiding direct impacts to <i>Grevillea parviflora</i> beyond the buffer. This should include information on how the buffer will be managed for ecological benefit and the activities and access that will be allowed in the buffer.	Figures 6 and 7 provide a higher resolution representation of the locations of individual <i>Grevillea parviflora</i> subsp. <i>parviflora</i> in relation to the extractions areas in Domains 3 and 7. As shown on Figure 7, extensive areas of <i>Grevillea parviflora</i> subsp. <i>parviflora</i> occur in close proximity to active quarry areas and disturbed tracks, which supports the assertion that existing quarry operations have limited indirect impacts on adjacent habitats, including habitat for <i>Grevillea parviflora</i> subsp. <i>parviflora</i>.
4. The Department requests confirmation that the NSW Government would have no objection to the proposed tenure of the proposed offsets for the domain 3 option (the Department has already been provided with correspondence confirming that NSW Trade and Investment would not object to the offsets proposed for the domain 7 option).	The Department of Trade and Investment will be contacted to ensure that they do not object to the proposed future tenure of the biodiversity offset areas.

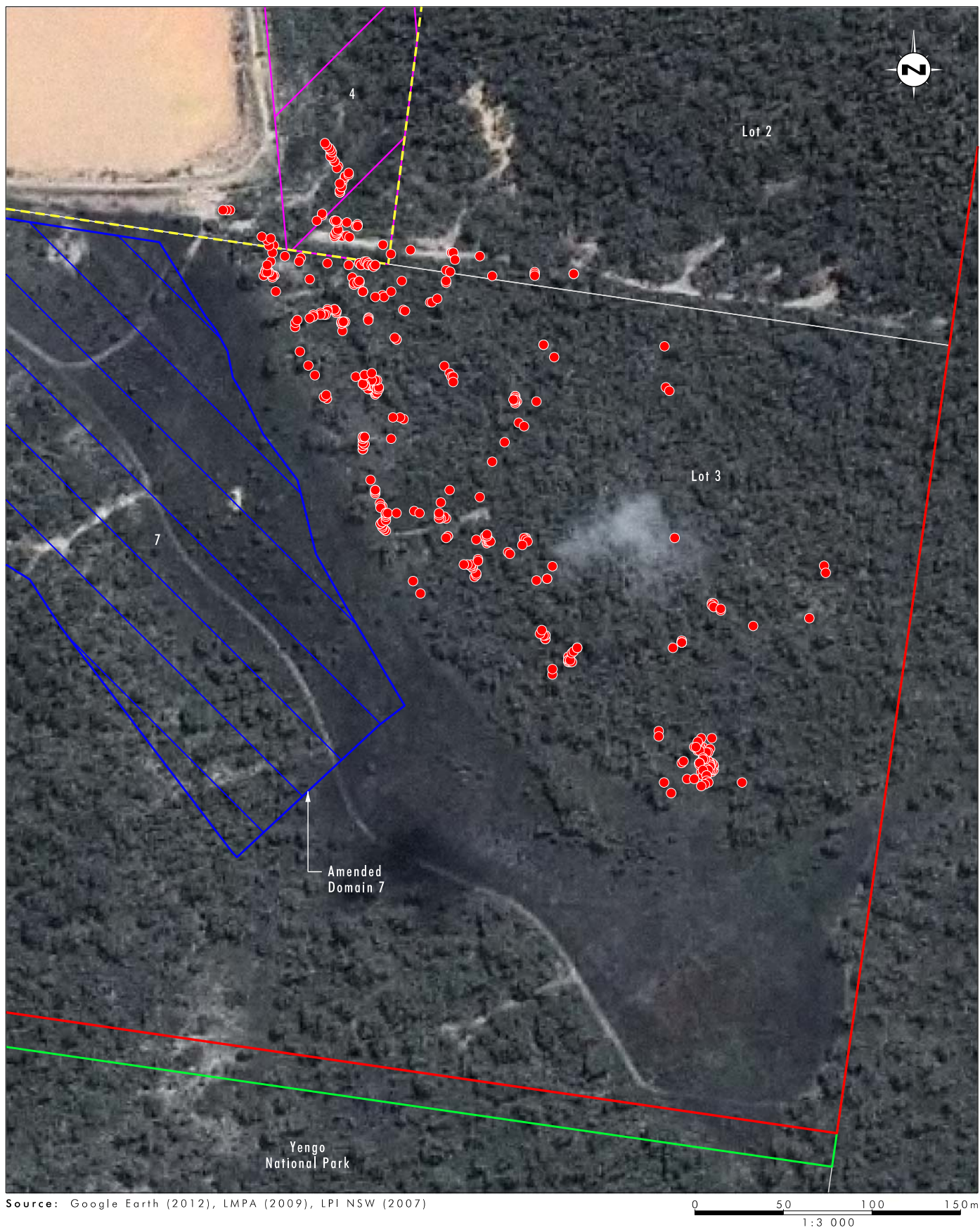


Legend

- Project Area
- Proposed Extraction Area
- Limit of Approved Extraction (DA 134/95)
- Amended Domain 3
- *Grevillea parviflora* subsp. *parviflora*

FIGURE 6

Grevillea parviflora subsp. *parviflora*
Proximate to Domain 3



Legend

- Project Area
- Proposed Extraction Area
- National Park Boundary
- Limit of Approved Extraction (DA 134/95)
- Amended Domain 7
- *Grevillea parviflora* subsp. *parviflora*

File Name (A4): 1731_480.dgn
20141204 15.36

FIGURE 7

Grevillea parviflora subsp. *parviflora*
Proximate to Domain 7

6.0 Greater Blue Mountains World Heritage Area Advisory Committee

Location of Gibba Swamp

The proposed extension to quarrying will be designed and constructed to operate with a closed water management system as has been in place for the last 20 or more years. This system will be operated so as to not adversely impact on any downstream environments regardless of landform type or name.

Grevillea parviflora subsp. *parviflora*

As discussed above, the proponent has avoided direct impact on 845 recorded *Grevillea parviflora* subsp. *parviflora* with only three individuals being impacted. All of the known *Grevillea parviflora* subsp. *parviflora* are located at least 40 metres from the proposed extraction area in Domain 7. While quarrying is proposed to occur within 40 metres of the closest occurrence of *Grevillea parviflora* subsp. *parviflora* (except for the three in Domain 3 that will be impacted), as shown on **Figure 7** existing quarry activities have been occurring within 10 metres of known *Grevillea parviflora* subsp. *parviflora* and no adverse effects were noted during field surveys. The proponent will implement a suitable program to monitor the ongoing health and condition of remnant *Grevillea parviflora* subsp. *parviflora* which will be documented in an approved management plan.

A total of 845 *Grevillea parviflora* subsp. *parviflora* are located within the revised Biodiversity Offset Area.

Coastal Upland Swamps EEC

Umwelt contends that the Mellong Sandmass Sedgeland recorded in the Project area does not conform to either the state or Commonwealth listings for Coastal Upland Swamp EEC. Please refer to **Section 1.0** for a detailed discussion in relation to this issue.

Buffer Zones to GBMWhA

As discussed above, following concern from the GBMWhAC and OEH, the minimum distance between the boundary of the GBMWhA and quarrying in Domains 3 and 7 has been increased to a minimum of 230 metres (refer to **Figure 2**). Based on the last 30 years of operations and extensive ecological surveys undertaken on-site that show that the quarry is not impacting on the surrounding area, the Project can be undertaken without detrimentally affecting the values of the GBMWhA.

Biodiversity Offset Strategy

As stated above, on-site offsets are proposed in order to allow for a 'like-for-like' offset to be implemented. The proposed offset has been determined in accordance with the OEH (2013b) NSW Offset Principles for Major Projects (state significant development and infrastructure). The revised offset strategy is considered to adequately compensate for the residual significant impacts of the Project, including impacts to threatened fauna species and their habitat and OEH state that the proposed strategy has merit.

Site Rehabilitation

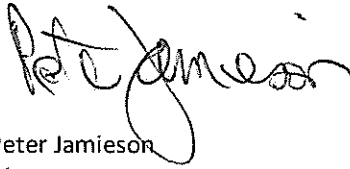
A conceptual rehabilitation plan has been prepared as shown on **Figure 4**. Rehabilitation of sand quarry and sand mining operations has been shown to be successful across NSW and the proponent is confident that the site can be adequately rehabilitated. As shown on **Figure 4**, the final landform will be shaped and rehabilitated to increase the area of Mellong Sandmass Sedgeland within the disturbance area from 0.3 hectares to 3.3 hectares and also to increase the area of Mellong Sandmass Swamp Woodland from 6.1 hectares to 13.3 hectares.

As part of the decommissioning process, the site will be progressively rehabilitated to be broadly consistent with either native communities or grasslands. The site rehabilitation is not likely to adversely affect the values of the proximate GBMWhA or the protected and threatened species and communities that occur in it.

As discussed above, the Project has been further revised in order to address the residual concerns of OEH, DoE and GBMWhAC. The revised Project further reduces the impact on *Grevillea parviflora* subsp. *parviflora*

through avoiding the direct impact and increasing the buffers between the extraction areas and known locations of *Grevillea parviflora* subsp. *parviflora* to a minimum of 40 metres and between the extraction area and the National Park (and GBMWHA) boundary to a minimum of 230 metres. These Project changes improve the conservation outcome associated with the Project while allowing for the recovery of a commercial volume of construction sand in proximity to the Sydney construction market.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Peter Jamieson', written in a cursive style.

Peter Jamieson
Director

enc

ATTACHMENT A - RFS - Letter of Appreciation



Senior Deputy Captain
Colo Heights Rural Fire Brigade
496 Wheelbarrow Ridge Rd
COLO HEIGHTS 2756

2nd December, 2014

Hy Tec
Putty Road
COLO HEIGHTS 2756

Attention: Ray Bygraves

Dear Ray,

Letter of Appreciation **Use of facilities during Bushfire Emergencies**

I take this opportunity to formally thank you and Hy Tec for the co-operation you have shown to the Colo Heights Rural Fire Brigade, and the Rural Fire Service in general, during periods of bushfire in the Colo Heights area.

Colo Heights brigade covers an area of almost 1,000 square kilometres, the majority of which is eucalypt bushland, subject to frequent fire. Neighbouring brigade areas to the north, east and west in the Singleton, Gosford and Lithgow / Rylstone areas would be of a similar area.

The large area and volume of permanent water available at the quarry has proven invaluable during major events, such as the 1994, 1997, 2001 and more recent fires such as the Howes Swamp Fire. This water source is one of the only available large, permanent sources of water for safe bucketing into helicopters, and has provided an almost limitless supply for tanker refills. Your co-operation and assistance in allowing the use of your water supply has been invaluable.

The large open area around your operations have also been invaluable as a safe staging area for fire crews, and as a safe area for the deployment and refuelling of helicopters, which have become an integral part of modern firefighting.

Your prompt and unquestioning assistance during these periods of bushfire, and ongoing support of the local brigade (an entirely volunteer organisation), has made Hy Tec a respected and valued member of the community. It is hoped that this partnership continues well into the future.

Yours Faithfully,

Anthony Shorten
Senior Deputy Captain
Colo Heights Rural Fire Brigade

Hilton Pollard
Deputy Captain
Colo Heights Rural Fire Brigade