Appendix I

FLORA AND FAUNA ASSESSMENTS - CATHERINE HILL BAY AND MOONEE

October 2006

ENVIRONMENTAL CONSTRAINTS ASSESSMENT:
Lot 6 DP 774923, Lot 2 DP 809795, Lot 5 DP 774923, Lot 2031 DP 841175 and Lot 4 DP 129341, No. 595 Pacific Highway, Crangan Bay.

Report prepared for Rosecorp Pty Ltd with instructions from Asquith & de Witt Pty Ltd.

Prepared By:
EcoBiological

Adam Blundell
Environmental Scientist
NPWS Scientific Licence S10565

Reviewed By:
EcoBiological

Colin Driscoll
Senior Environmental Biologist
NPWS Scientific Licence S10565

EcoBiological is a division of Littoria Pty Ltd,
ABN 74 14 440 041,
Tel. 4948 2323
E. admin@ecobiological.com.au
PO Box 63, Warners Bay 2282

TABLE OF CONTENTS

Figures

1. INTRODUCTION

1.1. SCOPE

EcoBiological was commissioned by Rosecorp Pty Ltd to prepare an assessment of environmental constraints and to determine the undisturbed and spoiled areas of the subject site (Lot 6 DP 774923, Lot 2 DP 809795, Lot 5 DP 774923, Lot 2031 DP 841175 and Lot 4 DP 129341, No. 595 Pacific Highway, Crangan Bay (See Figure 1)). For the purpose of this report spoiled is considered to be any land that has been cleared as part of mining operations. Undisturbed is considered to be any vegetation community that is either original or natural regrowth that reflects surrounding vegetation communities and provides habitat for native fauna species. The site may also require environmental offsets for the undisturbed portion of the site and those portions of the spoiled area that contain threatened species or could support threatened species.

Factors that have been used to help determine the spoiled / undisturbed portions of the subject site include:

- Aerial photography at 10 year intervals;
- Vegetation mapping (identifying natural vegetation, regrowth vegetation, threatened species and habitat hollows);
- Identification of potential Eastern Pygmy-possum habitat;
- Identification of fill areas, determined from 20 boreholes across the site; and

This report describes the geographic, vegetative and floristic attributes of the subject site and assesses their significance in relation to the provisions of the following legislation:

- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *NSW Threatened Species Conservation Act 1995* (TSC Act);
- *NSW Threatened Species Conservation Amendment Act 2002*;
- *National Parks and Wildlife Act 1974* (NP&W Act);
- *Environmental Planning and Assessment Act 1979* (EP&A Act);
- *Native Vegetation Act (NSW) 2003;*
- State Environment Planning Policy 44 (SEPP44) Koala Habitat Assessment;

- State Environment Planning Policy 14 (SEPP 14) Coastal Wetlands;
- LCCREMS (2002a) – 'Flora and Fauna Survey Guidelines Volume 1'; and
- LHCCREMS (2002b) – 'Flora and Fauna Survey Guidelines Volume 2'.

2. PROPERTY DESCRIPTION

The subject site is owned by Rosecorp Pty Ltd and comprises Lot 6 DP 774923, Lot 2 DP 809795, Lot 5 DP 774923, Lot 2031 DP 841175 and Lot 4 DP 129341 Pacific Highway, Crangan Bay, NSW. The combined area is approximately 370 hectares. The subject site is bound by the township of Catherine Hill Bay, old mining operations and natural bushland to the north, by Munmorah State Recreation Area to the south, by the Pacific Ocean to the east, and by Lake Macquarie to the west. A 72.7 hectare investigation area has been identified and is the subject of this constraints report (see Figure 2).

3. THE PROPOSAL

Rosecorp Pty Ltd wishes to determine the potential of the investigation area for development as a residential subdivision with up to 600 lots. Of the 72.7 hectare investigation area, a maximum of 60 hectares is allowed for development as agreed by the Minister for the Environment, the Minister for Planning, Coastal Hamlets Pty Ltd and Lakeside Living Pty Ltd. The remaining 310 Hectares is proposed to be an environmental offset.

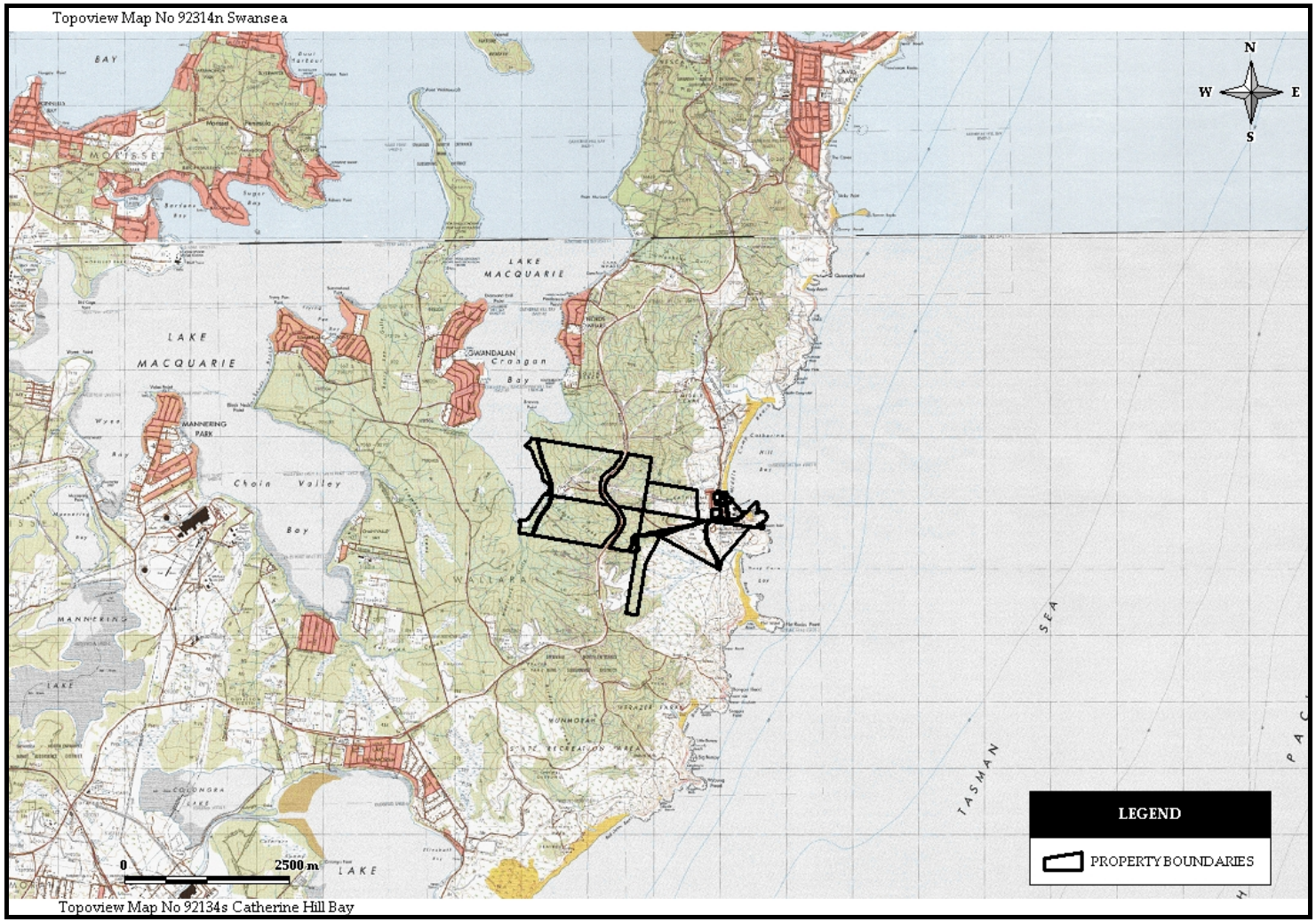

Figure 1: The location of the subject site within the region.

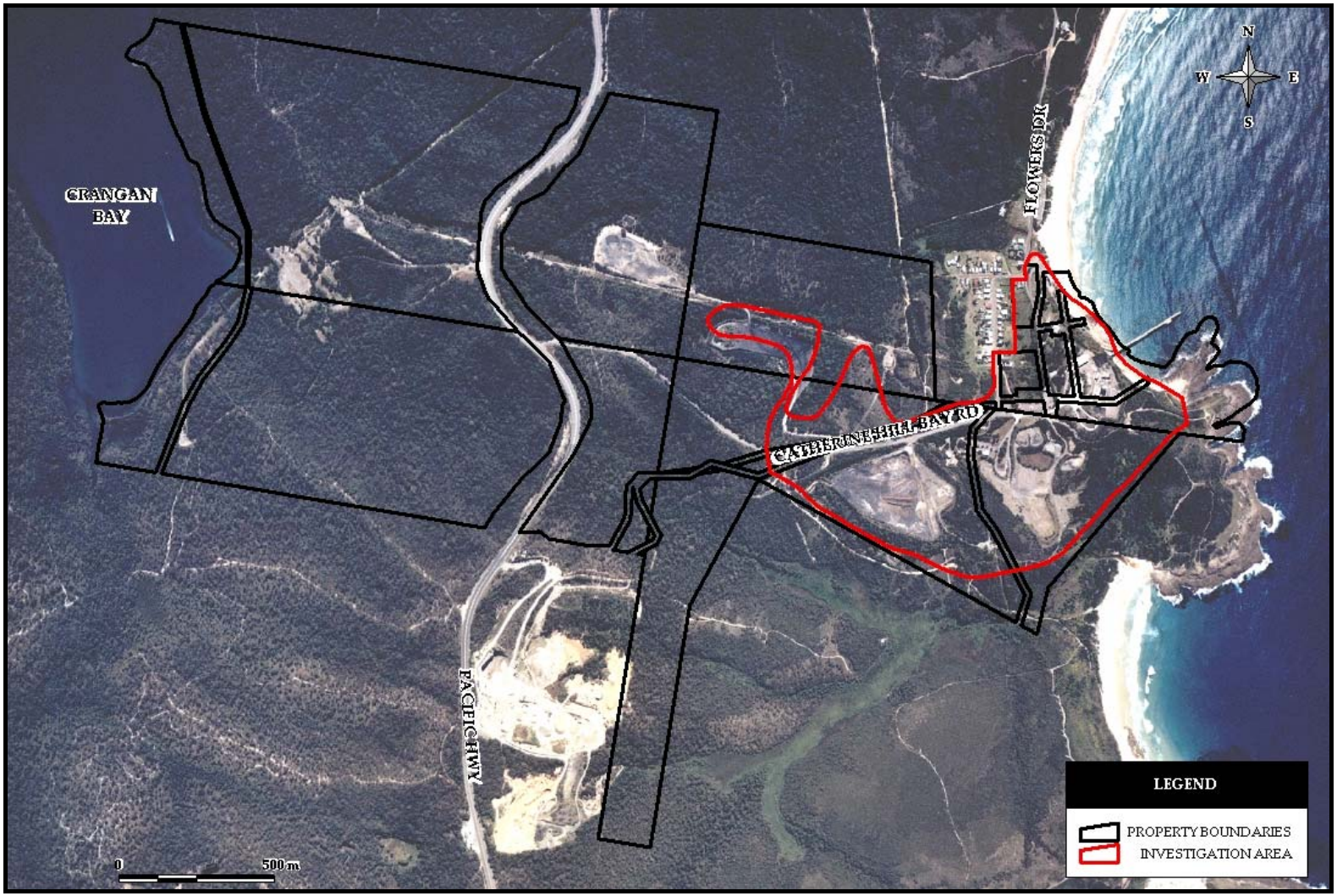

Figure 2. Aerial photograph of the subject site and investigation area.

4. ENVIRONMENTAL CONSTRAINTS

Several indices have been used to assess the possible environmental constraints on the subject site:

- Potential Eastern Pygmy-possum habitat
- SEPP44 Koala habitat
- Trees having potential habitat hollows
- Threatened flora species
- Historical aerial photograph analysis
- Substrate analysis
- SEPP14 coastal wetlands
- Acid sulfate soils
- Vegetation and floristic content

4.1. POTENTIAL EASTERN PYGMY-POSSUM HABITAT

An Eastern Pygmy-possum has recently been trapped in the Munmorah State Recreation Area, which is adjacent to the southern boundary of the subject site. The possible foraging area of the Eastern Pygmy-possum was mapped using a GPS. The edge of the likely foraging habitat was walked and recorded tracks were downloaded and mapped. Foraging habitat was determined to be areas having a high density of flowering shrubs especially Banksia species, which are an important nectar source for these small possums. Four Banksia species, *B. serrata, B. spinulosa, B. oblongifolia* and *B.integrifolia* were present throughout the potential habitat of the Eastern Pygmy-possum. The conclusion of the 7-part test completed for the Eastern Pygmy-possum (EcoBiological, July 2006) was that the removal of its habitat within the investigation area would not effect the life cycle, such that a viable local population would be put at risk of extinction (see Figure 3 below).

4.2. SEPP 44 KOALA HABITAT

SEPP 44 requires that for proposals on properties involving 1 hectare or more, the habitat should be evaluated for potential Koala habitat and core Koala Habitat. Potential Koala habitat is defined as *'areas of native vegetation where the trees listed in Schedule 2 (of SEPP 44) 'constitute at least 15% of the total number of trees in the upper and lower strata of the tree component'*. Should potential Koala habitat be found, further investigation of the existence of core Koala habitat should be undertaken and if this habitat

is found to be present then a detailed Plan of Management should be prepared for the Koala colony in the area. A list of Schedule 2 feed trees is provided in Table 3 below.

Table 3. SEPP 44, Schedule 2 - Koala Feed Tree Species

Scientific Name	Common Name
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus microcorys	Tallowwood
Eucalyptus punctata	Grey Gum
Eucalyptus viminalis	Ribbon or Manna Gum
Eucalyptus camaldensis	River Red Gum
Eucalyptus haemastoma	Broad-leaved Scribbly Gum
Eucalyptus signata	Scribbly Gum
Eucalyptus albens	White Box
Eucalyptus populnea	Bimble Box or Poplar Box
Eucalyptus robusta	Swamp Mahogany

Two species on the SEPP 44, Schedule 2 Koala Feed Tree Species list were found on the subject site: *Eucalyptus haemastoma* and *Eucalyptus punctata.* The *Eucalyptus haemastoma* constitutes greater than 15% of the total number of trees in the Narrabeen Doyalson Coastal Woodland mapped at the northern portion of the site. It is proposed that this portion of the investigation area will not be impacted by the planned sub-division. However, despite extensive searches, no Koalas or indications of their presence (e.g. scratches or scats) were identified on-site. Therefore, the site does not constitute 'Core Koala Habitat'.

4.3. HABITAT HOLLOWS

The 72.7 hectare investigation area had only 1 tree having potential fauna habitat hollows, an *Angophora costata* with a trunk diameter at chest height of 160 cm and 2 potential habitat hollows, both greater than 10cm in diameter (see Figure 3 below).

4.4. THREATENED FLORA SPECIES MAPPING

Targeted surveys were conducted by EcoBiological (July 2006) between October 2005 and February 2006 to determine the presence or absence of the ground orchids *Diuris praecox, Caladenia tessellata, Cryptostylis hunteriana* and *Microtis angusii and Tetratheca juncea.* None of the targeted ground orchids were found on the subject site. A further survey for *Tetratheca juncea* was conducted during October 2006. Figure 3 below shows the location of the *Tetratheca juncea* populations.

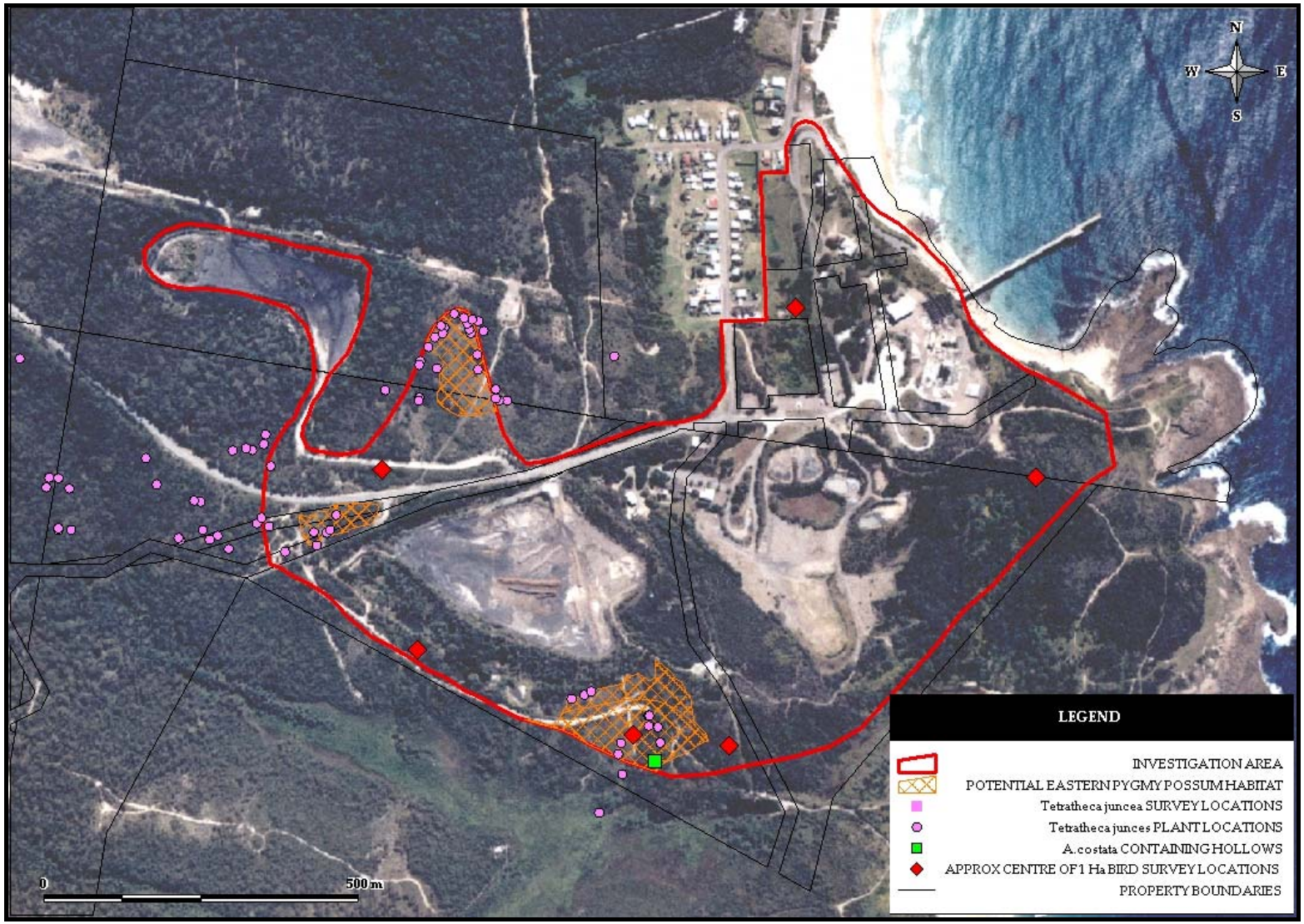

Figure 3: Habitat Hollows, Eastern Pygmy-possum habitat and *Tetratheca juncea* Locations.

4.5. HISTORICAL AERIAL PHOTOGRAPHY ANALYSIS

Aerial photographs at 10-year intervals were obtained from 1974 to 2006 to determine the extent of disturbance on the subject site. 1974 was the earliest aerial photograph that could be obtained from NSW Department of Lands (Lands). Figure 4 below shows the mapped disturbance areas.

4.6. SUBSTRATE ANALYSIS

20 Boreholes were excavated across the site to determine the extent of filling over the subject site. The locations of the boreholes and whether they contained fill or not are shown in Figure 4 below

4.7. SEPP 14 COASTAL WETLANDS

The SEPP 14 wetlands are located approximately 105m to the south of the investigation area boundary at their closest. SEPP 14 legislation will not pose any issues with the proposed sub-division.

4.8. ACID SULFATE SOILS

Acid Sulfate Soils (ASS) are naturally occurring sediments containing iron sulfides, which remain inert while not exposed to air. Exposure of the sulfide in these sediments to oxygen by drainage or excavation leads to the generation of sulfuric acid, which is then environmentally damaging. The Catherine Hill Bay Acid Sulfate Soil Risk Map produced by the Department of Natural Resources indicates that the investigation area has two areas of Low Risk Potential Acid Sulfate Soil, one to the north and one to the south. Both areas area located off the site and will not impact upon any proposed sub-division layout.

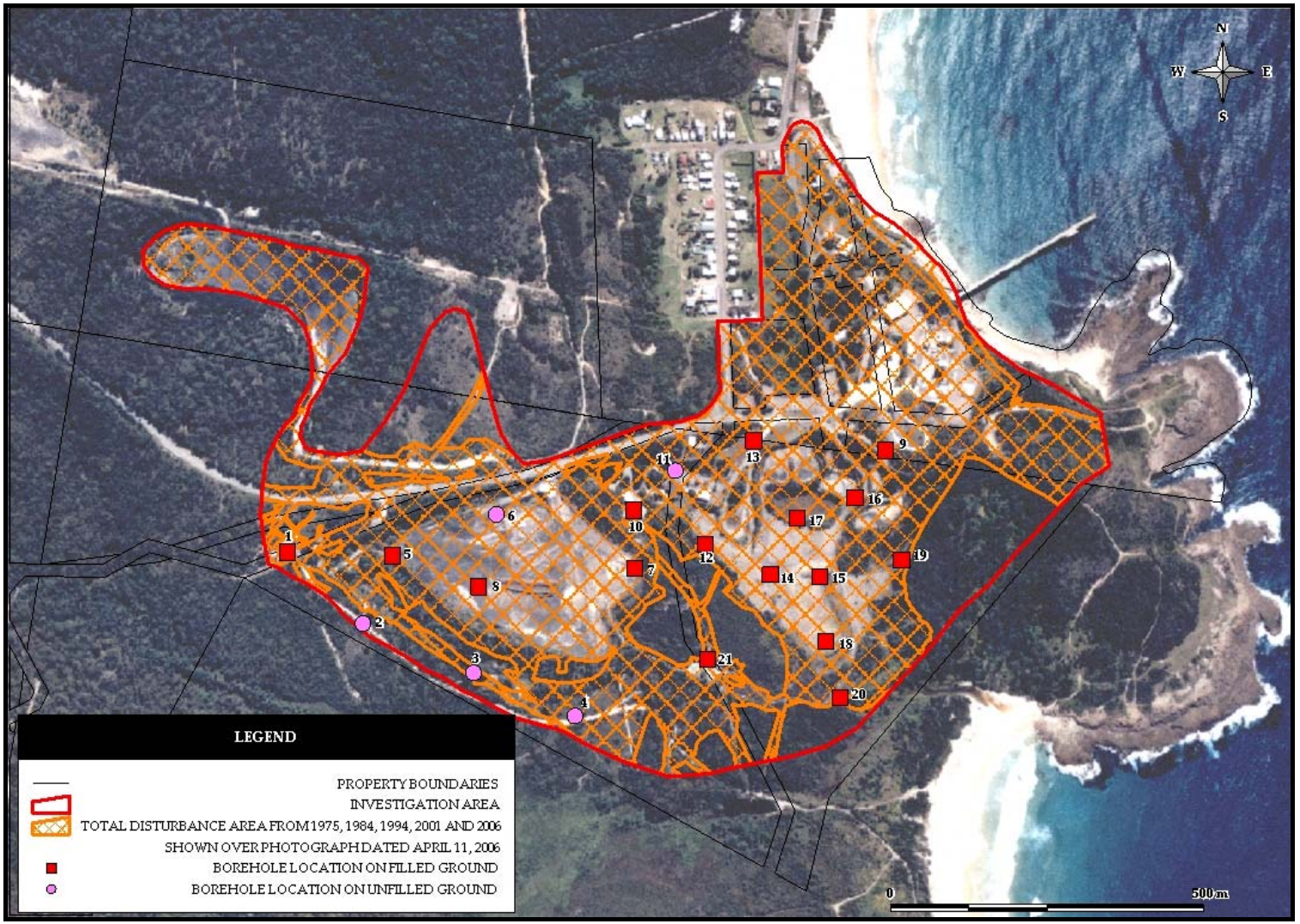

Figure 4: Extent of disturbance since 1974 and fill across the subject site.

4.9. VEGETATION AND FLORISTIC CONTENT

The subject site was walked in order to assess the vegetation community type. Figure 5 below shows the vegetation communities on site that are considered remnant or natural regrowth and are worthy of retention.

The vegetation community nomenclature was referenced from the report for Wyong Council (Bell 2002). This report details the natural vegetation and vegetation community profiles within the Wyong Shire Council LGA.

The investigation area contained 4 vegetation communities, the Coastal Headland Complex variant (MU 13(b)), Coastal Sand Wallum Heath variant (MU 7(a)), Narrabeen Doyalson Coastal Woodland (MU 31) and Narrabeen Wallarah Sheltered Gully Forest (MU 33). The remaining vegetation not mapped was regrowth in disturbed areas and was inconsistent with the surrounding vegetation communities. This vegetation was heavily affected by weed infestation or contained native plant species not from our region. Therefore, this regrowth was not considered to be an environmental constraint or to be worth retaining.

The areas described as undisturbed shown in Figure 6 were either:

- Wallum Scrub dominated by *Banksia aemula, Leptospermum trinervium* and *Xanthorrhoea glauca* (area 1, 1ha);
- remnant littoral rainforest containing *Cupaniopsis anacaroides*, *Glochidion ferdinandi, Banksia integrifolia* and with a dense weed infestation of Lantana and Bitou Bush surrounded by drier *Leptospermum laevigatum* or *Melaleuca nodosa* scrub (area 2, 3.9ha); or,
- sheltered gully forest containing *Eucalyptus piperita, Eucalyptus resinifera, Corymbia maculata, Angophora costata* and with a mesic to dry low understorey (area 3, 1.8ha).

Areas 1 and 3 have vegetation that is generally comparable with vegetation in the adjoining Munmorah SCA, area 2 is significantly degraded by weeds but has similar endemics to those in rainforest habitat further south in the Frazer Park locality.

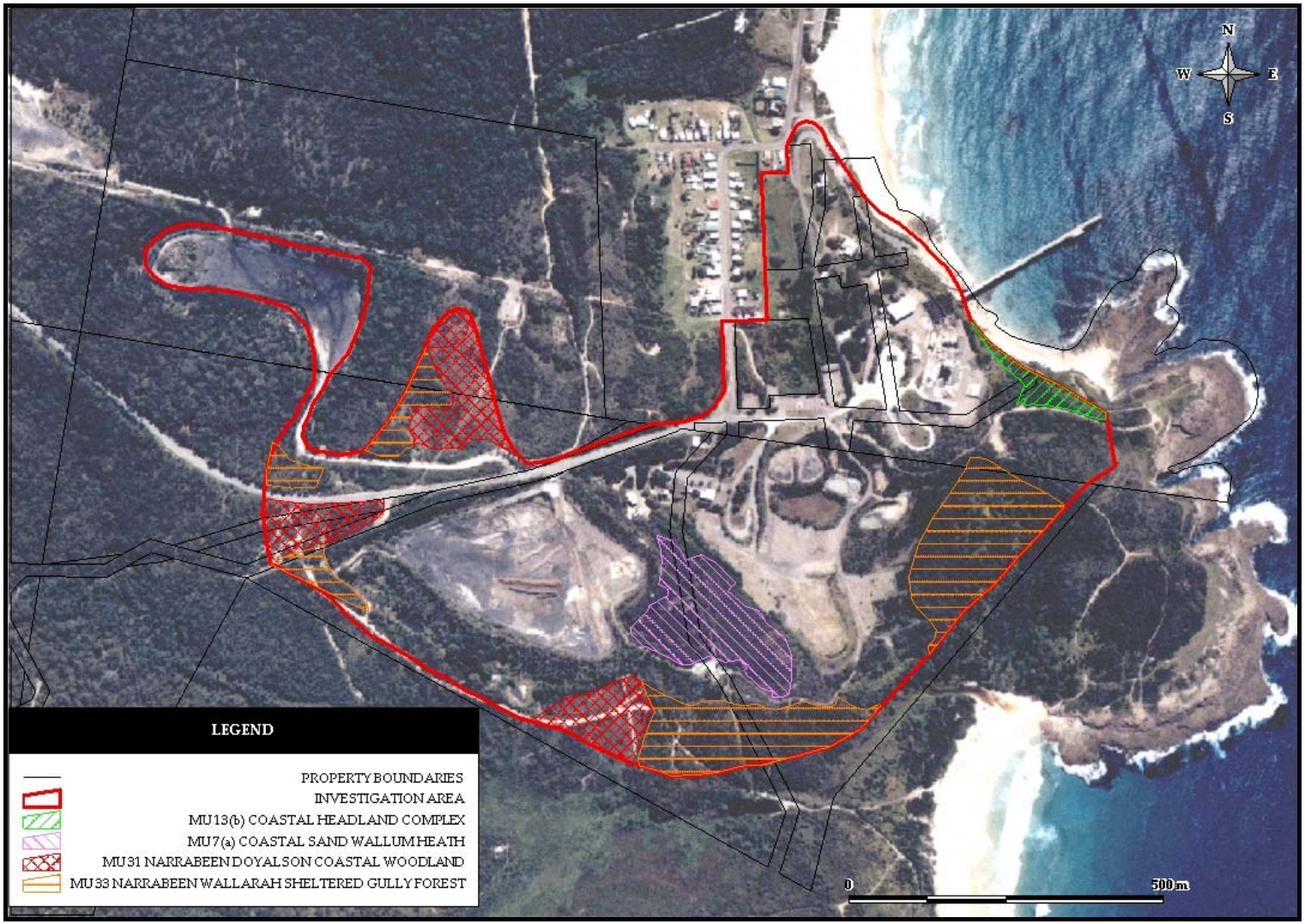

Figure 5: Vegetation communities

5. DISCUSSION

Figure 6 maps the spoiled and undisturbed portions of the investigation area. Of the 72.7-hectare investigation area, 66 hectares was considered to be spoiled and 6.7 hectares was considered undisturbed by mining activities.

Figure 7 shows the areas of the site that may require environmental offsets. The environmental offsets may be required as the mapped portions of the site either support undisturbed vegetation or such species as *Tetratheca juncea*, Eastern Pygmy-possum habitat and forest containing habitat hollows suitable for use by arboreal mammals or birds that is protected by State or Commonwealth legislation. A total of 14.9 hectares may require environmental offsets. Of the 370 hectare site, 310 hectares is a proposed environmental offset.

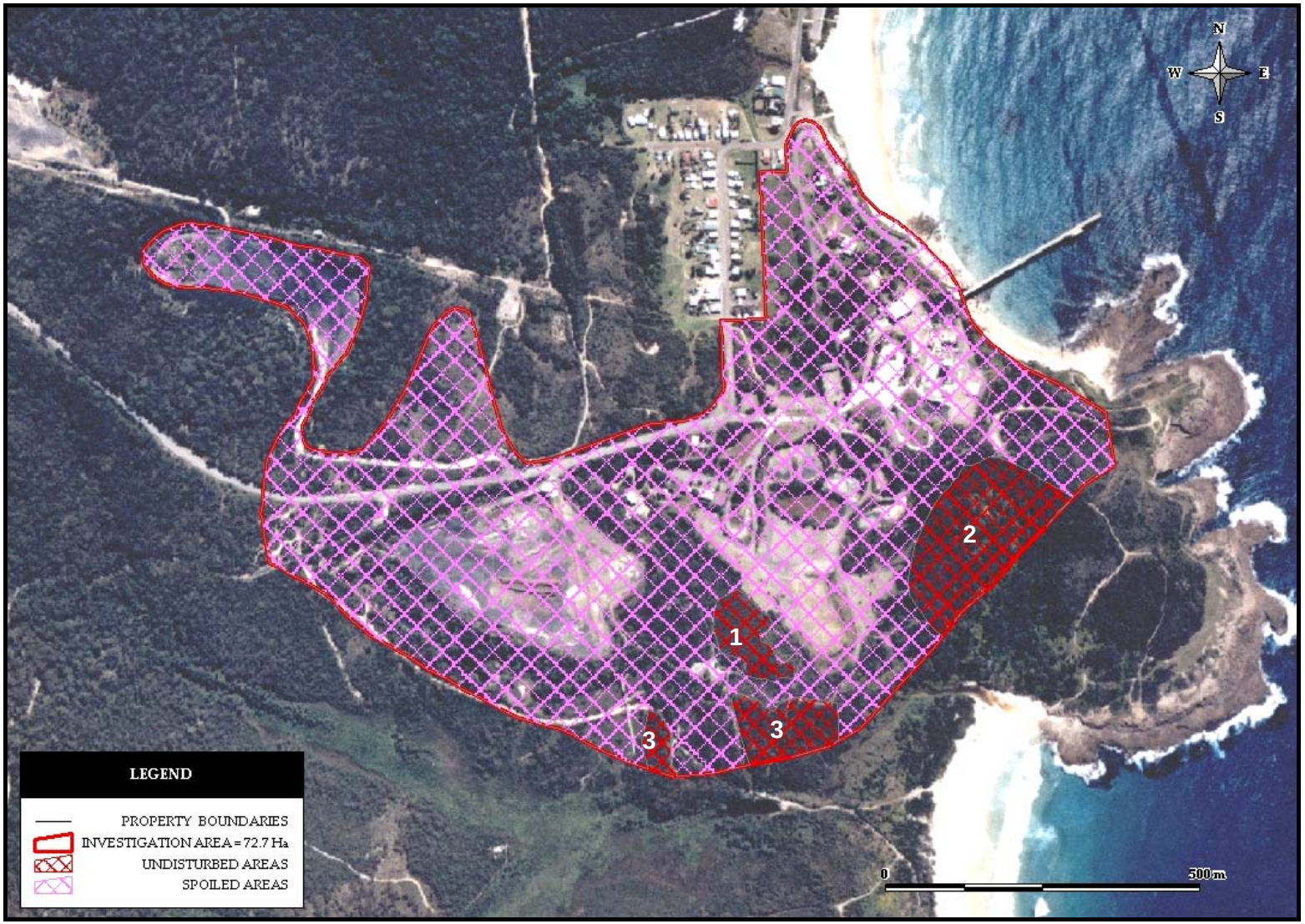

Figure 6: Spoiled and Undisturbed areas of the investigation area.

Figure 7: Areas of the investigation area that may require environmental offsets.

Appendix J

CIVIL ENGINEERING REPORT - CATHERINE HILL BAY AND MOONEE

Client: ROSECORP
Project: CATHERINE HILL BAY
Location: CATHERINE HILL BAY
NEW SOUTH WALES

20 0 20 40 60 80 100 Metres

Scale 1 : 2000

PB PARSONS BRINCKERHOFF

RISING MAIN TO MIDDLE CAMP

WWPSB

BEACH

TO ZONE SUBSTATION

WWPSA

BEACH

EXISTING POND

LEGEND

- COMMON SERVICE TRENCHING
- GRAVITY SEWER
- HIGH VOLTAGE ELEC
- POTABLE WATER MAIN
- RECYCLED WATER MAIN
- ROOF WATER PIPE
- ELECTRICAL KIOSK
- ROOF WATER RESERVOIR

* Detailed Lot Boundary Shown in Environmental Assessment.

SERVICING STRATEGY

Figure 3.9.1

Plot Date: 27/07/07 - 17:54 Cad File: J:\A502-NCL\PROJ\212274.3A_Catherine_Hill\09_CADD\DRAWINGS\PR_0559\pr-0559-servicing-fig-all.dwg

Moonee Hamlets

Civil Design Report

July 2007

Coastal Hamlets Pty Ltd

Parsons Brinckerhoff Australia Pty Limited ACN 078 004 798 and Parsons Brinckerhoff International (Australia) Pty Limited ACN 006 475 056 trading as Parsons Brinckerhoff ABN 84 797 323 433

Level 3, 55 Bolton Street
Newcastle NSW 2300
PO Box 1152
Newcastle NSW 2300
Australia
Telephone +61 2 4929 3900
Facsimile +61 2 4929 7299
Email newcastle@pb.com.au

ABN 84 797 323 433
NCSI Certified Quality System ISO 9001

2122743A PR_0651

Author: Ben Slee.....

Signed: .....

Reviewer: Stuart Holle .....

Signed: .....

Approved by: Stuart Holle .....

Signed: .....

Date: July 2007.....

Distribution: Project File, Client.....

Contents

List of figures

1. Introduction

Coastal Hamlets Pty Ltd is the proponent for the redevelopment of the former Moonee Colliery site located at Catherine Hill Bay, NSW and has engaged Parsons Brinckerhoff (PB) to produce Civil engineering designs for the project.

The development has been declared to be a major project pursuant to part 3A of the Environmental Planning and Assessment Act, 1979. Accordingly, the NSW Minister for Planning is the consent authority. The project is supported by a Concept Plan, which, when approved will be the Environmental Planning Instrument (EPI) for the site. Subsequent project applications will contain more detail and form the basis for development consent. Detailed designs for construction will be certified in accordance with the requirements for Construction Certificates.

The development will largely be subdivided as a nested community scheme, with only Montefiore Parkway being dedicated to the public as Road. As the rest of the roads within the development will be Community Property, compliance with the relevant council standards for public roads is not required.

The site lies across the boundary of the Lake Macquarie and Wyong Local Government Areas. Notwithstanding that compliance with local authority standards for public roads is not required, we have ensured that road design standards for longitudinal grades comply. Cross sections exceed the minimum standards for road widths as outlined in the Australian Model Code for Residential Development (AMCORD).

The maximum developable area does not exceed 60Ha and there are approximately 600 lots in the proposal. However, the 60Ha comprises bushland corridors, roads, drainage structures and bushfire asset protection zones. The average lot size is in the order of 400m^2. The development is divided into seven distinct ‘hamlets’ with each hamlet linked by a series of local roads. Each hamlet will form its own precinct plan in the nested community titles scheme.

Due to its former use as a coal mine and preparation area, the topography of the site is heavily disturbed and requires a significant bulk earthworks operation to rehabilitate for residential use. The bulk earthworks and the local roads will form part of an initial project application (termed ‘major works’ to prepare the site in general for future residential use. Separate project applications will then follow for the subdivision of each of seven ‘hamlet’ precincts. These ‘hamlet applications’ may also include detail for the erection of dwellings and other buildings on the site as appropriate.

This report is to accompany the Concept Plan, and details some of the more pertinent points of the design to ensure the concept plan is achievable and properly scoped ahead of the more detailed design phases associated with the Project Applications and Construction Certificate applications respectively.

Designs for the major works associated with the proposed development are at an advanced stage. It is intended to lodge project applications for the major works at the same time as the Concept Plan. Accordingly, much of the detail discussed in this assessment is available for inspection on the major works project application plans, which should be read in conjunction with this report.

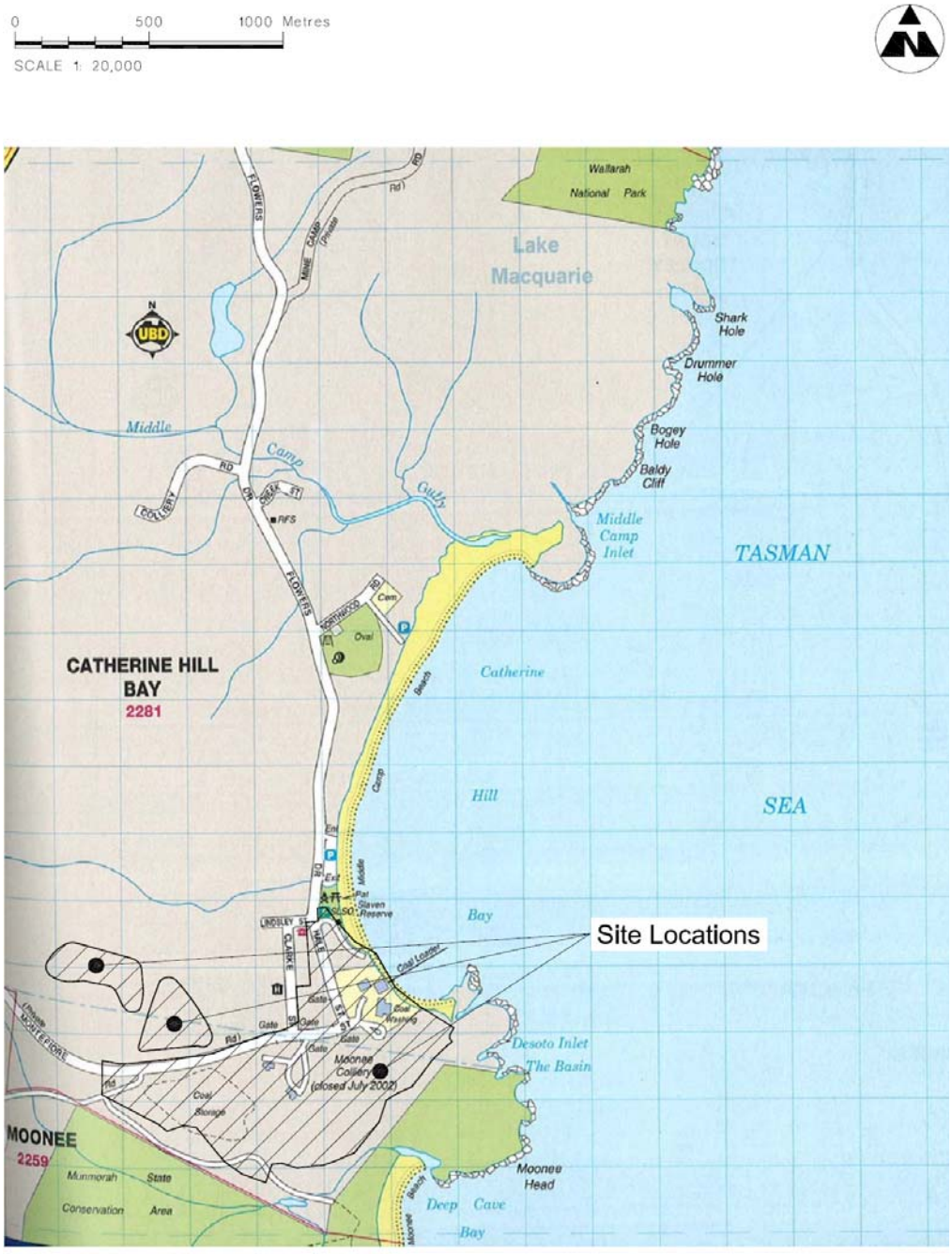

Figure 1-1 shows the locality plan of the subject site.

Figure 1-1 Locality Plan

2. Existing conditions

2.1 Topography

Levels on the site vary from about 5.0m AHD to about 45m AHD. The eastern perimeter of the site is bounded by the Pacific Ocean, with steep cliffs rising from the ocean to a level of

approximately 35m AHD. This area was the site of the former bin building which was used for storing and distributing the processed coal product to the wharf, which lies at the bottom of the cliff.

Montefiore Parkway runs along an east – west running ridge in the topography at about 35m AHD. The majority of the development lies on the southern side of the ridge.

The existing topography at the cliff top and Montefiore Parkway is to be retained. However, other areas are largely disturbed as a result of the former use of the site as a coal mine and preparation area. These areas are to be regraded to make the site more suitable for residential development, to take advantage of views and to ensure the site drains properly in accordance with the separate stormwater management plan.

2.2 Existing road network

The site is serviced by an existing sealed mine road which links to the Pacific Highway to the West. This road is currently on private land and is not a dedicated public road. However, it is proposed to dedicate this road to the Public as Road as part of the major works project application. The newly dedicated road will be known as Montefiore Parkway.

Catherine Hill Bay Village, which lies to the north of the proposed development site, is accessed via the mine road (to be dedicated Montefiore Parkway) and Flowers Drive to the north. It is proposed to link the development via direct connection to Montefiore Parkway and an additional connection to Flowers Drive, refer to the separate traffic report for details.

2.3 Existing developments

The area behind the cliff top was formerly the coal preparation area and administration centre for the coal mine. Various concrete footings and pavements remained in place at the time of the Concept Plan and further detailed assessment is required at construction stage to identify demolition plans.

The former mine managers residence and the jetty masters cottage are both retained in a heritage precinct and ground levels in this area are remaining largely the same as existing.

Additional buildings are located on the south side of Montefiore Street, including the former bath houses and other mines infrastructure. These areas are to be regraded and accordingly, these buildings will be demolished in the major works project application.

Also, large scale earthworks had been performed during the mine operations, in particular, a number of large flat areas had been levelled for the stockpiling and storage of raw coal. Some of the previously excavated material has been moved to the southern region of the site, however, it has not been appropriately consolidated to a standard suitable for residential development. Accordingly, detailed geotechnical assessment will be required prior to construction to resolve foundation material to be suitable fro residential buildings in accordance with AS 2870.

2.4 Existing services

The site is not currently serviced by Sewer or Water.

There is some limited capacity in the existing electrical network for the village of Catherine Hill Bay however, augmentation of the system will be required. There is a zone substation identified in the Lower Hunter Regional Strategy.

The site is not serviced by Gas

There is a telecommunications optic fibre servicing the site. This will need to be relocated as a result of the development, and its capacity may need to be upgraded, depending on future Telstra network planning.

All utilities services will need to be either upgraded, or extended to the site to accommodate the proposed development. Existing services on the site include a 6.1m sewer easement along the southern side of the property adjacent to Links Road. This sewer line is to be retained. There are no further services found on the remainder of the site.

3. Proposed development

3.1 Access

Montefiore Parkway is to be dedicated to the public as road. In preparation for dedication, a 2.0m cycleway is to be attached to the southern side of the existing road alignment. No other roadworks are proposed for Montefiore Parkway, whose speed zone, on dedication, is proposed to be 50 km/hr.

The mine access road, which currently terminates at Clarke Street, will be extended to the proposed village centre, where a second link road “Hale Street” will be constructed to link with Flowers Drive. While there is already a former minor mines road on the alignment of Hale Street, this will be realigned and reconstructed to suit the proposed development layout.

Preliminary design for the intersection with Flowers Drive has been undertaken and allows for all turning movements, in particular, the right turn movement from Flowers Drive to Hale Street to occur safely. Any required islands etc would be marked in paint, rather than provided in concrete to minimise the impacts of the intersection on the existing residential environment, and to allow for any existing driveway access and the like. Having regard for the realignment of this intersection, it is likely that the access arrangements for the former mine managers residence and the jetty masters cottage will need to be revised.

The intersection of the existing mine road with the Pacific Highway is likely to require upgrading, having regard for the increased level of traffic generated by the development. Negotiations are currently underway with the Roads and Traffic Authority to determine the required intersection works. It is likely these will comprise left in left out movements only, with or without appropriate u turn bays or, traffic signals. Refer to the traffic assessment report by Masson Wilson Twinney for further details.

A number of local roads will intersect directly with Montefiore Parkway. These will be delineated by at grade thresholds to indicate the change in road hierarchy on entering each of the separate hamlets.

3.2 Roads

All roads grading have been designed to both LMCC and WSC standards. A maximum grade of 12% has been adopted with largely one-way cross-fall. 300mm deep swales have been provided on the low side of road to provide for attenuated flows and water quality treatment in accordance with the separate stormwater management plan.

Road materials will be asphaltic concrete for the local roads, and a lightly bound (cement) decomposed granite surface for car courts. Pavements will be confined by 150mm wide concrete edge strips, to be flush with the top surface of the roads.

However, the loop road (extension of the Montefiore Parkway) in the village centre will be kerbed with standard 150mm integral kerb and gutter due to room constraints, and the more formal nature of this precinct. A pit an pipe drainage system is to be provided for this area, draining to the swale system Hale Street.

Road widths are in excess of the minimum standards espoused by AMCORD, refer to the typical cross sections on drawings 0191 and 0192 for details.

Refer to the materials palette submitted with the project application's environmental assessments for further detail.

Where the local roads cross the inter hamlet bushland corridors, each of which contains a drainage swale, a timber bridge is proposed to delineate the hamlets and to serve as a water course crossing.

All roads, with the exception of Montefiore Parkway, west of Hale Street, are to be retained by the Community Associations for maintenance purposes, with access given to the public via the management plans.

Hale Street also incorporates a cycleway to the intersection with Flowers Drive. Detailed landscaping of all roads is proposed in accordance with the landscape architect's (Context Pty Ltd) plans.

Kerb returns for the local roads are sufficient to allow 12m trucks (garbage trucks) to negotiate intersections, however, car courts are not designed for regular garbage truck use. It is anticipated that furniture removal vans etc will need to reverse into car courts in order to service the lots, however, the itinerant nature of these vehicles is considered to be acceptable.

A 2.5 m wide parking lane is provided on all roads to allow for additional itinerant on street visitor parking, and is to be shared with carefully located street tree planting. Sufficient on site parking will be provided within each dwelling site for two cars.

3.3 Drainage

Refer to the separate stormwater management strategy for detail concerning drainage.

3.4 Site regrading

Major site regrading is required to take advantage of the site's views. This has been carefully designed to ensure visual impacts of the development from existing view sheds are minimised, refer to the separate visual assessment submitted with the Concept Plan.

The total bulk earthworks strategy involves some 750,000 cubic metres of cut to fill, with the overall volumes balanced to ensure that no site material is removed, and no additional material is required to be imported to the site.

The regrading exercise is to be performed as one contract, in preparation for the construction of roads. It is anticipated that this could be of up to 9 months duration, depending on the level of resources deployed by the earthworks contractor.

Preliminary geotechnical assessment has been conducted, which indicates that there will be little or no excavation in rock, however, detailed geotechnical assessment is required prior to construction to identify and quantify the full extent of earthworks, particularly with respect to deep consolidation of existing unconsolidated material, demolition of existing concrete structures, the management of ground water, slope stability, pavement design and the presence and strength of rock.

It is proposed to consolidate all site material to enable construction of standard footing systems for residential development in accordance with AS 2870.

A preliminary sediment and erosion control strategy has been developed in for the major works project application. It is expected that this will be a guide only, with detailed strategies to be employed by the earthworks contractor.

3.5 Servicing

Water / waste water

The site lies across the boundary of the Lake Macquarie and Wyong Local Government Areas, accordingly statutory responsibility for water servicing is also split between Hunter Water Corporation and the Gosford / Wyong Water authority. However having regard for the servicing strategy that will bring water to the site from Swansea, and return waste water to Belmont, the Hunter Water Corporation has agreed to accept responsibility for all water supply, and sewer management issues.

Potable water is to be brought to the site from the north (Swansea) via a system of mains and reservoirs sufficient to supply the existing villages as well as the proposed development. The application of a stormwater recycling system (refer section on Stormwater Recycling) will reduce potable water demand.

Design of the trunk water supply and sewer systems is currently being undertaken in consultation with the Hunter Water Corporation, who are supportive of the proposal.

A water reticulation system, including supply for fire fighting purposes will be designed and installed on the site in accordance with the schematic utilities services plan.

A sewer pump station will be installed at the lowest point on the southern side of the proposed development to transfer waste water to another pump station near the intersection of Hale Street and Flowers Drive, which will pump to a third station at middle camp and then into the existing network at Walarah.

Trunk sewer services will have sufficient capacity, and will be sufficiently low to accommodate connection of the existing village, as well as other future proposed development within the region.

Electricity

Electrical infrastructure is currently near capacity. Development of the site requires the installation of a new zone substation to be supplied from the HV lines at the Pacific Highway. Detailed planning for the substation is the prerogative of Energy Australia’s network planning section, who is aware of and supportive of the proposal.

Telecommunications

The site is serviced by optical fibre as part of Telstra's network. Telstra may need to upgrade their system to cater for the proposed development and are currently engaged in discussions with PB.

Gas

The site is not serviced by reticulated mains natural gas and is not likely to be serviced in the foreseeable future.

3.6 Bush fire management

Asset protection zones have been provided in accordance with advice from Barry Eadie (refer separate report).

Fire trails to enable access by bushfire fighting vehicles has been provided as indicated on the detailed plans for the major works project application. Maximum grades for the fire trails are xx%. The fire trails are unsealed, but drained by table drains (swales) in accordance with the typical cross sections (Drawings 0191 and 0192).

The fire trails have a width of 4m and regular access to the main roads and car courts within the development; access to roads is more frequent than 500m.

Fire hydrants are provided at the ends of car courts adjacent to fire trails to allow for filling of tankers and the hosing of dwellings and the fighting of fires. Minimum pressures for fire fighting (25m static head) will be maintained.