4 UTILITIES & SERVICES

4.1 Water Supply

Bulk water is supplied by Rous Water to Ballina Shire Council who in turn distributes it to the community.

Ballina Shire Council's strategy for distribution to the Pacific Pines development is to augment the existing sub-main supply down Montwood Drive and Hutley Drive with a dedicated Pacific Pines Reservoir below North Creek Road on land currently owned by R and J Pidcock. Council's Development Servicing Plan (DSP) also provides for Pressure Zone Mains (300mm and 375mm diameter) to be installed through the middle of the Pines Estate. See Appendix 2 for DSP provision.

The DSP programmed construction of the Reservoir and Mains by 2008. This is unlikely to be achieved. Council's Engineering staff advise that future augmentation is unlikely to proceed until demand requires it and further development in the precinct commences.[6] APP has written to Council seeking confirmation of how much further the Pines Estate can be expanded before the Reservoir and Mains are to be installed. See Appendix 2 for correspondence to Council. Previous advice and anecdotal evidence indicates that by extension of sub mains in Hutley and Montwood Drives that adequate water supply will be available to the Estate for some years. Council has undertaken to advise APP of the amount of development that can be completed in the Pines Estate before augmentation of the pressure trunk mains and reservoirs is required.

Development conditions for the most recently completed stage of the development required purchasers of the land to supply water storage tanks to catch rainwater. Council has yet to advise whether this requirement is to supplement water supply or reduce stormwater discharge. However, the tanks have been used in the stormwater management strategy as a means of reducing stormwater flows and it is intended that this contribution to stormwater management will be extended to the rest of the subdivision. Opportunities exist to extend this facility to provide non-potable water supply replacement capacity through the use of stored rainwater to supply irrigation and toilet flushing and non-potable demands. This is discussed further in section 10 overleaf.

[6] Personal comm.. Bill Payne and Rod Haigh 5 July 2007

4.2 Sewer

Ballina Shire Council collects and treats sewage via its sewerage reticule, pump stations and treatment plants.

Council's previous sewage augmentation strategy required the upgrading of the Lennox Head Treatment Plant to approximately a 58,000 EP capacity.

Following a lengthy community consultation and Urban Water investigation program, Council has adopted a revised strategy that reduces the upgrade to 28,000 EP with the balance of required upgrade capacity transferred to the Ballina Sewage Treatment Plant. Council has advised that even with the reduced ultimate capacity at the Lennox Head plant it will be able to receive and treat the sewage from Pacific Pines**.**

As part of the above-referred Urban Water investigation Council has adopted a policy that developments such as Pacific Pines investigated the use of treated effluent in a dual water reticule as a condition of development consent. Dual reticulation is a policy derived from the UWMS investigation to reduce potable water demand and ocean outfall discharges.

Council has subsequently decided that all Greenfield developments install dual reticulation piping for distribution of treated effluent as non potable water. It is most likely that the proposed rainwater storage tanks discussed above would negate any benefit derived form dual reticulation as it is likely there would be insufficient demand to take up both extra sources of water supply. This is discussed in more detail in section 10.

Council's current DSP makes provision for dual reticulation and sewage disposal headworks. Augmentation at Pacific Pines covered by the DSP provides for increased flows generated by Pacific Pines and surrounding development. The augmentation includes a) new pumps; b) new gravity main. Sewage generally flows to the existing pump station beside the WQCP and is then pumped to the Lennox Head STP. See Appendix 2.

4.3 Telecommunications

Telstra has been contacted concerning the proposed development. A variety of systems are available from conventional communication systems involving copper cable installations to optic fibre installation.

4.4 Power

Country Energy has been contacted concerning the proposed development and has advised that although discrete planning for the Pines Estate has not commenced they considered the proposals power requirements could be met by broader planning strategies.

5 EARTHWORKS AND GEOTECHNICAL ISSUES

5.1 Geotechnical Summary

Ardill Payne & Partners (APP) completed a broad scale geotechnical investigation of the site in 2002 and 2003. The investigation was based on seventeen test pits sunk around the site and Ardill Payne and Partners experience in the investigation for and design of many of the residential and commercial buildings in Lennox Head. Attached Figure 5.1 shows soil unit types and test locations.

The Geotechnical Investigation found that conventional building construction systems were applicable for the site. There was one area on the eastern section of the site that is very steep and not suited to conventional construction. Site specific designs for steep slopes will be required. The central portion of the site to be filled will require some consolidation of soft clays prior to house construction.

5.2 Earthworks Summary

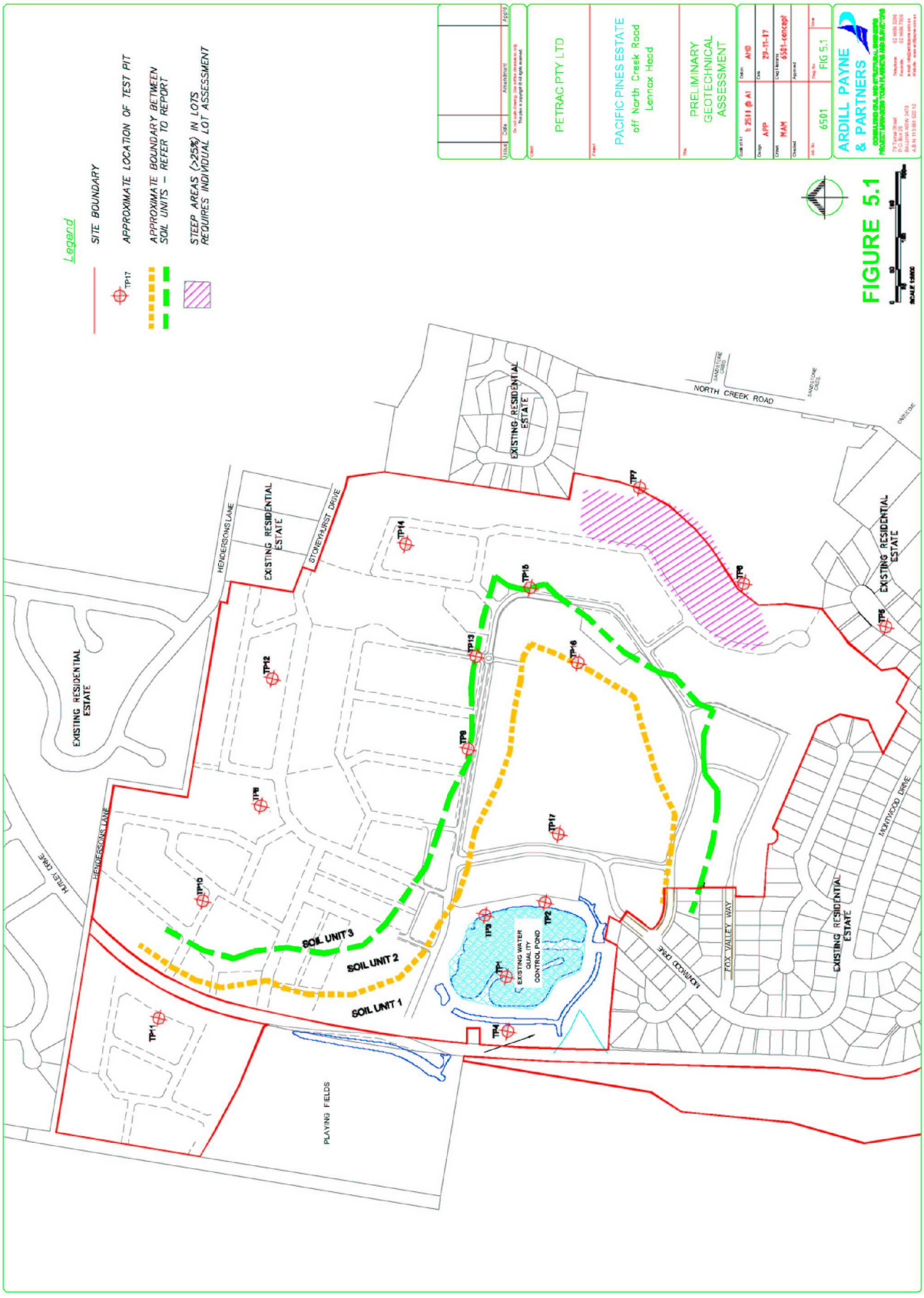
The central portion and areas around Hutley Drive of the site are to be filled under an existing DA approval for reasons of flood proofing and to provide adequate drainage. This work is included as part of Stage 1. The central area will be overfilled to allow for expected consolidation of the soils in this area. Elsewhere there is no requirement for over placing fill. Material for filling is to be won from excavations around the surrounding hills but predominately from work on the northern ridge and slopes of Stoneyhurst Road. See attached Figure 5.2 for locations of bulk excavations and filling. Details of management controls for earthworks are provided in the Stage 1 Construction Management Plan.

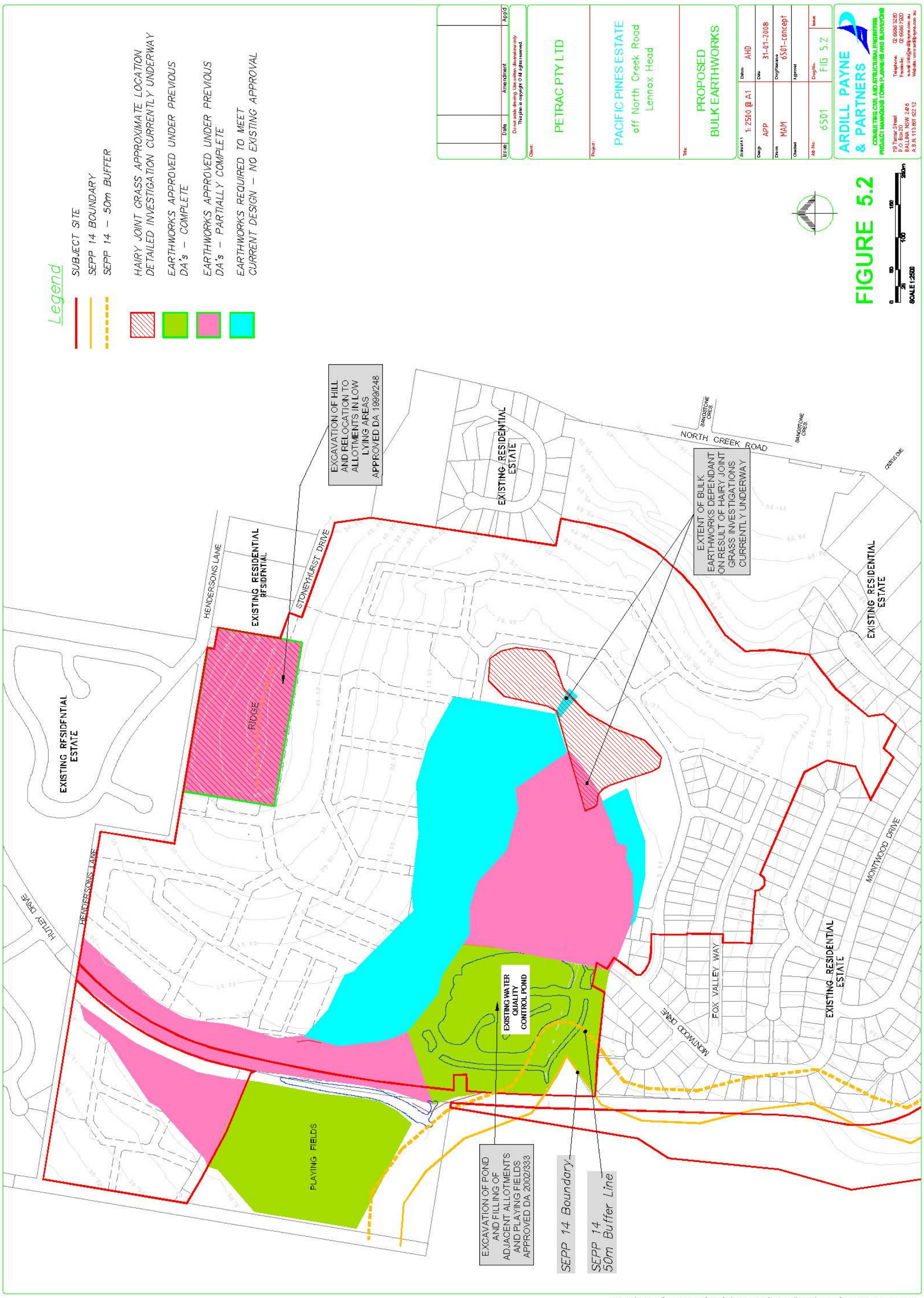
Filling in the central area will generally be between 1.2 and 2.0 metres deep depending on location. Some sections close to the watercourse will require greater depths depending upon final stormwater design details. Current quantities analysis indicates 150,000 cubic metres of cutting and filling will be required across the site.

This central area also was found to have low level Potential Acid Sulfate Soils (PASS). These soils will be generally between 1 and 1.5 metres below ground level after filling. It is proposed to use the Environmental Management Plan prepared for the more reactive soils encountered in the WQCP site to address any effects the construction and operation of the subdivision has on the PASS.

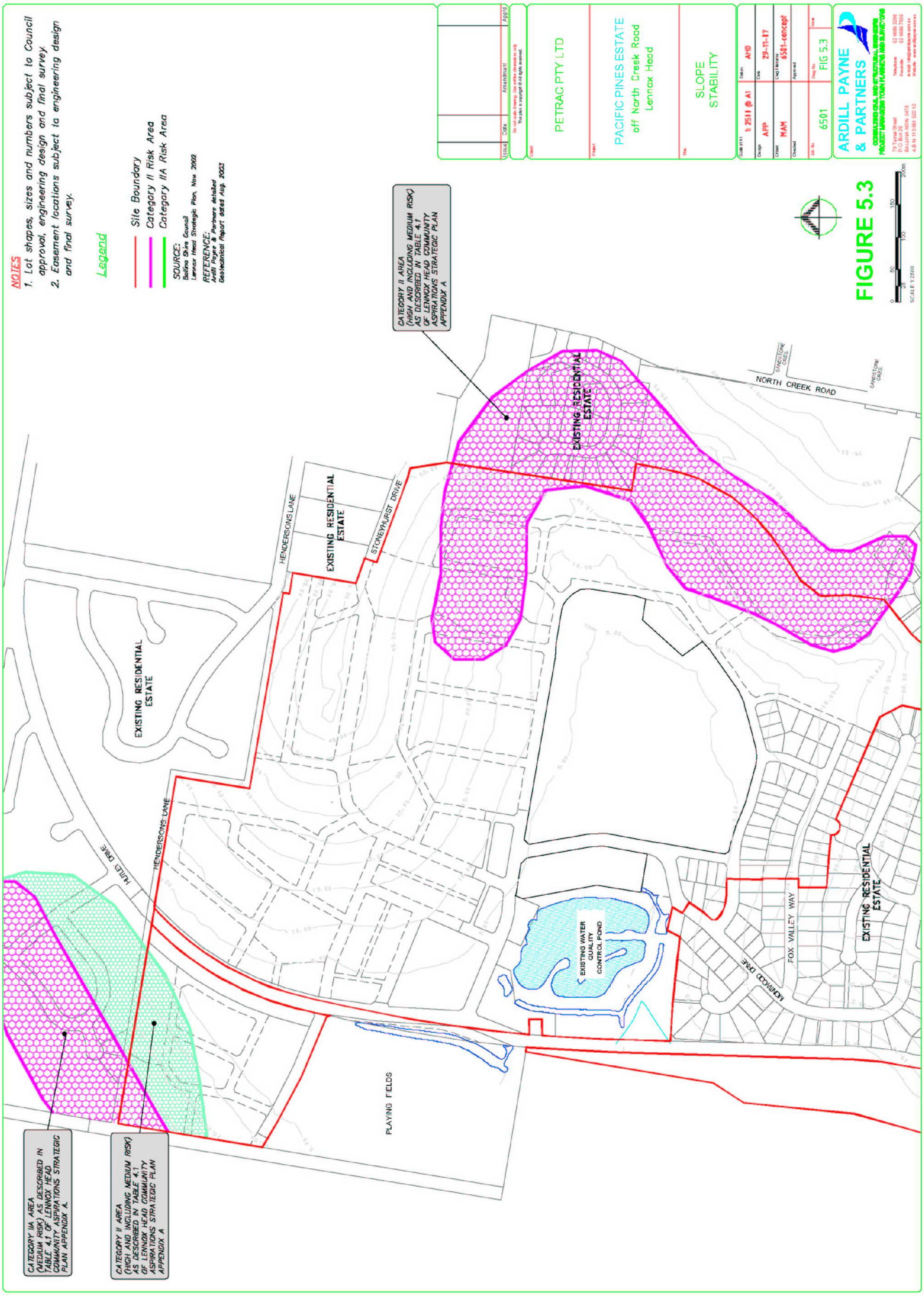
5.3 Discussion

Ballina Shire Council's GIS mapping of the subdivision indicates slope stability hazard areas. These areas are shown on Figure 5.3 and consist of class II and IIa hazard areas.


Legend
SITE BOUNDARY
TP17 APPROXIMATE LOCATION OF TEST PIT
APPROXIMATE BOUNDARY BETWEEN SOIL UNITS – REFER TO REPORT
STEEP AREAS (>25%) IN LOTS REQUIRES INDIVIDUAL LOT ASSESSMENT
PETRAC PTY LTD
PACIFIC PINES ESTATE off North Creek Road Lennox Head
PRELIMINARY GEOTECHNICAL ASSESSMENT
ARDILL PAYNE & PARTNERS
6501
FIG 5.1
FIGURE 5.1
NORTH CREEK ROAD
EXISTING RESIDENTIAL ESTATE
HENDERSONS LANE
STONEHURST DRIVE
SOIL UNIT 1
SOIL UNIT 2
SOIL UNIT 3
EXISTING WATER QUALITY CONTROL POND
PLAYING FIELDS
HONEYWOOD DRIVE
FOX VALLEY WAY
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16
TP17



Legend
SUBJECT SITE
SEPP 14 BOUNDARY
SEPP 14 – 50m BUFFER
HAIRY JOINT GRASS APPROXIMATE LOCATION
DETAILED INVESTIGATION CURRENTLY UNDERWAY
EARTHWORKS APPROVED UNDER PREVIOUS
DA's – COMPLETE
EARTHWORKS APPROVED UNDER PREVIOUS
DA's – PARTIALLY COMPLETE
EARTHWORKS REQUIRED TO MEET
CURRENT DESIGN – NO EXISTING APPROVAL
PETRAC PTY LTD
PACIFIC PINES ESTATE
off North Creek Road
Lennox Head
PROPOSED
BULK EARTHWORKS
1: 2500 @ A1
AHD
APP
31-01-2008
MAM
6501-concept
6501
FIG 5.2
ARDILL PAYNE
& PARTNERS
FIGURE 5.2
EXCAVATION OF HILL AND RELOCATION TO ALLOTMENTS IN LOW LYING AREAS APPROVED DA 1999/248
EXISTING RESIDENTIAL ESTATE
NORTH CREEK ROAD
EXTENT OF BULK EARTHWORKS DEPENDANT ON RESULT OF HAIRY JOINT GRASS INVESTIGATIONS CURRENTLY UNDERWAY
HENDERSONS LANE
STONEYHURST DRIVE
RIDGE
EXISTING RESIDENTIAL ESTATE
HUTLEY DRIVE
EXISTING WATER QUALITY CONTROL POND
FOX VALLEY WAY
MONTWOOD DRIVE
PLAYING FIELDS
EXCAVATION OF POND AND FILLING OF ADJACENT ALLOTMENTS AND PLAYING FIELDS APPROVED DA 2002/333
SEPP 14 Boundary
SEPP 14 50m Buffer Line


NOTES
1. Lot shapes, sizes and numbers subject to Council approval, engineering design and final survey.
2. Easement locations subject to engineering design and final survey.
Legend
Site Boundary
Category II Risk Area
Category IIA Risk Area
SOURCE:
Ballina Shire Council
Lennox Head Strategic Plan, Nov 2002
REFERENCE:
Ardill Payne & Partners detailed Geotechnical Report dated Aug. 2003
CATEGORY II AREA (HIGH AND INCLUDING MEDIUM RISK) AS DESCRIBED IN TABLE 4.1 OF LENNOX HEAD COMMUNITY ASPIRATIONS STRATEGIC PLAN APPENDIX A
CATEGORY IIA AREA (MEDIUM RISK) AS DESCRIBED IN TABLE 4.1 OF LENNOX HEAD COMMUNITY ASPIRATIONS STRATEGIC PLAN APPENDIX A.
EXISTING RESIDENTIAL ESTATE
HENDERSONS LANE
STONEYHURST DRIVE
NORTH CREEK ROAD
HUTLEY DRIVE
PLAYING FIELDS
EXISTING WATER QUALITY CONTROL POND
FOX VALLEY WAY
MONWOOD DRIVE
FIGURE 5.3
PETRAC PTY LTD
PACIFIC PINES ESTATE
off North Creek Road
Lennox Head
SLOPE
STABILITY
6501
FIG 5.3
ARDILL PAYNE & PARTNERS

The APP report addresses the investigation procedures required in the hazard classification areas nominated in Council's mapping. Class II hazards require test pits to be dug in the subject area, and, based on the results appropriate building constraints are to be developed. The relevant area of class II land is between test pits TP6, TP7 and TP14 as indicated in the Geotechnical report.

Because of the very stiff clays and shallow depth to rock in these locations conventional domestic construction was determined as being suitable. In the very steep areas below pits TP6 and TP7, additional geotechnical investigations will be required if house construction is proposed on steep grades. However, within these areas very large blocks have been provided to supply building envelopes outside of the steep areas. This would permit conventional domestic construction systems to be incorporated.

Class IIA land is of a lower risk of instability and requires site specific assessment of stability to ensure suitable development is adopted. Based on excavations and constructions completed in the adjoining class IIA land it was assessed as being of a low to moderate risk rating as defined by the Australian Geomechanics Journal Volume 35 No.1 March 2000.

From the seventeen test pits sunk across the site, three types of soil profiles were encountered. These are described in the report and are summarised below:

- Soil Unit 1

  Found in the lower level of the subdivision between the southern and northern ridges and in the playing field areas. Profile consists of soft wet clays overlying loose to medium dense sands. These soils will generally have fill placed over them and may suffer from some degree of consolidation due to the 1.5 metre (nominal) thickness of soft wet clays.

- Soil Unit 2

  Found in the lower slopes of the surrounding ridges comprising stiff to very stiff silty red clays overlying alluvial clays and clayey gravel. Ideal founding material for house construction.

- Soil Unit 3

  Found in the upper slopes and tops of surrounding ridges consists of stiff to very stiff silty sandy clay overlying clayey gravel. Ideal founding material for house construction

Subject to satisfactory consolidation and treatment of the type 1 soils, the APP report advises that conventional footing designs to Class M standard under AS 2870-1996 “Residential Slabs and Footings” Code would be suitable. However, AS 2870 classifications will still be required for all lots following completion of earthworks on the site.

The APP report also recommends that where housing is proposed within areas where slopes exceed 25%, additional geotechnical investigation and advice be sought on slope stability and design criteria for individual houses.

These areas (slopes > 25%) are shown on the geotechnical reports site plan and are contained in the backyard of very large blocks which have alternative building sites to those on the >25% slope component of the block.

6 SEPP 55 – CONTAMINATION REPORT

6.1 Introduction

Ardill Payne and Partners undertook a Preliminary Site Investigation for the site in September 2003 and reported their findings in a November 2003 report. This report was adopted by the Department of Planning and Ballina Shire Council at the time of their determination of the 2003 SEPP71 Masterplan application. At the time of the investigation the site was completely undeveloped and the water quality control pond had not been constructed.

The site investigation included a desktop site history assessment as well as preliminary soil sampling. The site history assessment indicated that the site had been mainly used for dairy grazing. Sugar cane may have been grown for a very short period but failed due to cane disease. The previous site owners indicated that horticultural activities had not been undertaken during the past 35 years and that no chemicals had been used in the recent past. The Coral cattle tick dip is located to the north of the site but is unlikely to have had any chemical carry-over due its topographical position. The natural site soils are thus unlikely to have been contaminated by past activities.

The investigation found that there were no past uses likely to cause contamination of the site. Past uses consisted of cattle grazing and dairying. A judgemental sampling pattern was adopted to ensure imported fill material was suitable for residential use. The analysis indicated that some stockpiles of material soils exhibited elevated levels of chromium and manganese. Further research indicated that this was a common finding for soils of volcanic origin and were naturally occurring background levels.

Some composite samples exhibited elevated Mercury levels which were above acceptable limits for residential use, but suitable for commercial/industrial and open space/recreational areas. The Mercury was found to be tightly adsorbed to soil particles and thus unlikely to leach. All fill material was classified as “inert” in accordance with EPA guidelines.

It was concluded that fill was suitable for use under sports fields, road embankments and below commercial areas. It was also concluded that it would be suitable for residential use if subject to capping with at least 300mm of virgin excavated natural material (VENM).

These stockpiles were used for construction of the WQCP and playing fields. It is also our understanding that any future fill material is to be sourced from the northern slopes of the subject site and will thus not require any further sampling or investigation.

No further development, other than the construction of the WQCP and approved filling of the sports fields and adjacent residential land, has occurred on the site since the investigation, neither has the proposed end use changed. Thus the previous Preliminary Site Investigation is deemed acceptable for lodgement as part of this new application. The full SEPP55 Report is provided as Appendix 4.

7 ACID SULPHATE REPORT

Gilbert & Sutherland undertook an acid sulfate soils assessment in March 2004 in relation to the then proposed water quality pond (WQCP), which has subsequently been constructed. The findings and management requirements were provided in the above referenced report which is provided as an attachment to this report. See Appendix 5.

In summary, Potential Acid Sulfate Soils (PASS) were observed in soils between 0.75m and 3m below natural surface levels in the location of the pond. These levels were not converted to AHD, however an indicative natural surface level of 1.2m AHD is assumed based on site survey information. The report identifies three soil types found at the site which exhibited PASS. These include course sands, silty sands and silty clays in increasing severity of PASS. A geotechnical investigation was undertaken by Ardill Payne and Partners of the entire subdivision area in October 2003. We refer to the updated version of this report (Geotech Report – Pacific Pines Subdivision - June 2007), which has been submitted to the Department of Planning as part of this application. Based on the soil types found during the investigation, the occurrence of PASS soils is unlikely above the 10m AHD contour (Limit of Alluvial soils). This finding appears to agree closely with Sheet 2 of the Ballina Local Environmental Plan 1987, which indicates the extent of class 2 & 5 Acid Sulfate Soils approximately follows the 10m AHD contour. See Figure 7.1 attached.

Class 2 soils require an assessment for all works below the ground surface, or which will lower the water table beyond 1m. It is currently proposed to borrow soils from the northern slopes of the site, which do not contain PASS material, as fill material in the lower lying central areas. This would increase the ground level adjacent to the WQCP from around 1.2m to approximately 2.3m AHD. Thus the surface level will be increased by some 1.1m. The majority of site excavation works are thus not likely to occur within the PASS soil profile some 1.85m below the finished surface level.

It is thus proposed, based on Gilbert and Sutherlands findings, to initially assume that PASS exists in all soils below the 10m AHD contour and deeper than 0.75 below ground level. Where excavation into PASS might occur, It is proposed to undertake laboratory sampling a rate of 1 per 1000m^3 of excavated material in accordance with the Environmental Management Plan (EMP) details provided in sections 7.7 & 7.8 of the Gilbert and Sutherland report. The laboratory analysis will be used to determine appropriate liming rates and management requirements if necessary. It is not proposed to sample material borrowed from areas above the 10m AHD contour as these are unlikely to contain PASS.

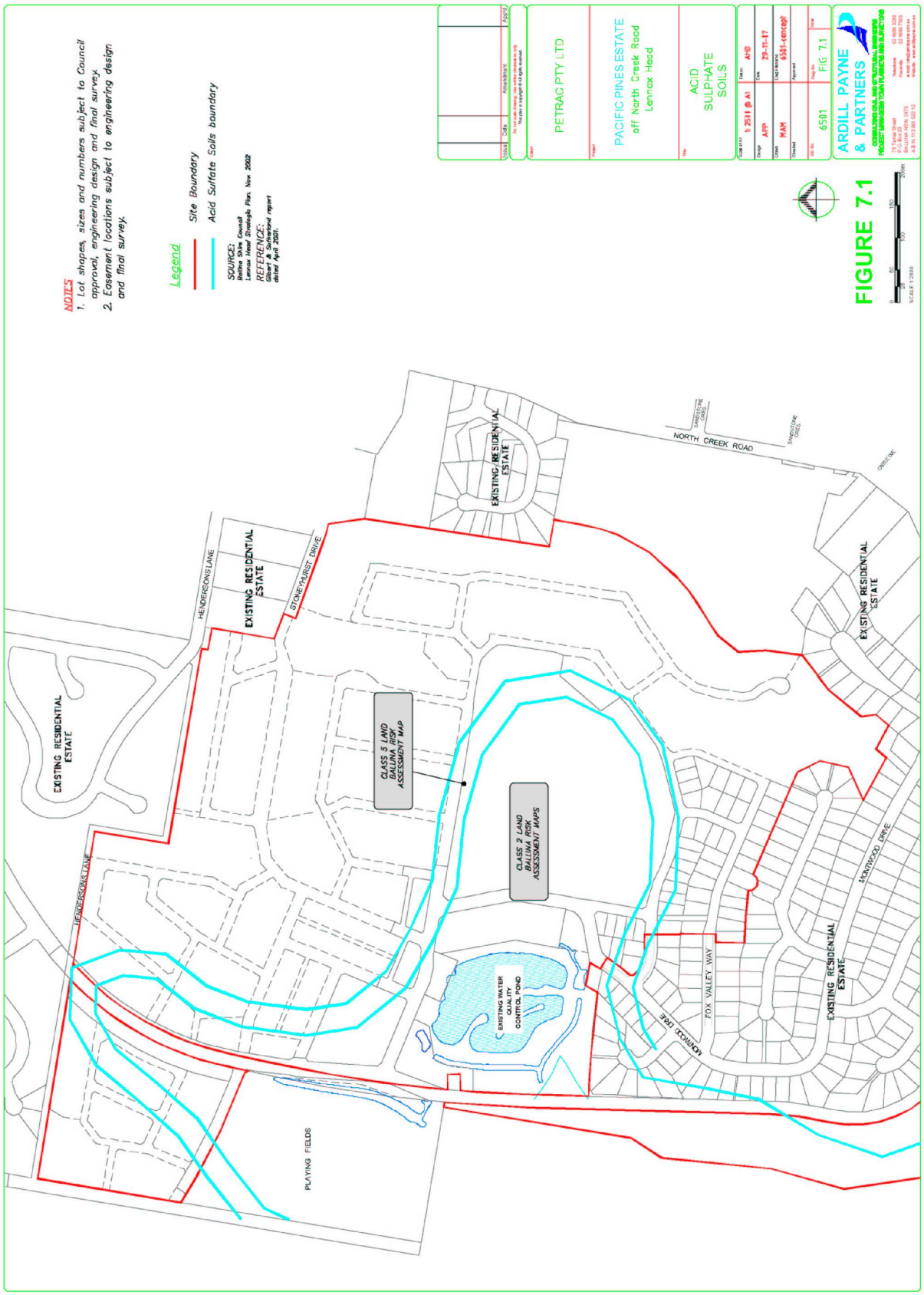
Discussion

Council's GIS mapping of the site indicates possible locations for PASS on site. Council's mapping is reproduced on Figure 7.1 and indicates areas where various classes of PASS-affected land may exist. The class of land indicates what type of work requires Council development consent prior to the works proceeding. Council's risk assessment plans indicate class 2 and 5 land exists on site. The specified works associated with the different land classes is provided below. In accordance with The Ballina Local Environmental Plan 1987 (cl. 36), any works below ground surface will require Council consent. Suitable Acid Sulfate Management Systems or Environmental Management Plans (EMP) will be required to be incorporated. The proposed EMP summarised overleaf has been developed based on the Environmental Management Plan prepared by Gilbert and Sutherland for treatment of the more reactive PASS encountered during their investigation of the WQCP site and surrounding land. Refer Appendix 5 for full EMP. It is proposed to use the Gilbert and Sutherland EMP for Acid Sulfate Management for the rest of the site.

Table 7.1 Ballina LEP Acid Sulfate Land Classes Treatment Measures

Class of Land	Specified Works
1	Any works
2	Works below the ground surface Works by which the watertable is likely to be lowered
3	Works beyond 1 metre below the natural ground surface Works by which the watertable is likely to be lowered beyond 1 metre below the natural ground surface
4	Works beyond 2 metres below the natural ground surface Works by which the watertable is likely to be lowered beyond 2 metres below the natural ground surface
5	Works within 500 metres of class 1, 2, 3 or 4 land which are likely to lower the watertable below 1 metre AHD in adjacent class 1, 2, 3 or 4 land

Four main soil orders were identified by Gilbert & Sutherland, namely Ferrosols, Kandosols, Kurosols and Chromosols. The distribution of these soils is provided in Figure 5 of the G&S report. In summary Ferrosols and Kandosols were the dominant order. Ferrosols being found to the east and south of the pond and its boundaries while Kandosols were encountered to the north of the pond and may extend to the playing fields. Kurosols and Chromosols occurred in the centre and to the west of the pond.


NOTES
1. Lot shapes, sizes and numbers subject to Council approval, engineering design and final survey.
2. Easement locations subject to engineering design and final survey.
Legend
Site Boundary
Acid Sulfate Soils boundary
SOURCE:
Ballina Shire Council
Lennox Head Strategic Plan. Nov 2002
REFERENCE:
Coast & Catchment report
dated April 2001.
PETRAC PTY LTD
PACIFIC PINES ESTATE
off North Creek Road
Lennox Head
ACID SULPHATE SOILS
ARDILL PAYNE & PARTNERS
FIGURE 7.1
FIG 7.1
6501
EXISTING RESIDENTIAL ESTATE
NORTH CREEK ROAD
HENDERSONS LANE
STONEHURST DRIVE
CLASS 5 LAND BALLINA RISK ASSESSMENT MAP
CLASS 2 LAND BALLINA RISK ASSESSMENT MAPS
EXISTING WATER QUALITY CONTROL POND
PLAYING FIELDS
FOX VALLEY WAY
MONTWOOD DRIVE
SANDSTONE CRES.
CREEK DR.

Of the ten boreholes sampled for PASS classification, eight exhibited moderate severity of PASS. All PASS materials were found below 0.75m below natural surface levels (NSL) with the majority of PASS material exceeding threshold level occurring between 1.75m and 3.0m below NSL.

Approval already exists to fill the central portions of the site under DA 1999/248 whilst DA 2002/333 grants consent to fill residential area adjoining the WQCP and playing fields. Such filling will vary in height but generally exceed 0.8 metres. Consequently only the deepest of utility excavations are likely to intercept PASS layers in the class 2 land. Such utilities would be limited to sewerage gravity mains or sewer pump stations if required. Treatment will consist of Acid soil and water management as per the above-referred EMP. The treatment procedures are summarised below and provided in detail in Appendix 5.

Environmental Management Plan (PASS Soils)

The source of the Acid Sulfate Management Plan for PASS is included in the Gilbert and Sutherland EMP provided in the Appendices. In summary the EMP requires monitoring and reporting of PASS if they are encountered, and, appropriate treatment of the same. The EMP will require daily records to be kept on site of earthworks undertaken and what actions are taken in response to uncovering PASS. The EMP sets out the responsibilities of the various parties involved in control of the site during construction of the site. Typically an audit of the monitoring system is undertaken quarterly or after moderate rainfalls by an independent reviewer. Daily site inspections are required during construction from the supervising engineer or Council representative. Generally the site Contractor is responsible for the daily monitoring and treatment of PASS.

Acid Sulfate monitoring after occupation of the site is provided by downstream monitoring of discharge water from the WQCP in accordance with the Consent Conditions for the WQCP.

Where PASS is encountered during construction, or has to be excavated, the area is sealed off from downstream waters by constructing an earthen mound or bund. Lime dosing rates to reduce acid levels are determined by sampling and the appropriate quantities of lime added. If very high PASS is encountered the area may have to treated then capped with an inert layer of clay nominally 300 mm thick. Material to be excavated is kept within the bunded area and treated with lime and clay as described above. This is the process required to treat any acid soils encountered during the deep utility excavations referred to above.

Water captured in the bund is periodically checked for pH and treated with lime, if required, prior to release. Once the excavation is complete and the pH is at an acceptable level, treated excavated material is returned to the excavated pit and site closed off with inert material.

8 FLOODING

8.1 Introduction

Three flood investigations have been undertaken on the subject site in response to Shire Wide Policies and local flooding effects.

8.2 Flood Studies Undertaken

Ballina Shire Council engaged WBM Oceanics to undertake a Shire Wide Flood Study which concluded in 1998. This study provided flood levels for the 1 in 100 year event across the Ballina Flood Plain. As part of the modelling the impacts of filling flood prone areas within undeveloped parts of the urban footprint was investigated. From this report the 1 in 100 year line was determined across the flood plain and minimum fill and floor levels were determined. The results are presented on Council's flood plain policy document which in summary required minimum ground levels of RL1.8 (AHD) in the Pacific Pines Estate. This represents a minimum filling depth of approximately 0.8 m for flooding.

As part of more detailed investigations of local flood impacts caused by urban development and the detention effects of the WQCP and local tides at the site Ardill Payne and Partners engaged WBM to do a site specific study of the Pines Estate in 2002. The results of this study indicated that local flood levels could reach RL 2.07 AHD at the WQCP site. This represents a 0.27 metre increase over the values from the 1998 general study.

Ballina Council is currently updating its Flood Plain model using recent improvements in flood plain modelling software and Global Warming allowances. Results have yet to be released or adopted by Council. However APP understands that flood level increases at the mouth of the Richmond River in the order of 200mm are to be adopted. The increase in flood levels further up the catchment where Pacific Pines is located is thought to be less than the 200mm mouth allowance.

8.3 Fill Levels Adopted to address Climate Change

In response to these three studies a minimum fill level of RL 2.3 at the edge of floodways has been adopted in the design. Adjacent levels at property boundaries are approximately 0.36 metres higher than this minimum value. Filling of these areas has been previously approved by Council.

The increased fill level is considered to be adequate to address potential sea level rises given the studies performed at the time of designing the subdivision. This is a result of Ecologically Sustainable Design principles being used throughout the design of the subdivision.

8.4 Fill Effects on Flooding

Previous modelling by WBM provided for extensive filling in the basin of the Pacific Pines Estate. The extent of this filling has not changed markedly. The increased height (from RL 1.8 to RL 2.3) will require inclusion of some walls in floodways so that stormwater conveyance is not reduced through loss of available waterway area and EEC areas are not impacted. Consequently it is not expected that any significant change will occur to the flood levels as previously modelled for filling of the Pacific Pines flood prone lands.