

The predominant trip patterns generated by the proposed Area E development are likely to occur in a north-south direction, with activity centres at Tweed Heads, Coolangatta and Broadbeach and Southport to be key destinations. Destinations south of Area E, such as Murwillumbah are likely to be secondary to those in the north. In this regard, the link from Area E to the Pacific Highway, which is the main arterial link providing north-south access along the North Coast, is essential for future viability of transport and access for the proposed development.

There are currently four possible access routes between Area E and activity centres to the north-east, which are shown in Figure 3.33. All existing routes are two-lane, two-way rural roads. Analysis of existing mid-block traffic volumes on these access routes showed that these routes currently operate well within capacity, with the exception of the section of Terranora Road between Kiora Street and the Pacific Highway, which currently has a volume capacity ratio of 60%.

Traffic generation of the fully developed Area E proposal was estimated to be 16,000 daily trips and 1,500 trips in the peak hour.

Analysis of the impact of the additional traffic volume generated by Area E on the surrounding network showed that in most cases the various routes would likely have sufficient mid-block capacity to accommodate these future traffic volumes. Notwithstanding, future road network upgrades would be favoured to reduce traffic impacts associated with the development of Area E.

There are a number of proposed road improvements, either in planning or current construction, to accommodate the future growth in traffic volumes, to serve the general area including Area E, particularly:

- duplication of Fraser Drive (Leisure Drive to Amaroo Drive and Vintage Lakes Drive to Kirkwood);
- Kirkwood Road /Pacific Highway interchange;
- Extension of Kirkwood Road to Minjungbal Drive; and
- Duplication of Leisure Drive.

Some of these improvements are required regardless of whether Area E develops.

Studies and modelling undertaken for Tweed Shire Council (Veitch Lister Consulting Pty Ltd, 2003) indicate that the development of Area E would add reasonably significant volumes to the secondary road network in the South Tweed Heads / Banora Point area. Despite this, the majority of these impacts are capable of being sustained by the local network, as exists or is planned.

The impacts of Area E on the strategic road network will be small, relative to the future base volumes and conditions. Any improvements which address the forecast base conditions should be capable of handling the additional impacts of Area E.

With respect to intersections from Area E, analysis shows the existing intersection of Maher's lane and Terranora Road should be able to operate without any additional changes.

The proposed external intersection of Area E with Terranora Road to the south of the site should be set up as and Austroads "Type B" intersection.

The proposed internal intersection of Area E internal road and the Maher's lane extension may operate as an Austroads "Type A" intersection, unless line of site issues are a factor, in which case a "Type B" should be built.

The proposed 4-way intersection at the current 3-way intersection of Amaroo Drive and Fraser Drive operationally works best as a roundabout. However, a signalised intersection will also work, with a smaller "design footprint" (Less pavement and island construction". Notwithstanding, given the operational advantages of the roundabout option over the signalised option the roundabout option is therefore considered to be the preferred option.

From the analyses of the 2 different route variations, which may be susceptible to "rat-running", the Amaroo Drive, Darlington Drive (south) and Banora Hills Drive to access Terranora Road seems unlikely to attract additional through traffic due to existing speed bumps and the steepness of Banora Hills Drive. However, it is recommended that consideration be given to further more detailed investigations to determine whether LATM treatments are suitable or required for this route.

Amaroo Drive and Darlington Drive (north) to access Leisure Drive however would appear to be an attractive route, and various means of managing traffic flow through this route should be further investigated. Various LATM options may be considered for this route, e.g. horizontal displacement devices and supporting signage. However, it is likely that any LATM treatments will require the input from the local community, in particular the residents situated along the "rat run" route, to determine if they will support the implementation of LATM treatments through their streets.

Development would be expected to contribute to the upgrading of road networks within the area in accordance with the Tweed Road Contribution Plan 2003 (as amended) which would be in the order of \$5,342 per detached housing lot. However, it should be noted that this contribution does not include intersection upgrade costs at Fraser Drive and Terranora Road or the potential need for traffic calming on the adjoining local road network. Further investigations are required to establish the potential costs associated with these likely future improvements.

Within Area E a movement network will be able to be developed in accordance with the requirements set out in DCP 16 which includes road, bikeways, pedestrian ways and public transport routes. This will require the ultimate movement network design to take into account the physical and other constraints of the site as well as integration into the surrounding area.

### 3.9 Agricultural lands

The long-term use of Area E for agriculture has been in question for some time. Since the late 1980s, the land has been identified as an 'investigation area' (Area E) for potential residential expansion due to favourable topography, proximity to other urban areas and favourable surrounding land use (TSC, 1987). The Draft Interim Strategic Plan – Cobaki/Bilambil Heights/Terranora (TSC, 1995) also confirmed this potential by identifying limitations to cropping of the land and the erosion of any locational advantages of Area E.

NSW Agriculture has previously identified in correspondence (10 February 1995) to previous consultants dealing with the site, that it will not oppose the rezoning of lands adjoining Mahers Lane providing that it goes to a residential zoning. This correspondence indicates that the provision of Lindisfarne School within the centre of the agricultural land has created a significant point of conflict between uses.

Similarly, previous studies (Wilkie Fleming and Associates, 1994) indicate that the intrusion and encroachment by urban development, the need to employ a high level of technology to maintain productivity, the limitations placed on farming practices (by both surrounding uses and the physical constraints of the land for agricultural production) and the loss of market advantages through improved transport for other areas, has undermined the long-term viability of these lands for agricultural production.

Based on the history of this site, the continued long-term use for agriculture is in question. In order to draw conclusions on the long term viability of the land, this study has reviewed the following matters which are fundamental to Area E's future:

- agricultural land classes;
- biophysical limitations;
- land use trends;
- agricultural land use conflicts;
- farming returns; and
- sustainable farming indicators.

This study has been undertaken within the current and historical planning context for Area E and with regard to the efficient use of this land for urban purposes as opposed to other lands and settlement forms (e.g. rural residential) in other parts of the Shire.

The methodology used in preparing this assessment of agricultural matters (as part of the preparation of a Local Environmental Study and draft LEP amendment for Area E comprehensive planning framework), is itemised below:

- review of Council and NSW Agriculture's documentation relating to agricultural protection generally and to the site specifically, to ascertain current policy and expectations for agriculture in the area;
- discussion with the Agricultural Environmental Officer from NSW Agriculture, to verify this agency's current position and to identify any outstanding matters that need to be addressed in relation to the change of land use from agriculture to urban; and
- site visit site and photography of current land use activities both within Area E and on adjacent holdings to allow an assessment of land use options and potential conflicts.

### **3.9.1 Zoning**

Area E comprises approximately 297 ha with the majority of land included in the 1(b1) Agricultural Protection Zone under the Tweed LEP 2000. This zoning is reflective of the land's general agricultural values, excepting the land in the 1(c) Zone. However, within this area, 52.3ha has been readily accepted by NSW Agriculture and Tweed Shire as not being suitable for the zoning, being a low-lying wetland area, which is also included in SEPP 14.

The remaining 245ha contain a range of Agricultural Land Suitability Classes (NSW Agriculture, 1998) as indicated in Table 3.43 and Figure 3.37

### **3.9.2 North Coast Regional Environmental Plan**

The North Coast Regional Environmental Plan (DUAP, 2001) includes specific provision relating to how prime crop or pasture land should be dealt with in the preparation of a Local Environmental Plan, viz:

*"7 Plan preparation: prime crop or pasture land*

*A draft local environmental plan applying to prime crop or pasture land should:*

- a identify and include land in an agricultural protection zone and contain provisions that:
  - (i) prevent the subdivision of land within the zone for purposes other than commercial farming,*
  - (ii) set minimum allotment sizes which maintain the concept of a minimum area capable of efficient, sustainable agricultural production in the long term,*
  - (iii) separate land zoned for residential use from land zoned or used for agricultural use or for intensive animal industries, and*
  - (iv) prohibit development which is incompatible with the objectives of this Division, and*
  - (v) rezone prime crop or pasture land for purposes other than agricultural only after a detailed analysis of the agricultural capability of the land and adjoining land has been carried out, and**
- b in relation to any prime crop or pasture land not identified and included in an agricultural protection zone in paragraph (a):
  - (i) include provisions that retain the land for commercial farming purposes, and*
  - (ii) set minimum lot sizes which are sufficient to maintain commercial farming in the long term.”**

Of these provisions, Clause 7 (v) is relevant to this study as Area E contains prime crop land. The following sections address this clause.

### **3.9.3 TSC Strategic Plan (1996)**

The Tweed Shire Strategic Plan (1996) contains a number of clauses relating to the future use of the Terranora Area E including:

*“Clause 117 .....limiting (urban) development of Area E to the north facing slope of the Terranora Ridge, so the southern face remains as a forested backdrop to the Tweed River and agricultural land.*

*Clause 122..... Subject to meeting other strategic requirements for integrated planning, the detailed local area planning for Terranora (Area E) should include the following principles:*

- a a relatively high proportion of large residential lots (i.e., minimum size 800 m2) because of existing development and scenic values;*
- b defined areas of potential dual occupancy and medium density development;*
- c controls over clearing of vegetation on land containing vegetation with habitat significance;*
- d housing not located directly adjoining wetlands or other significant vegetation; buffer areas provided with these based on local characteristics of vegetation, drainage and topography; and*
- e houses not permitted on prominent ridgelines.”*

The strategic plan has not placed any importance on the retention of agricultural uses in Area E which is consistent with other Council Planning Documents, such as the Residential Development Strategy (1997) and the Draft Interim Strategic Plan – Cobaki/Bilambil Heights/Terranora (TSC 1995).

### **3.9.4 Farmland Protection (2003)**

The Northern Rivers Farmland Protection Project (Lismore Living Centres, 2003) aims to support agriculture and agricultural lands in the Northern Rivers by protecting the land from the encroachment of urban development. The first step in this process was to identify the most important lands for agriculture. A set of draft maps has been compiled which identifies three types of important agricultural lands. In addition, a set of draft principles and draft land use codes have been compiled that set a framework for protecting agricultural land and define what may or may not be done on the land.

The Draft Northern Rivers Farmland Protection Areas Mapping (Lismore Living Centres, 2003) identifies three types of important agricultural lands. These include those of State and Regional Significance as well as those that are classified as 'Locally Important'. This 'whole of government' approach to farmland protection embraces NSW Agriculture's integrated management approach as outlined in their Policy for Sustainable Agriculture (1998).

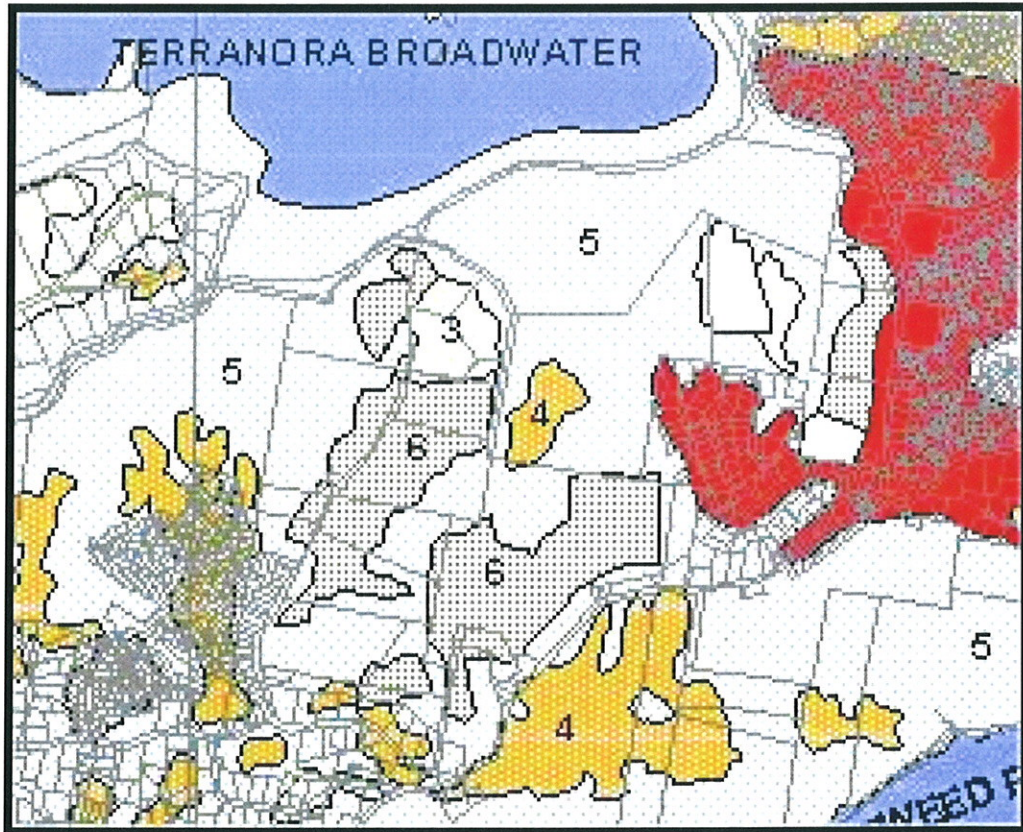
'Locally Important' agricultural lands are identified as important for agriculture, however they are not included as Significant Farmland Protection Areas. This is usually because of their small size, isolation from other important agricultural lands, or proximity to urban areas. Councils may choose to protect these lands for agriculture under local plans'.

Area E has been classified as 'Locally Important' agricultural land and therefore subject to 'draft planning principles' but not to 'draft land use codes' specifying controls for subdivision, dwellings, permissible uses, rural workers' dwellings and boundary adjustments.

### **3.9.5 Agricultural Land Classes**

The krasnozem (red volcanic) soils of the Tweed Shire are regarded as some of the most productive and unique agricultural lands in NSW (Smith, 1982). Like the Cudgen / Duranbah area, Terranora has a long history of high levels of agricultural productivity across a broad range of farming enterprises on these soils.

The major difference between the two areas is that the Terranora area is much smaller, contains a greater proportion of steep land and has experienced urban encroachment on 3 sides in former intensively farmed areas, as illustrated in Figure 3.37. Land within Area E falls within classes 3, 4, 5 and specialist class 6.



**Figure 3-37: Agricultural Land Suitability Classes and Encroachment of Urban Development (Source: NSW Agriculture, 1998)**

**Table 3-43: Description of Agricultural Land Classifications**

Class	Description
Class 3	Grazing land or land well suited to pasture improvement. It may be cultivated or cropped in rotation with sown pasture. The overall production level is moderate because of soil or environmental constraints.
Class 4	Land suitable for grazing but not for cultivation. Agriculture is based on native pastures or improved pastures established using minimum tillage techniques.
Class 5	Land generally unsuitable for agriculture or at best suitable for occasional light grazing or supporting activities related to agriculture (shelter for livestock, forestry). Agricultural production is low as a result of severe biophysical, social and economic constraints which preclude land improvements
Class 6 Specialist Use	Land which, because of a combination of soil, climate and other features, is well suited to intensive production of a crop or narrow range of crops whose special requirements limit their successful culture to such land. This class may include some lands formerly described as 'unique'.
Source: NSW Agriculture August 1998	

### 3.9.5.1 Area Calculations

An estimate of the area of each agricultural land class within Area E is provided in Table 3.44 below.

**Table 3-44: Agricultural Land Classes within Area E**

Class	Area (ha)
Class 3	14.06*
Class 4	12.23
Class 5	171.23
Specialist Class 6	80.09*
Bananas	10.97*
Urban	8.43
<b>TOTAL</b>	<b>297 ha</b>

\* Lands of horticultural significance

### 3.9.5.2 Adjustments to Area Calculations

Two adjustments to these area calculations are warranted:

- Portion 227 (52.3 ha) should not be included in Class 5 as it is a wetland area and serves no value as agricultural land.
- Lindisfarne School (16.1 ha) consists of 7.2 ha of Specialist Class land and 8.9 ha of Class 5 land. 7.7 ha of this site is already used for the school (contains 3.7 ha of Specialist Class land and 4 ha of Class 5 land). Of the remainder of the site (8.4 ha) which is currently vacant, there are 3.5 ha of Specialist Class land and 4.9 ha of Class 5 land. This is summarised in Table 3.45 below.

**Table 3-45: Lindisfarne School Agricultural Land Classification**

	Totals (ha)	Subtotals (ha)	
		Specialist Class	Class 5
Total site	16.1	7.2	8.9
Area of site currently used for school	7.7	3.7	4
Area of site currently vacant	8.4	3.5	4.9

Based on Table 3.45, a rationalised assessment of the area is agricultural land classes within Area E is provided in Table 3.46 below.

**Table 3-46: Rationalised Agricultural Land Class Area Summary**

Class	Area (ha)	Comment
Class 3	14.06*	".....may be cultivated or cropped in rotation.....overall production level is moderate because of soil or environmental constraints".
Class 4	12.23	".....not (suitable) for cultivation"
Class 5	110.03	Excludes Lindisfarne School and Portion 227..... "unsuitable for agriculture"
Specialist Class 6	72.89*	Excludes Lindisfarne School ..... "well suited to intensive production of a crop or narrow range of crops whose special requirements limit their successful culture to such land....."

Class	Area (ha)	Comment
Bananas	10.97*	
Urban	24.53	Includes Lindisfarne school
Wetland	52.3	Wetland – refer to Agfact AC25 Page 7 section 6.3(i) - indicates that this area should not be mapped as agricultural land
<b>TOTAL</b>	<b>297</b>	

\* Lands of horticultural significance

**Table 3-47: Comparison of Area E and Shire Agricultural Land Classes**

Agricultural Land Class	Area E ha	Shire ha	Class as % Shire
Class 1	-	389	0.30
Class 2	-	100	0.08
Class 3	14.06	12804	9.72
Class 4	12.23	33349	25.30
Class 5	110.03	57160	43.37
Special Use (horticulture) Class 6	72.89	280	0.21
Special Use (bananas) Class 10	10.97	2388	1.81
Urban	24.53	3049	2.31
Water (Wetland)	52.3	2018	1.53
State Forest	-	10405	7.89
National Park	-	9852	7.47
<b>Total</b>	<b>297</b>	<b>131794</b>	<b>100</b>

Source: NSW Agriculture, 1998

The main findings from this area analysis are that Area E contains:

- no Class 1 or Class 2 agricultural land (at the 1:25,000 scale of mapping) out of a total of 489 ha;
- less than 0.1% of the Shire's mapped Class 3 land out of a total of 12,804 ha;
- 26% (73 ha) of the Shire's mapped Special Use (horticulture) Class 6 land (mostly krasnozem soils) out of a total of 280 ha; and
- less than 0.5% of the Shire's Special Use (bananas) Class 10 land.

In summary, the only significant agricultural land class in Area E is 73 ha of Special Use (horticulture) Class 6, held by 13 landowners. Alternative agricultural uses more consistent with land suitability such as grazing, orchards etc are not commercially viable given the small size of holdings.

### 3.9.6 Biophysical Limitations on the Agricultural Land

The Carool soil landscape is the most important agricultural land found within the Terranora area. This is described (NSW Agriculture, 1998) as being moderately hilly land with 10-15% slope, deep well-drained krasnozem, highly erodible soils with high to severe limitation for cultivation. Lands with less than 5% slope have been placed in Class 2, and 5-15% slope Class 3.



NSW Agriculture (1998) suggests that while there are significant areas of soil suitable for banana and horticultural crops in Area E, no areas of greater than 2.5 ha are located on krasnozem soils with slope less than 5% (i.e. Class 2, within the limitations of mapping). A total of 14.06 ha of krasnozem soils on slopes of up to 15% slope were mapped as Class 3. For other soil types, the upper slope limit for Class 3 lands should be reduced to 10% according to NSW Agriculture.

Land with greater than 15% slope on krasnozem soils is not ideal for horticultural crops. Although the high rainfall allows a wide range of horticultural crops to be grown, the high rainfall intensity increases the risk of soil erosion on all types of soil, particularly the krasnozem soils. On these lands, horticultural crops are usually hand harvested. With the use of sound agronomy practices, it may be possible to produce horticultural crops on the Carool soil landscapes, while hand harvested horticultural crops (tropical fruit and plantation crops) such as bananas would be suitable on all soil landscapes. These areas have been classified as Class 6 or banana lands (NSW Agriculture, 1998).

### **3.9.7 Land Use Trends**

Terranora has a history of dairying followed by intensive row crops, bananas and passionfruit as well as some cattle grazing, floriculture and plantation tree crops. Vegetable growing and banana plantations were the dominant use in the mid 1990s together with a field rose operation and a plant nursery (Wilkie Fleming and Associates, 1994).

The property in the NE of Area E fronting Fraser Drive contains about 25 ha of Class 6, Class 3 and Banana agricultural land (see Figure 3.37). This area continues to be intensively farmed and has a history of successfully growing bananas, passionfruit, cucurbits, tomatoes and other crops.

Through the remainder of Area E, landholders have demonstrated a major trend away from intensive row cropping. A survey of 12 landholders adjacent to Mahers Lane recorded 9 ha of row crops, 36 ha of plantation crops (mostly bananas) and 38 ha of fallow land (Wilkie Fleming and Associates, 1994).

### **3.9.8 Agricultural Land Use Conflicts**

Area E is bounded on three sides by urban development, thus creating a high level of potential for conflict between residents and neighbouring farming activities. In addition, previous land use decisions have seen the placement of a significant secondary school centrally within the area of Class 6 land which has resulted in the alienation of a significant part of this land as well as limited the ability of adjoining lands to be farmed in an unrestricted manner.

In addition, the area is bounded on its northern edge by a significant wetland area and Terranora Broadwater, both of which are of ecological significance. Terranora Broadwater is also documented as having a fragile water quality.

Conflicts in this situation can be expected to be a constant issue for farmers and neighbouring residents resulting especially from noise, dust and odours associated with use of agricultural machinery, organic fertilisers and chemical sprays.

Agricultural activities would also likely to have impacts on the wetland area and Terranora Broadwater in terms of soils erosion and nutrient loads.

The long-term viability of agriculture in Area E requires an 'integrated approach' to agricultural conflict risk management, using a combination of tools (Smith, 2003). Unfortunately, these tools have not been adequately applied to most past decisions to release land for urban development surrounding Area E as outlined below.

- Strategic and Statutory Planning – most decisions surrounding Area E were taken prior to the current integrated approach to separating conflicting uses.
- Environmental Regulation – farmers are increasingly being required to conform with statutes administered by local and state government, especially where off-site impacts are likely to occur (e.g. spray drift, noise).
- Risk Assessment – a Land Use Conflict Risk Assessment of horticultural activities in the area is likely to confirm a high level of risk of land use conflict and a low level of potential to further alter farming activities to reduce sources of conflicts.
- Buffers Between Uses – because of small farm size and the close proximity of neighbouring houses, there is virtually no opportunity to retrofit either biological (spray filter) vegetation belts or adequate separation distances to mitigate sources of conflict between residential development on adjacent Fraser Drive, Terranora Road, Parkes Lane and parts of Mahers land. There is little opportunity to incorporate buffers except on existing agricultural land. Imposing appropriate buffers (approx 150 m) on current agricultural lands would see significant amounts of better quality land excluded from production.
- Farming Best Practice – improvements in farming practices in Area E are possible but are expensive to implement and need to be phased in over a long period as farm income allows.
- Information & Awareness – a comprehensive set of publications and an education campaign are planned by NSW DIPNR but are not yet available.
- Dispute Resolution – the sheer weight of numbers of urban residents compared with farmers in Area E would make equitable resolution of existing and new conflicts difficult to achieve.

As a result, farming activities in Area E are significantly constrained. For example, aerial spraying for leaf disease management, which is widely practised in the production of bananas elsewhere, is not possible in Area E due to the proximity of residential development.

Encroachment limits the ability to undertake strategic crop pest control by timely pesticide application necessary to produce marketable quality, especially during variable wind conditions. Also, the hours of farming operation of machinery and transport is limited due to proximity of residents. The lack of existing buffers built into surrounding urban developments and intrusion of the Lindisfarne School have had a significant impact on the ability to farm the land to a level that is needed to stay competitive with other non-urban production areas. The land must be worked hard to be commercially viable. In Area E, land suitability and encroachment limit best farming practices being carried out.

The characteristics of the study area and adjoining land, namely, urban encroachment, small lot size within the study area and high land prices are recognized as having severe limitations on the future viability of the land (Agfact AC 25 NSW Agriculture, 2002) which states:

"Around the perimeter of urban areas where high land prices and small lot sizes are common, even the best agricultural land may have potential conflict with urban neighbours as one constraint, limiting versatility and affecting productivity. However, close proximity to urban markets may outweigh the constraints."

### 3.9.9 Farming Returns

Agricultural production in the Tweed Shire in 1997 was valued at \$65 million or 7.1% of the total Tweed output (Sinclair Knight Merz, 2002) and comprised the values outlined in Table 3.48.

**Table 3-48: Value of Agricultural production in the Tweed Shire**

Farming Enterprise	Value \$ m
Orchard and nut	1.8
Pigs	3.1
Cattle	4.5
Nurseries, flowers, turf	4.8
Vegetables	6.0
Milk	6.6
Tropical fruit (bananas)	16.3
Sugar cane	21.1
<b>Total</b>	<b>64.2</b>

The data necessary to calculate the value of agricultural production in Area E is not readily available. However, a number of indicators of the economic output of the area are provided below.

Within the Shire-wide context, the economic importance of Area E is limited to the productivity of the 73ha of '.....land suitable for intensive production of a crop or narrow range of crops whose special requirements limit their successful culture to such land.....'. The profitability of the main crops grown in the area is outlined below.

#### 3.9.9.1 Bananas

One family can normally manage about 7 ha of Lady Finger bananas (BGF Bulletin, January, 1996). Gross income from such a farm was estimated to be \$84,000 less production costs of \$76,500, which includes a family labour allowance of \$30,000. This provides a net return of \$7,500 per annum/per 7 ha plantation. Based on these figures, bananas, the largest plantation crop in the Mahers Lane 1995 study area, would have returned total net profit for the 36 ha plantation area of less than \$40,000 (gross return of \$430,000) per annum.

The Wilkie Fleming and Associates, (1994) survey in the Mahers Lane study area recorded a combined gross farm income from all 12 holdings in the vicinity of \$300,000 per year over the previous 3 years, which barely covered production costs. This survey excluded the 25 ha of intensively cropped land in the North East of Area E.

#### 3.9.9.2 Row Crops

Row crops are more lucrative than bananas but require better quality land, higher input costs and are a higher risk. The normal measure of crop profitability used by NSW Agriculture is to calculate crop gross margins (gross income minus variable costs). Two examples of row crop gross margins grown in Area E are summarised below:

**Table 3-49: Gross Margins for Zucchini and Sweet Potato**

Crop	Gross Income / ha	Variable Costs / ha <sup>+</sup>	Gross Margin
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			\$/ha/yr
Zucchini*	15,000	12,200	2,800
Sweep potato**	22,500	12,755	9,750

Sources: \*Includes field labour but not farm management, \*NSW Agriculture (2001) and \*\*Agrilink (2003)

Row crops such as zucchini and sweet potato can only be sustainably grown on Class 2 and Class 3 agricultural land, significantly limiting the long-term productivity from this activity in Area E.

While these returns are amongst the highest attainable for any field agricultural enterprise in Australia, the area of cropping continues to decline within Area E. This is likely as a result of a combination of factors such as:

- the high level of effort required to achieve these levels of profitability;
- site limitations of soils, slope, paddock size;
- attitude to risk and past bad experiences;
- the lack of suitable farming equipment and infrastructure;
- attitude to borrowing to finance crop;
- availability and problems with hiring labour;
- persistent pest and diseases;
- potential conflicts with neighbours; and
- the opportunity to sell to developers.

The early seasonal market advantage traditionally enjoyed by Tweed fruit and vegetable growers in the southern capitals has been undermined by improved transportation allowing competition from Queensland. However, the rapidly expanding local market in SE Queensland has provided some new marketing opportunities. Regardless of this, there are numerous horticultural farming operations in the SEQ region, which have the advantage of larger economies of scale and lack of restrictions from urban encroachment.

The steep slopes in the Terranora Area E severely limit labour saving mechanisation of many farming operations. The absence of any central packing house also limits marketing efficiency. Plantation crops such as macadamias need far larger farm sizes than row cropping and are also severely constrained by steep slopes which limit mechanisation (Wilkie Fleming and Associates (1994).

### 3.9.10 Sustainable Farming Indicators

The long-term future for Area E as an agricultural production area can also be gauged by the performance of the area against a number of indicators of sustainability including, decline of soils, use of chemicals, decline in organic matter, farm planning, cropping systems and water supply.

#### 3.9.10.1 Soil Decline

Both the arable land and the non-arable land in Area E have a history of significant soil erosion as a result of past clearing and disturbance. This is evidenced by the deep accumulation of deposited soil at the bottom of paddocks, occasional severe siltation of dams, shallow soil depth over weathered parent material and continuing evidence of rill and

gully erosion. Some success in erosion control has been reported but this has led to vermin and disease problems (Wilkie Fleming and Associates, 1994).

Soil erosion continues to occur on a seasonal basis when heavy rainfall coincides with recent cultivation. This is despite the best efforts of landholders to implement soil control measures. Current farming practices do not embrace all of the erosion control technologies available, which is likely to be related to social as well as economic factors.

Wilkie Fleming and Associates (1994) reported that almost half the land that is unsuitable or marginally suitable for cultivation has been used for intensive banana and row crop cultivation. They conclude that the past land practices have been highly exploitative and have contributed to land deterioration. Small farm size limits the opportunity to adequately spell paddocks or to confine intensive farming activities to highly suitable Class 2 agricultural land.

The range of crops historically grown in Area E has progressively diminished, placing increased degradation pressures on the land as farming practices tend towards monoculture.

#### **3.9.10.2 Chemicals, Pests and Diseases**

A preliminary assessment of soil chemical residues (Wilkie Fleming and Associates, 1995) concluded that persistent residue levels do not preclude the use of the land for residential development. However further testing of potential hot spots such as chemical storage and mixing areas was indicated.

The testing carried out was for the older generation of persistent pesticides (organochlorines, organophosphates and metals) rather than the current generation of more readily degradable pesticides, which are still used for bananas (Lorsban, Mocap, Namacur, Paraquat, Glyphosate) and row crops (Thiodan, Lannate, Fusilade). Some of the pesticides and fertilisers applied to crops in Area E are likely to be transported from cropping areas into the wetlands and waterways to the north attached to soil particles during heavy rainfall events.

#### **3.9.10.3 Organic Matter**

Krasnozem soils are prone to a decline in organic matter content unless special cultural practices are undertaken. In Area E, herbicides are routinely used to maintain bare ground under banana plantations, with leaf trash providing only limited ground cover on steep slopes. Cultivation paddocks are allowed to grow weeds as a means of stabilising areas and presumably to build up organic matter. High yielding green manure crops essential to rebuilding organic matter levels are not reported as a normal component of crop rotation.

#### **3.9.10.4 Property Planning**

Landholders in Area E, as a co-ordinated group, have clearly signalled their intentions to move out of agriculture if they can. This trend was also evident in the high ratio of idle/fallow land to cropped land in the Mahers Lane study area with 38 ha idle vs 45 ha cropped (Wilkie Fleming and Associates, 1994). Since then, several major landholdings have substantially ceased agricultural production according to NSW Agriculture (Murwillumbah Office 17/6/03) and the trend is towards farming activities to progressively contract within the area. More recently, reports have been received that several major landholders have entered into negotiations or have disposed of farms to urban property developers.

#### **3.9.10.5 Cropping Systems**

Despite the well recognised potential diversity of crops that may be grown in Area E, there is a surprisingly limited range of crops that has been grown in the area over the past decade.

Increasingly, crops tend to be grown as monoculture rather than as part of a long diverse crop rotation that allows integrated pest and disease management. These crops are limited to mostly ladyfinger bananas, sweet potatoes and zucchini. Each of these crops has significant impediments to production including:

- Panama disease risk in ladyfinger bananas;
- Wire worm damage in sweet potatoes; and
- Black spot disease in zucchini.

These pests and diseases threaten production and contribute to a further reduction in the potential productive diversity of the area.

### **3.9.10.6 Water Supply**

The area has an adequate supply of water to meet seasonal irrigation needs for most cropping activity (Wilkie Fleming and Associates, 1994). Over-exploitation of groundwater and interruption to riparian flows may occur on a seasonal basis as a result of dam construction and irrigation activities. While adverse impacts on the adjoining wetlands have not been examined, they are likely to be minimal compared with the construction of a floodgated levee and subsequent drainage and clearing of the wetlands fronting Terranora Lake several decades ago.

### **3.9.11 Summary and Conclusions**

Based on the foregoing Assessment of Agricultural Matters in Area E, the following is concluded:

- Past strategic planning and urban development approvals around Area E have paved the way for a change of use of the area from 'Agriculture Protection' to 'Urban', rather than 'Rural Residential' development.
- Agriculturally, some of the land has been identified as 'Locally Important' rather than of 'State or Regional Significance', allowing Council the option of complying with 'draft planning principles' rather than having to comply with 'draft land use codes'.
- There is no mapped Class 1 or Class 2 agricultural land and only 14 ha of Class 3 land within the 297 ha of Area E.
- The long-term productivity from row cropping in Area E is significantly limited because this activity can only be sustained on the very limited areas of Class 2 and Class 3 agricultural land.
- The major agricultural land resource within Area E is 73 ha of Class 6 Specialist Use agricultural land which by definition ... is well suited to intensive production of a crop or narrow range of crops whose special requirements limit their successful culture to such land (e.g. ladyfinger banana, macadamia and avocado).
- These 73 ha are held in 13 holdings, with the majority of this land currently idle and much of it reported to be subject to negotiations between landholders and developers.
- The major biophysical limitations to the site for agricultural use are excessive slope and risk of soil erosion associated with the continuation of intensive cropping.
- In response, landholders have chosen ladyfinger bananas (36 ha, 1995) as the preferred crop for Area E (macadamia and avocado plantations need to be much larger than banana plantations).

- The economic viability of Area E for banana production is marginal. Extensive areas (2388 ha) of other banana lands have been mapped by NSW Agriculture elsewhere in Tweed Shire.
- There has been a long and sustained trend away from intensive use of agricultural land in Area E resulting from limited returns from farming, the potential for conflict with encroaching development and persistent development pressures.
- This trend is also indicative of the inherent site limitations and the inability of landholders to successfully engage in the sustainable production of a more diversified range of crops in the future, as indicated by soil and organic matter decline and the reliance on chemicals to control pests and diseases.
- In the future, pressures on landholders to curtail certain farming activities that might conflict with neighbouring urban uses is likely to increase, further undermining the viability of the area for intensive farming.

### 3.9.12 Recommendations

Based on this Assessment of Agricultural Matters, there is justification for a change in zoning of Area E from 'Agricultural Protection' to 'Urban' in accordance with the NCREP Clause 7 (prime crop and pasture land) and TSC Strategic Plan (1996) Clause 122, relating to the use of the site for residential lots, dual occupancy and medium density development. This accords with previous advice given by NSW Agriculture on the future use of Area E.

## 3.10 Bushfire hazard

A review of the Tweed Shire Council Remnant Vegetation GIS Digital data layer identifies that much of Area E has been cleared of vegetation. The predominant remnant vegetation remaining on site consists of:

- highly modified disturbed vegetation remnants in the areas external to Lot 227 on DP 755740;
- Estuarine complexes, melaleuca and swamp sheoak forests in areas adjoining the Terranora Broadwater and the north-western perimeter of Area E;
- highly modified disturbed vegetation remnants, melaleuca and swamp sheoak forests, and sedgeland and related communities in the southern portion of Lot 227 on DP 755740 (where adjoining Lot 1 on DP 175234 and Lot 1 on DP 304649); and
- Rainforest and riparian communities exist at the northern property boundary of Lot 1 on DP 175234.

Comparison of this vegetation against the Tweed Shire Council Bushfire Hazard GIS Digital data layer identifies the predominant remnant vegetation on site as being with either of 'Low' to 'Moderate' fire hazard rating. Aside from this, the identified rainforest and riparian communities, and melaleuca and swamp sheoak forests in the north-west corner of Area E are identified as 'High' fire hazard rating (refer to Figure 3.38). Despite this, Objective (I) of the Development Design Specification – D1 requires that streets must be designed to allow for fire fighting and other emergency services.

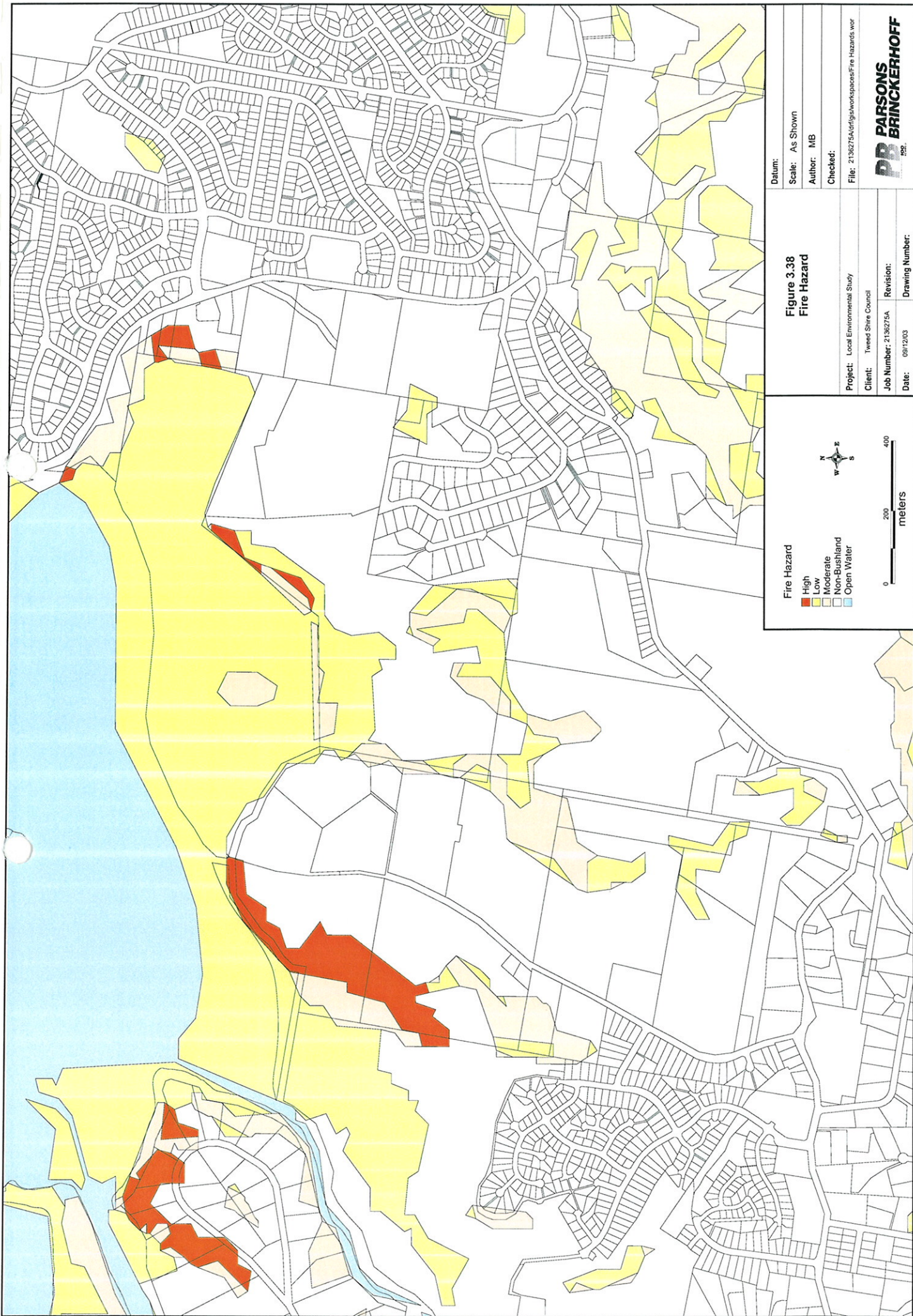
### 3.10.1 Summary and conclusion

The presence of predominately low to moderate fire hazard ratings for remnant vegetation and limited high fire hazard ratings to the north of the site emphasises that bushfire hazards within Area E are generally not a significant development constraint.

### 3.10.2 Recommendations

Pursuant with Objective (I) of the Development Design Specification – D1, streets must be designed to allow for fire fighting and other emergency services. Therefore, it is recommended that Area E streets will be subsequently designed in accordance with same, thereby allowing for fire fighting vehicle access. This is considered adequate to deal with the minimal risk associated with this issue.





**Fire Hazard**  
 High  
 Low  
 Moderate  
 Non-Bushland  
 Open Water



**Figure 3.38**  
**Fire Hazard**

Datum: As Shown  
 Scale: As Shown  
 Author: MB  
 Checked:

Project: Local Environmental Study  
 Client: Tweed Shire Council  
 Job Number: 2136275A  
 Date: 09/12/03  
 Revision: 09/12/03  
 Drawing Number:



File: 2136275A\rf\gis\workspace\Fire Hazards.wor

### 3.11 Visual environment

The Draft Interim Strategic Plan for the Cobaki, Bilambil Heights and Terranora area contains an appraisal of Terranora (Area E), identifying the very high to extreme scenic quality of the area as a result of an inter-mixing of water bodies, topography, vegetated slopes, valleys and agricultural uses (TSC, 1995 p. 43).

The Draft Interim Strategic Plan recognises that a diversity of landscape elements is a key to the visual quality of the area. This includes both vegetation and land use diversity, and the need to ensure that no one particular land use should dominate in any one or all areas. This principle of diversity will be considered at the Structure Planning stage of the LEP development. In particular, the Draft Interim Strategic Plan indicates that the retention of the existing patchwork scenic amenity of Area E can be promoted through the use of access routes along contour lines, where there is vegetation on the downslope (p. 44).

Further, the use of ridgelines for open space linkages, thereby protecting them from likely residential visual impacts, will also be promoted. This form of potential ridgeline use will occur irrespective of the tenure of the underlying land in question (predominantly freehold, as opposed to Council Designated Community Land).

The visual qualities of Area E are summarised in the following table and illustrated in Photographs Figures 2.1 to 2.6. The visual analysis undertaken for Area E is depicted in Figure 3.39 and identifies:

- Major land uses currently within Area E;
- Areas of vegetation;
- Entry points, nodal points and edges of Area E; and
- Scenic views, both internally and externally to the site.

This visual analysis will guide the application of the Draft Interim Strategic Plan implementation principles in subsequent stages of the study.

**Table 3-50: Summary of visual qualities of Area E**

View	Comments
Views from/to higher ridges (Terranora Road, Mahers Lane and unnamed ridges)	Higher parts of the study area have significant panoramic views. Views are 180° in the best locations and include (described from west to east): <ul style="list-style-type: none"> <li>▪ McPherson Ranges</li> <li>▪ Bilambil heights</li> <li>▪ Terranora Broadwater</li> <li>▪ Tugun (limited distant views)</li> <li>▪ Flametree Park Estate</li> <li>▪ Razorback Hill</li> <li>▪ Point Danger, and</li> <li>▪ West Tweed Heads.</li> </ul>
Views from/to	Lower parts of the study area have limited views to: <ul style="list-style-type: none"> <li>▪ Bilambil Heights</li> <li>▪ Terranora Broadwater</li> <li>▪ Flame Tree Park.</li> </ul>

It is recognised that the Terranora Broadwater and surrounds is the focus of views from Terranora, particularly from Terranora Road. The Draft Interim Strategic Plan nominates the preservation of the scenic value of the Broadwater as a whole as an important objective

(p. 38). This objective, including protection of ridgelines from development that would otherwise impinge on these views will be considered in the LEP development for Area E.

When viewed from external, the significant visual qualities of Area E include:

- wetland vegetation fringing Terranora Broadwater;
- the open/rural characteristics of the patchwork mosaic of cultivated fields (this has diminished over time due to abandonment of farming practices and fields becoming fallow; and
- vegetated water way corridors and steep slopes.

Views are largely from individual vantage points and very few major trafficable routes in the area have anything other than fleeting views of Area E. Distant views of the site are best from Bilambil Heights and to a lesser extent parts of Tugun, Razorback Hill and Point Danger.

The visual amenity afforded to the site by its outlook will provide potential future residents with a high level of amenity, having beneficial short and long distance views to a range of natural, semi-natural and urban settings.

Visual impacts resulting from potential development for views to the site include loss of open/rural character through the transformation of the site from a rural area to residential development. Cut and fill on the site could also have the potential to cause significant visual scarring.

Previous sections of this LES have identified the need to enforce erosion and sedimentation controls and cut and fill controls already required by Tweed Shire Council policies.

Given the ecological values of the wetlands fringing Terranora Broadwater, this significant visual feature will be retained and potentially enhanced by rehabilitation works. In addition it is proposed that vegetated waterway corridors be retained to protect their ecological and waterway functions and it is recommended that on steeper areas development be limited to development forms that limit cut and fill.

The open/rural characteristics of Area E have already been eroded by the fact that it is surrounded on both its western and eastern boundaries by highly urbanised areas and ribbon residential development along Terranora Road and residential development in the Parkes Lane also tend to frame much of the upper/more visible parts of Area E.

The impact of urban development on the landscape values of Area E will be limited by the retained presence of wetlands and other vegetation fringing Terranora Broadwater and the retention of vegetation along waterways and steeper slopes. This will tend to break up the urban form of development thus some preserving characteristics of views to the site. Encouragement of plantings throughout development areas will also soften impacts on views to the site.

The Draft Interim Strategic Plan contains Strategic Principles for the implementation of Scenic Amenity objectives, generally including the following that will be considered in the LEP development:

- Revegetation of ridgelines and creek banks.
- Houses not permitted on ridgelines.
- Housing on escarpments or steep timbered slopes shall minimise vegetation loss, not protrude over the top of the escarpment, and be generally finished in earth-toned colours (Council's Scenic Escarpment Map references areas of slope >18%.

However, the slope analysis provided by McLauchlan Surveying has an improved analysis of slopes >18% which will be utilised further in this Study).

- The replanting or rehabilitation of native vegetation, and embellishment of land for habitat and vegetation protection (this Implementation Principle will be considered in further detail in the development of the DCP and S94 Contribution Plans).

These principles are considered generally appropriate and along with recommendations identified above should minimise impacts on views.

### **3.11.1 Summary and conclusion**

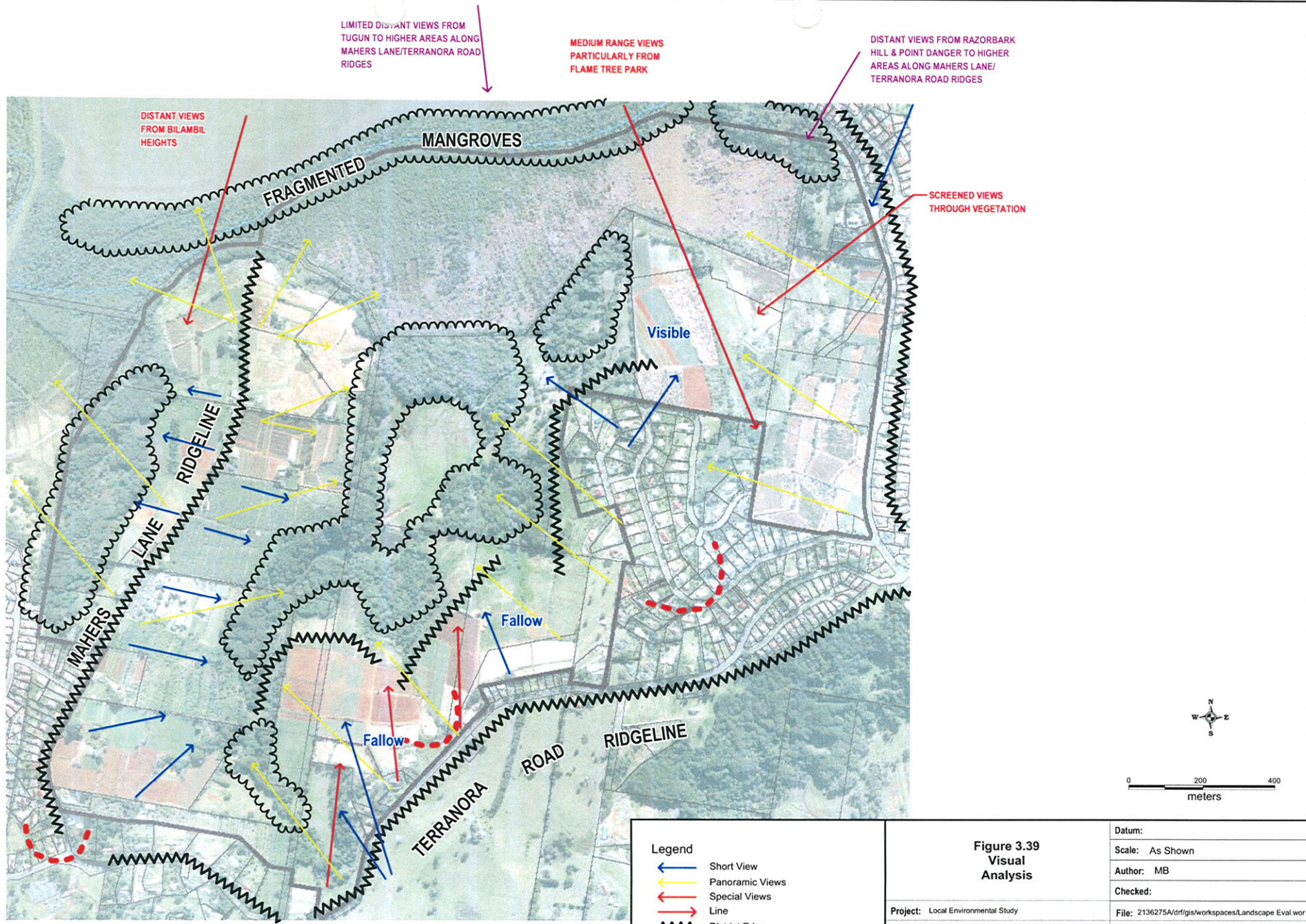
The Draft Interim Strategic Plan outlines three important considerations for the visual environment of Area E. These are:

- the existence of very high scenic quality for the site due to the diversity of the landscape;
- the views from Terranora focus on the Terranora Broadwater, particularly Terranora Road; and
- Strategic Principles for the implementation of Scenic Amenity objectives.

### **3.11.2 Recommendations**

As a result of the very high to extreme scenic quality for Area E, it is recommended that the following apply to the development of Area E:

- The implementation of access routes along contour lines where vegetation exists down slope, to promote the existing patchwork scenic amenity areas of the site.
- Open space linkages are enhanced by the use of ridgelines, ensuring limited potential residential visual impacts. This will occur irrespective of tenure, however predominately on freehold land, rather than Council Designated Community Land.
- The preservation of the Broadwater's scenic value should be a significant objective. This includes the exclusion of development on the ridgelines that would encroach upon the views.
- Revegetation of ridgelines and creek banks.
- Houses are not permitted on ridgelines.
- Protection/enhancement of vegetation within the wetlands, along waterway corridors and steep slopes.
- Housing on escarpments or steep timbered slopes shall minimise vegetation loss, not protrude over the top of the escarpment, and be generally finished in earth-toned colours.
- The replanting or rehabilitation of native vegetation, and embellishment of land for habitat and vegetation protection (this principle will be considered in further detail in the development of the LEP and S94 Contribution Plans).



Legend	
	Short View
	Panoramic Views
	Special Views
	Line
	District Edge
	Distant Views
	Forest Edge

Figure 3.39 Visual Analysis	
Project:	Local Environmental Study
Client:	Tweed Shire Council
Job Number:	2136275A
Date:	09/12/03
Revision:	
Drawing Number:	

Datum:	
Scale:	As Shown
Author:	MB
Checked:	
File:	2136275A/drif/gis/workspaces/Landscape Eval wor

### 3.12 Urban Design

The design of potential development will have significant impacts on the characteristics of the urban form, community creation, liveability, health and safety.

Tweed Shire Council currently maintains a number of policy documents which should be applied to any potential development of the area to ensure that development is of a high standard and provides potential residents with facilities that meet their needs. These controls are summarised in the following table.

**Table 3-51: Tweed Shire Council Policy Documents**

Document	Summary
Development Control Plan No. 6 - Multi-Dwelling Housing	<p>Development Control Plan No. 6 - Multi-Dwelling Housing is designed to encourage a mixture of housing types throughout the Tweed Local Government Area. The DCP includes a range of controls to ensure that the form of multi dwelling housing is appropriate to the context and needs of the shire, including:</p> <ul style="list-style-type: none"> <li>▪ encouraging a high quality urban design and residential amenity in multi dwelling housing development;</li> <li>▪ promoting wider housing choice and more affordable housing in Tweed Shire;</li> <li>▪ setting of appropriate environmental criteria for solar access, privacy, noise, vehicular access, parking and open space;</li> <li>▪ ensuring that the impact of multi dwelling housing proposals on the amenity of adjoining properties is a prime and initial consideration of applicants when preparing their development proposals;</li> <li>▪ providing a comprehensive design oriented approach to multi-dwelling housing in Tweed Shire through a single document; and</li> <li>▪ providing a user friendly document with flexible performance-based criteria to guide development.</li> </ul>
Development Control Plan No 16: Subdivision Manual	<p>The purposes of this DCP are:</p> <ul style="list-style-type: none"> <li>▪ to present Council's strategic plan objectives for the development of subdivisions;</li> <li>▪ to achieve the highest quality and "best practice" of subdivision development in the Shire;</li> <li>▪ to implement the policies and provisions of the NSW State Government in terms of seeking to achieve quality of subdivision planning and development;</li> <li>▪ to provide guidelines and development standards for the development of subdivisions; and</li> <li>▪ to advise on: <ul style="list-style-type: none"> <li>▶ preliminary planning and design of the subdivisions</li> <li>▶ the approval processes</li> <li>▶ procedures and documentation for seeking subdivision approvals</li> <li>▶ how to prepare development applications and construction certificate applications for subdivisions and subdivision works</li> <li>▶ how to implement subdivision works in accordance with approvals</li> <li>▶ how to complete the subdivision by obtaining a subdivision certificate</li> </ul> </li> </ul>

Document	Summary
Development Control Plan No 39 - Energy Smart Homes Policy	This DCP aims to provide detailed provisions to ensure that energy efficient residential development occurs within Tweed Shire.  The objectives of this DCP are to: <ul style="list-style-type: none"> <li>• optimise solar access to residential land and buildings;</li> <li>• improve the quality and energy efficiency of residential subdivisions and buildings;</li> <li>• assist professionals, technicians and trades persons by providing relevant information, and resources in relation to energy efficient design; and</li> <li>• foster partnerships between the Council, State government and the building industry.</li> </ul>
Development Control Plan No. 44 Dual Occupancy Controls – Tweed Shire	"Dual occupancy" means any development which results in two (2) dwellings (whether attached or detached) on a single allotment of land (or which would have that result were it not for the fact that the allotment is to be subdivided) (where permissible) as part of the development.  The aims of the Plan are: <ul style="list-style-type: none"> <li>▪ to ensure infrastructure capacity in urban areas is not exceeded;</li> <li>▪ to protect the future character and amenity of the residential areas of the Shire;</li> <li>▪ to notify all persons dealing with the land (by way of S149 Certificates) that Council will not, on merit, approve dual occupancy development other than in accordance with the provisions of this plan; and</li> <li>▪ to replace the existing fragmented controls for dual occupancy development with a comprehensive set of planning controls</li> </ul> Any development application for the subdivision of the land to which this plan applies for greater than 10 lots must include a plan which nominates those lots upon which dual occupancy development may be subsequently carried out with Council approval.  The total number of lots nominated must shall not exceed a maximum of 20% of the total number of lots proposed by that subdivision.
Development Control Plan No 45 – Socio-Economic Impact Assessment	Currently the Tweed Shire is under increasing imperative to respond to fundamental changes to its social and economic structure. The high growth within the Tweed Shire has placed increasing pressure to encourage and accommodate employment-generating activities.  Other factors such as the globalisation of information technology along with an increase in self-employment are helping alleviate some of this employment pressure but there is still a higher than average level of unemployment in the Shire  The DCP sets out Council's requirements for Socio-Economic Impact Assessments as identified in Clause 17 of the Tweed Local Environmental Plan 2000.  The DCP is also intended to: <ul style="list-style-type: none"> <li>▪ Ensure that Development Applications for certain developments that are likely to have a significant social and/or economic impact are properly considered in accordance with <i>the Environmental Planning &amp; Assessment Act 1979</i>, the Tweed Shire 2000+ Strategic Plan and the Tweed Local Environmental Plan 2000.</li> <li>▪ Achieve maximum benefit for the community from development activity, and mitigate negative impacts.</li> <li>▪ Achieve economic growth through employment generating activities that adopts the concepts of Ecologically Sustainable Development.</li> </ul>

Document	Summary
Development Control Plan No 47 - Cut And Fill On Residential Land.	The objectives of this Development Control Plan are as follows: <ul style="list-style-type: none"> <li>▪ to restrict and control excessive earth works in order to preserve as much as practicable the existing topography and amenity of the neighbourhood affected by the proposed development;</li> <li>▪ to ensure that the building design is appropriate for site conditions with consideration given to the stability and privacy of the adjoining properties;</li> <li>▪ to minimise the effect of disturbance on any land and ensure that dangerous excavations are avoided, or where necessary, are properly retained;</li> <li>▪ to prevent the siltation of waterways and erosion of land disturbed by the development;</li> <li>▪ to rehabilitate the site within a reasonable time frame upon completion of the development;</li> <li>▪ to minimise the removal and disposal of resultant spoil from the site;</li> <li>▪ to retain topsoil on site; and</li> <li>▪ to ensure adequate provision is made for drainage in relation to cut and fill practices.</li> </ul>

With respect to these controls all are relevant and should be applied across Area E to ensure that urban design requirements are of an appropriate standard.

With respect to DCP 6, multi dwelling housing is considered to be an appropriate form of housing for the area particularly where it can be accommodated close to transport nodes and other community focal points. Properly located and designed multi dwelling housing has the ability to provide for a range of housing choices. The controls and policies included in DCP 6 should therefore apply across Area E.

DCP 16 includes detailed requirements on location of land uses, community facilities, road networks, solar access and mitigation of impacts of subdivision. Due to the size of Area E there is an opportunity to provide for a well planned and integrated community design in accordance with the standards set in DCP 16. Specific opportunities which present themselves are the creation of a road network based on a modified grid which is varied to suit topography and other environmental features. The protection of waterway corridors and other natural features is also provided for by the provisions of this DCP. The controls and policies included in DCP 16 are therefore considered appropriate to apply across Area E.

Development Control Plan No 39 - Energy Smart Homes Policy includes provisions which are aimed at ensuring that housing provided in Tweed Shire is energy efficient in its design. The various controls put forward in this DCP are applicable to Area E and would be able to be achieved in subsequent development of the site. The controls will improve the comfort of residents as well as reduce potential energy use in households and are therefore considered appropriate to apply across Area E.

Development Control Plan No. 44 would allow increased housing choice across the site with minimal or no impact of the amenity of potential urban development. The adoption of these controls for Area E is appropriate given the desire to ensure the efficient use of land.



DCP 45 is applicable to Area E firstly because the overall development of the area will create demands for new services and facilities and as such social and economic matters set out in the DCP are applicable. In this regard this LES has identified the need for additional school, community, open space and transport requirements should Area E be developed for urban purposes. These requirements are to be addressed through Section 94 Plans and provision by government and private agencies. Secondly any subsequent development of the site must take the requirements of this DCP into account and as such it should apply to further development in Area E.

The requirements of DCP 47 relating to cut and fill will be important if impacts such as sedimentation and erosion and visual scarring are to be controlled for future development of the site. The controls contained in this DCP should be sufficient to ensure that this issue is addressed. This matter is addressed in greater detail in prior sections of this report relating to landform, soils and geology.

### **3.12.1 Conclusions**

It is appropriate that the controls included in the Planning instruments identified above be applied to subsequent development for Area E. Some modification to these controls may be appropriate and should be considered in the formulation of the subsequent DCP for this area.

## **3.13 Recreation and open space**

### **3.13.1 Existing open space**

There is currently no existing designated open space within Area E. An investigation of the localities west of Area E (e.g. the subdivision in the vicinity of Henry Lawson Drive, Terranora) identified a number of minor pockets of local level open space. It is also noted that Duroby Creek has a designated open space buffer adjoining its banks, that extends in a northeast direction to the Terranora Broadwater, whereby it joins the designated 7(a) Environmental Zone for the SEPP14 wetland areas.

An investigation of the localities east of Area E identified the presence of designated open space in the vicinity of Market Parade, generally also considered as local level open space. This open space does not currently have any embellishments, is predominantly comprised of a dam and vegetation, and would be utilised for passive recreation only.

Further open space, in the form of neighbourhood parks, exists at Glen Ayr and Amaroo Drives within the Banora Point subdivision to the east of Area E, separated by Fraser Drive.

Both the creek buffers and neighbourhood parks mentioned above are zoned 6(a) Open Space. Due to the location and physical proximity of both the Market Parade and Glen Ayr Drive open spaces, there exists an opportunity to provide an open space inter-linkage between both.

### **3.13.2 Additional open space requirements**

#### **3.13.2.1 General**

DCP 16 Subdivision Manual includes detailed requirements of the provision of an open space network in subdivision design. The manual includes requirements for:

- a variety of open space settings;
- location and characteristics of various park types;
- levels of embellishment;
- linkages;
- foreshore access;
- rates of provision;
- community land; and
- S94 Contributions.

These provisions should be imposed on any new development proposed for Area E.

It is noted that there is a Draft Open Space Infrastructure Strategy being prepared by Council to guide Open Space provision within the Shire. The Infrastructure Strategy recommends the provision of 4ha of open space per 1,000 head of population. This is divided into 1.7ha of structured open space (active recreation) and 2.3ha casual open space (passive recreation). While the lot yield and subsequent estimated population for Area E has not yet been established, the above open space requirements will be utilised to establish the amount of open space required.

The locations and accessibility of open space, through pedestrian, cyclist and vehicular connections, both internally and externally to Area E, are key considerations for later components of the Study, however large low-lying areas represent excellent opportunities for the location of large open space areas.

There are sufficient areas of appropriate characteristics located throughout Area E to allow for the establishment of a network of open space which will meet the requirements of potential residents in accordance with DCP 16.

#### **3.13.2.2 Passive recreation areas**

The need is recognised for passive recreation areas with appropriate embellishments, throughout Area E. The Draft Interim Strategic Plan for Cobaki/ Bilambil Heights and Terranora (TSC, 1995, p. 56) identifies the need for consideration of the open space locational needs for inhibited groups, being young children and the elderly (typically within 5 minutes walking distance of housing in new estates).

While the sporting and recreation choices of future generations cannot be known, the provision of a diverse number of quality open spaces in accessible locations, will allow flexibility for changing needs.

### 3.13.2.3 Active recreation areas

The Draft Interim Strategic Plan identifies the need for the neighbourhood sporting field and park, identified at the centre of Area E (TSC, 1995, p. 57). Figure 9 - Conceptual Structure Plan Terranora of the Draft Interim Strategic Plan identifies the location of the sporting field to the north-west of the Lindisfarne School (opportunities for joint/ shared maintenance) and to the immediate south of the Naponyah Road extension/ linkage to Fraser Drive.

The Interim Strategic Plan identifies that a neighbourhood level sporting field and park is to allow for local fixtures and practice sessions. This may include areas around the oval for a local clubhouse building and parking (TSC, 1995, p. 55).

It is recognised from the study that various environmental constraints exist with this conceptual location (eg proximity to wetlands and palm forests), which potentially create problems with respect to stormwater runoff and associated contamination.

Given the above, a suitable location will be identified within Area E for a neighbourhood sporting field and park that could potentially cater for the existing and proposed schools and the greater community. The associated environmental constraints with regard to the location of this sporting field will also be investigated and considered. Large low lying areas within Area E represent excellent opportunities for the location of large open space areas.

### 3.13.2.4 Foreshore access

The Terranora Lake Management Plan identified potential opportunities for access and boardwalks along the foreshore of Trutes Bay. Access to foreshore areas and their use for boardwalk recreation will be considered as part of the study. However, as there is no boardwalk developed on properties adjoining Area E, there would be no interconnection afforded to an Area E boardwalk.

Further, there may be potential conflicts between the use of Terranora foreshore and wetland areas, zoned as 7(a) Environmental Protection, and protected under SEPP14, for recreational purposes. Any such development in these areas would have to be treated sensitively, to avoid the degradation of the environmental asset sought to be accessed and enjoyed. In summary, the wetlands must be protected to the degree necessary to ensure their conservation and habitat function.

## 3.13.3 Summary and conclusion

The significant recreation and open space concerns are outlined below:

- No open space designations currently exist with Area E.
- Investigations regarding surrounding open space areas confirmed that creek buffers and neighbourhood parks exist within the region.
- Large low-lying areas of the site provide an opportunity to locate sizable open space areas for use by pedestrians, cyclists and vehicle connections.
- The development of a boardwalk for Area E would not provide a significant opportunity as no boardwalks currently exist on adjoining land. Furthermore, conflicts may arise from the recreational use of the Terranora foreshore and wetland areas. Any development in these sensitive areas must be treated appropriately.

### **3.13.4 Recommendations**

There are opportunities within Area E to include a diverse number of passive and active recreational open space areas with accessible locations and flexibility for the changing needs of the population. The proximity of the Market Parade and Glen Ayr Drive open spaces presents the opportunity to form an open space linkage.

Although the lot yield and population for Area E has not been established, open space will be provided at approximately 4ha of open space per 1,000 head of population.

## **3.14 Services**

### **3.14.1 Water supply**

#### **3.14.1.1 Bulk water Supply**

Tweed Shire Council has a strategy for providing bulk water supply for up to 160,000 population in the Shire, with connections currently provided to approximately 65,000 population. Council's strategy includes options for raising Clarrie Hall Dam to increase storage capacity and the construction of an additional dam at Byrrell Creek where Council has already purchased approximately 80% of the land required.

With recent legislative changes and drought events in the Shire, Tweed Shire Council is re-examining options for providing bulk water supply. A critical aim of this review is to ensure that bulk water supply for future population will be sustainable. Council has currently commissioned a study to prepare and integrated water cycle plan and it is likely that as a result of this study that estimates for population able to be supplied with bulk water will be revised down. This study will examine Council's current strategy for bulk water supply and investigate the impacts of introducing new measures for water conservation and control (D Oxenham, pers. comm., 2004).

This should not effect development with a short time horizon such as Area E but may have impacts on development in the Shire with a longer time horizon.

#### **3.14.1.2 Supply to Area E**

The water supplied in the vicinity of Area E comes from Clarrie Hall Dam via the Bray Park filtration plant through to the North Tumbulgum reservoir (Martin Findlater & Associates Pty Ltd, 1995).

A water conveyancing master plan prepared by GHD in 1999 based on developments scheduled to have taken place by 2011, which are in addition to the general increase in population, included a 4,000 EP development on Area E. This study indicated a number of capital works in the water supply system required to service the 2011 population but none specifically for Area E.

GHD's conveyancing study was conducted based on a peak day demand of 850L/person/day and an average day demand of 450L/person/day (GHD 1999).

The Duroby main is a 600 mm water main that traverses the northern boundary of Area E and is supplied from the North Tumbulgum reservoir (Alex Abedrabbo, pers. comm., 2003). In addition to the Duroby main there is a second 150mm (pers comm. Alex Abedrabbo, 26th June 2003) water main that runs along the southern boundary of Area E along Terranora Road, with two reservoirs at Rayles Lane (GHD 1999). The GHD analysis was undertaken assuming that the Duroby main would supply 3,000 EP while the Terranora Road main would supply 1,000 EP (GHD 1999).

The GHD report was based on trunk mains and although it shows that there is generally sufficient pressure to supply the future water demands in the distribution system after required capital works, it did not extend to the minor reticulation system. Hence, it did not identify areas of low or high pressure within Area E. There is no requirement for a reservoir on Area E identified in the GHD report (GHD 1999), however the Draft Interim Strategic Plan - Cobaki/Bilambil Heights/Terranora (TSC, 1995) stated that a site of sufficient size for a 5ML reservoir was required on site to service the area (TSC, 1995). The requirement for a reservoir has been confirmed by Council staff however it has been advised that only a 3 ML reservoir will be required within the site (Alexandra Abedrabbo, pers comm., June 2003).

Discussions with TSC have identified that the 600 mm Duroby main is the preferred water supply for Area E and a pipeline connecting the proposed 3ML reservoir with the 600mm Duroby main will be required (Alexandra Abedrabbo pers comm. June 2003). There is sufficient capacity from the North Tumbulgum reservoir to service Area E, provided a reservoir is constructed on site (Alex Abedrabbo pers comm. June 2003).

The North Tumbulgum reservoir is at approximately 115 m AHD. The recommended elevation within Area E for a reservoir is 130 m AHD. While the majority of the site is lower than the North Tumbulgum reservoir, a booster pump from the 600mm Duroby main to the reservoir may be required. A network analysis including main and booster pump (if required) sizing will therefore be necessary.

The footprint required for a 3 ML reservoir, which is approximately 30 m in diameter involve 1000m<sup>2</sup>. The land required for the 3 ML reservoir must be provided by the proponents for rezoning of the land at no cost to the community (TSC, 1995).

The footprint for the reservoir including some allowance for construction on slope and access requirements is 0.25 ha. The preferred location for this reservoir is in the vicinity of the intersection of Terranora Road and Mahers Lane .The approximate cost for a 3 ML reservoir is \$665,000 (Land & Water Conservation, 1999). This cost does not include land acquisition and power supply. Costs for the provision of the reservoir, pipeline and booster pumps will be required to be met by developers within Area E. Internal reticulation of water will also be required to be constructed by developers.

Developers will also be required to pay Tweed Shire Council's 2003/2004 developer charges for water of \$4110.00 per single equivalent tenement (TSC, 2003).

Figure 3.40 identifies water supply infrastructure.

### **3.14.2 Sewerage**

The Banora Point Sewage Treatment Plant (STP) has an existing capacity to treat 62,500 equivalent persons (EP) with a license to discharge 50,000 EP. The current load on the Banora Point STP is approximately 45,000 EP.

There is a planned upgrade to 75,000 EP for the Banora Point STP within the next 10 years, with an ultimate upgrade to 100,000 EP (Alexandra Abedrabbo, pers comm. 4th June 2003). Therefore there is sufficient planned capacity upgrades for the Banora Point STP to treat the sewage from the Site. Tweed Shire Council is currently conducting consultation on effluent management from the Banora STP. The ultimate disposal will be 110,000 EP with a 75,000 EP disposal licence expected by 2007 (Andrew Grant, pers comm. June 2003). The Draft Interim Strategic Plan - Cobaki/Bilambil Heights/Terranora states that consideration of rezoning Area E should be held over until Council has approval to increase the Banora STP discharge licence above 50,000 EP (TSC, 1995).

There is an existing 250 mm sewer rising main that runs through the Northern boundary of the Site and follows a section of Naponyah Road to service Terranora Village. This sewer is at capacity and will not be able to service the Site. The sewer has its own easement even though it approximates the route taken by the Duroby 600mm water main (Alex Abedrabbo, pers comm. June 2003). There is a 150 mm sewer rising main to the east of the Site, which has the capacity to cater for sewage from up to approximately 1280 EP from the proposed development (Alexandra Abedrabbo, pers comm. June 2003). This sewer may be able to be used as an interim measure for early stages of development.

For full development of the site a new regional pump station and rising main will be required with a preferred location in the lower parts of the site adjacent to the wetlands area.

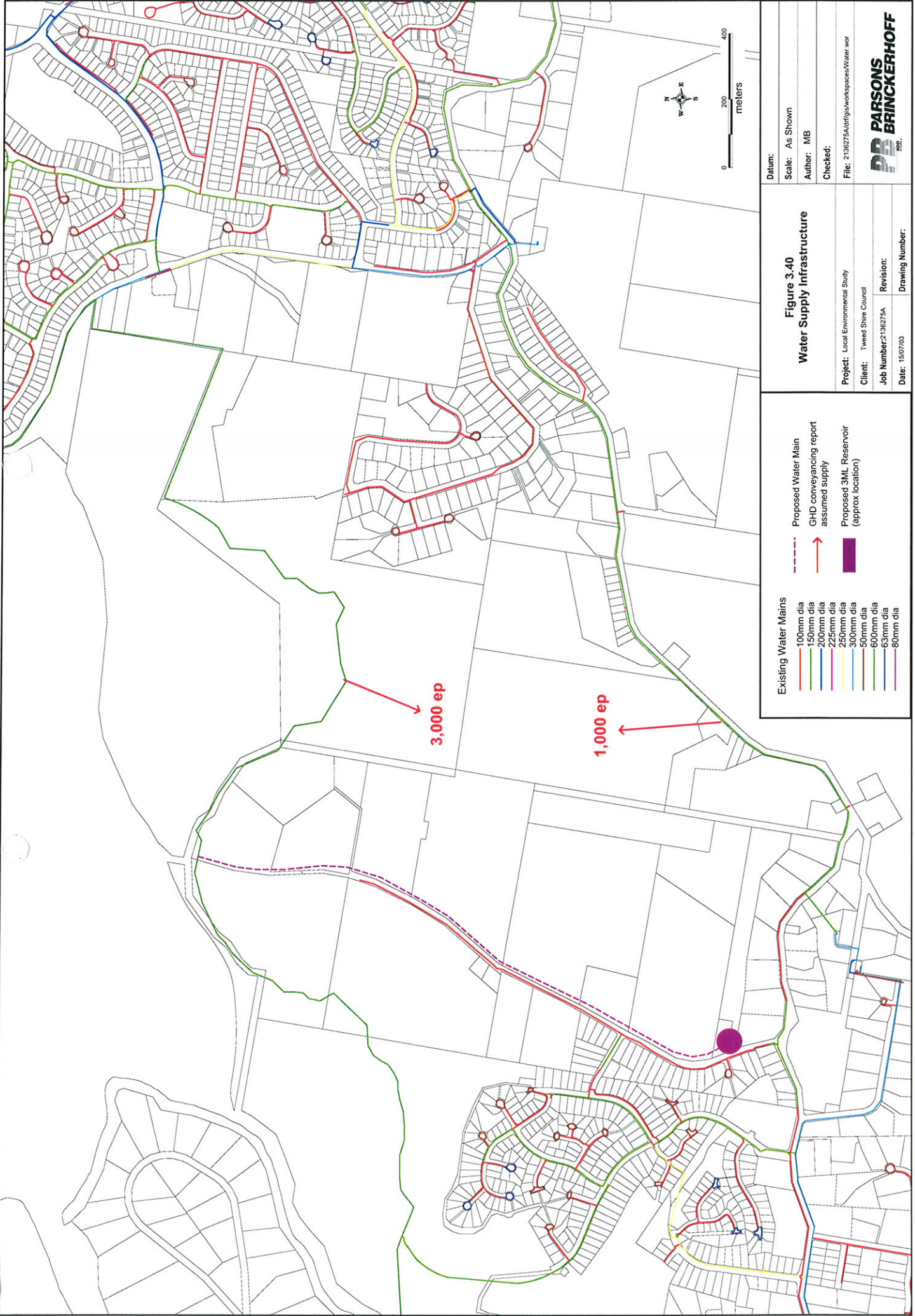
The Parkes Lane area, which is west of Fraser Drive and surrounded on three sides by Area E is not sewered and is zoned Rural Living. There is potential for Parkes Lane to be sewered in conjunction with the new Area E pump station and rising main to Banora Point STP. It should be noted that the Parkes Lane area has large lots that may be subdivided as a result of sewerage and the potential loadings of any subdivision should be included in capacity calculations. Costs of sewerage of Parkes Lane would be likely to be met initially by Tweed Shire Council with the costs to be passed on to Parkes Lane landowners

Developers will also be required to pay Tweed Shire Council's 2003/2004 developer charges for sewerage of \$3,290.00 per single equivalent tenement (TSC, 2003).

The estimated cost of the Terranora regional pump station for the early stages of development including pumps and interim rising main to connect to the existing 150mm rising main in Fraser Drive is \$300,000, with \$200,000 to be met by the developer (Engineering Services Planning and Design Unit of Tweed Shire Council, 1999). The Terranora regional rising main at its ultimate size of (375/450) to Banora Point STP is estimated at a cost of \$950,000, with the developer contribution being \$475,000 (Engineering Services Planning and Design Unit of Tweed Shire Council, 1999).

Internal reticulation would be provided by developers. Figure 3.41 identifies existing and potential future sewer infrastructure.

Tweed Shire Council has recently investigated options for effluent reuse from the Banora Point STP however there are limited opportunities and Council's preferred option for disposal of effluent still remains outfall to the Tweed River.



- Existing Water Mains**
- 100mm dia
  - 150mm dia
  - 200mm dia
  - 225mm dia
  - 250mm dia
  - 300mm dia
  - 500mm dia
  - 600mm dia
  - 630mm dia
  - 800mm dia

- Proposed Water Main
- GHD conveyancing report assumed supply
- Proposed 3ML Reservoir (approx location)

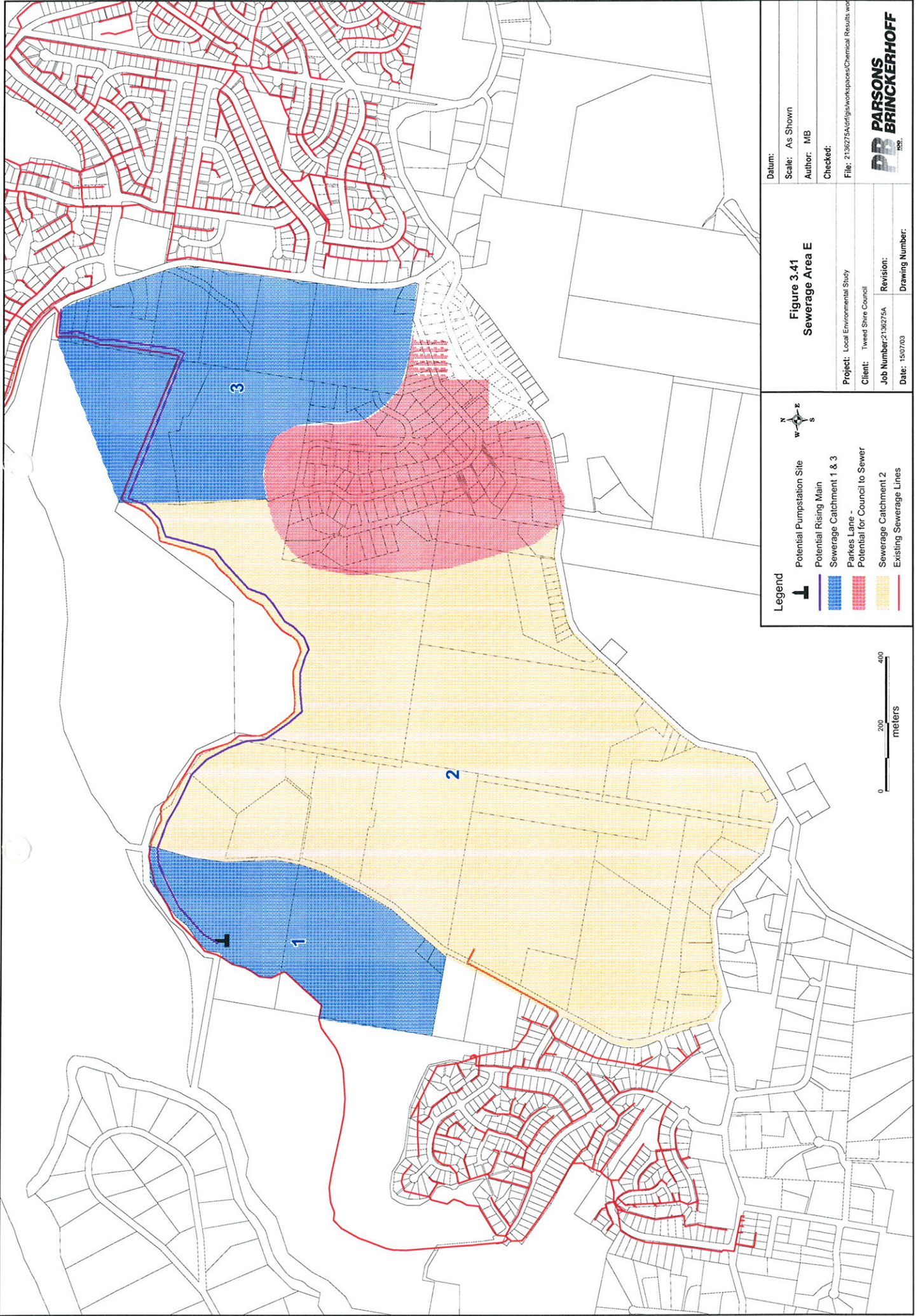
**Figure 3.40**  
**Water Supply Infrastructure**

Datum: Scale: As Shown  
 Author: MB  
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 File: 218275A\dr\figs\worksheets\Water.wor

Project: Local Environmental Study  
 Client: Tweed Shire Council  
 Job Number: 218275A  
 Date: 15/07/03

Revision:  
 Drawing Number:







### 3.14.3 Electricity

The Tweed LEP 2000 zoning maps indicate provision for a potential electricity transmission line corridor, for the local electricity supplier, Country Energy. As per Council correspondence dated 13 March 2002 (refer to Appendix G), this corridor "does not represent a formal 'power easement'. Such an easement has not been created and does not exist".

However, in correspondence dated 16 June 2003, Country Energy indicated that they still 'have a requirement for an electricity transmission corridor through the Area E site. An easement has been registered for this corridor. The transmission line will operate at a nominal voltage of 66,000 volts'.

The registered easement for electricity provision differs in location from that depicted in the Tweed LEP 2000 zoning maps. In discussions with Country Energy, it is noted that the registered easement is the preferred route for electricity provision through the site.

Development within the transmission line corridor, as shown on the Tweed LEP 2000 zoning maps, is subject to 'Clause 37 Electricity Transmission Line Corridor' of the LEP, which impacts on the approval process for subsequent development within the transmission line corridor. However, the draft LEP will also recognise the registered easement, thereby ensuring that development within/adjacent to the transmission line corridor, would occur in accordance with minimum recommended operational clearances for overhead electricity lines.

#### 3.14.3.1 Electromagnetic Radiation from Powerlines

Up to the mid 1990s it was reasonable to suspect that there could be an association between power line magnetic fields and health hazards. Some studies, particularly the Swedish study, did appear to point to power line magnetic fields causing an increased risk of leukaemia in children. Against this, other studies failed to confirm this result. The subject was (and still is) a highly controversial one. In the Gibbs Report (1990), the "prudent avoidance" approach was recommended, meaning that one should position power lines as far as possible from houses, within reasonable cost constraints.

While it is difficult to identify an exact buffer distance to powerlines, Powerlink Queensland (2001) has developed a set of model provisions that Queensland local government authorities are encouraged to include in their planning schemes. These guidelines are aimed at the "prudent avoidance approach". For rural areas these provisions suggest that habitable buildings and child activity areas, maintain a 20 metre separation distance from the most proximate boundary of an Electricity Transmission Line Easement for transmission lines up to 132 kV.

A child activity area is defined as land or buildings associated with the care or use by children for more than 5 hours per day at least 3 days per week including child care facilities providing day care, occasional care, kindergarten and creche services, educational establishments providing for preschool and primary school students and before/after school care and vacation care for children less than 13 years of age.

For urban areas the provisions suggest a Child activity areas maintain a 20 metre separation distance from the most proximate boundary of an Electricity Transmission Line Easement for transmission lines up to 132 kV but do not include the same requirements for habitable dwellings as for rural areas.

In the absence of further more detailed advice regarding the NSW situation it is prudent to adopt commonly accepted standards such as those put forward by Powerlink in their policy guidelines. Given that Area E is a green field site the adoption of a 20 metre separation distance from the most proximate boundary of an electricity transmission line easement is considered appropriate. The proposed line has a nominal voltage of 66,000 volts.

The transmission line corridors proposed by Country Energy should therefore be indicated by the proposed easements and an additional buffer of 20 metres.

Clause 37 of the Tweed Local environmental Plan 2000 provides appropriate measures to ensure the protection of electricity transmission line corridors.

### **3.14.4 Telecommunications**

Master Planning Services previously sought comment from the then Telecom, as part of the Application to Tweed Council for Approval to Rezone 16 Farm Properties in Mahers Lane/ Parkes Lane, Terranora (1995), to determine whether telecommunications services could be provided to the development.

Telecom's response dated 1 November 1994 indicated that 'they will be able to provide telephone services to the land under investigation' (Area E) subject to meeting certain requirements.

For the purposes of this LES, confirmation of the above advice was sought from Telstra on 2 June 2003. Reference is made to a telephone conversation between Parsons Brinckerhoff and Pauline Stanley, Telstra Section Coordinator for New Estate Subdivision Connections, on the above date. In this conversation Telstra indicated that 'provision for services to the subject subdivision (Area E) would be budgeted for in forecast planning for financial years 2003-2004'.

The above thereby tacitly suggests that telecommunications services can be provided to Area E. It is anticipated that as further information is known about the planning outcomes for Area E, such as residential lot yield, that Telstra will be contacted to allow for their informed planning of these telecommunications services to Area E.

With respect to the provision of mobile phone communications for the area the need for additional facilities to cater for anticipated growth is unknown. This is because there are a number of suppliers of this service (Telstra, Vodaphone and Optus being amongst the major suppliers). As these and other suppliers already have infrastructure servicing the general area which could be upgraded to meet demand it is not known if additional infrastructure will be needed within Area E. This is however unlikely as mobile phone communications can be supplied by transmitters within "line of sight" and Tweed Area has "line of site to numerous suitable areas.

In the unlikely event that additional mobile phone infrastructure was required in Area E concerns may be raised regarding electromagnetic radiation issues. These issues would be required to be addressed in accordance with Federal, State and local requirements which require this issue to be addressed.

### 3.14.5 Summary and conclusions

#### Water Supply

The water supply for the region currently serviced from the Clarrie Hall Dam via the Bray Park filtration plant through to the North Tumbulgum reservoir;

The study undertaken by GHD outlined the need for upgrading the current water infrastructure to adequately service the anticipated population in 2011 does not specifically identify Area E.

The GHD report outlines that no reservoir is required for Area E. Alternatively, the Draft Interim Strategic Plan - Cobaki/Bilambil Heights/Terranora delineated the need for an on-site 5ML reservoir to service the area. Consultation with Council staff has confirmed that a 3ML reservoir will be required in Area E.

Pursuant with the Tweed Shire Council's 2003/2004 developer charges for water, developers will be required to pay \$4110.00 per single equivalent tenement.

#### Sewerage

The sewerage infrastructure to the site is currently at working capacity. The Draft Interim Strategic Plan for the Cobaki/Bilambil Heights/Terranora areas outlines that the rezoning of Area E should be postponed until the approval to increase the Banora Point STP discharge licence above 50,000 EP occurs. There are limited opportunities for effluent reuse options for the Banora Point STP.

Developers will also be required to pay Tweed Shire Council's 2003/2004 developer charges for sewerage of \$3,290.00 per single equivalent tenement (TSC, 2003).

#### Electricity

The registered easement for electricity provision differs in location from that depicted in the Tweed LEP 2000 zoning maps. In discussions with Country Energy, it is noted that the registered easement is the preferred route for electricity provision through the site. Both easements are to be shown as corridors incorporating 20m buffers on either side of the easement for the purpose of clause 37 of the TLEP 2000.

#### Telecommunications

On the 2 June 2003, Telstra confirmed with Parsons Brinkerhoff that the 'provision for services to the subject subdivision (Area E) would be budgeted for in forecast planning for financial years 2003-2004'.

### 3.14.6 Recommendations

#### Water Supply

The preferred water supply infrastructure for Area E has been identified as the 600mm Duroby main. A pipeline connecting the proposed 3ML reservoir with the 600mm Duroby main will be required. If the proposed reservoir is constructed on site, there will be sufficient capacity for the servicing of Area E. Given the low lying land within Area E, a booster pump from the Duroby main to the reservoir is recommended.

The location of the proposed reservoir is in proximity of the Terranora Road and Mahers Lane intersection. The reservoir will require a development footprint of approximately 0.25ha. The land involved in the rezoning for the reservoir must be provided with no associated community costs. The estimated cost for the reservoir is \$665,000, excluding land acquisition and power supply. The provision of water supply infrastructure, including the reservoir, pipeline and booster pumps, will be met by developers within Area E. Internal reticulation of water and Council's development charges for water will also be required to be constructed by developers.

### **Sewage**

The full development of the site will entail the implementation of a new regional pump station and rising main which should be located in the lower parts of Area E, adjacent the wetlands area. The approximate cost associated with the development of the Terranora regional pump station during the early development stages is \$300,000, with \$200,000 to be provided by developers, while the maximum size of the Terranora regional rising main to Banora Point STP is estimated to be \$950,000, with \$475,000 being contributed by developers. Internal reticulation would be provided by developers.

### **Electricity**

Council states that the development of Area E will require the construction of a 66,000 volt electricity transmission corridor. This electrical easement is registered, although it differs from that outlined within the Tweed LEP 2000 zoning maps. The registered easement is the preferred route for electricity provision through Area E.

The approval process for any development within the transmission line corridor, outlined within Tweed LEP 2000 zoning maps, will be affected in terms of ensuring that development within or adjacent to the transmission line corridor will occur in accordance with minimum recommended operational clearances for overhead electricity lines. Both easements are to be shown as corridors incorporating 20m buffers on either side of the easement for the purpose of clause 37 of the TLEP 2000

### **Telecommunications**

Future telecommunication services will be provided to the Area E site. When the planning outcomes for the site are delineated, including residential lot yield, Telstra will be contacted to ensure they are able to install the necessary telecommunication services.

## **3.15 Social and Community Resources**

### **3.15.1 Existing Social and Community Resources**

The draft Interim Strategic Plan for Cobaki/ Bilambil Heights/ Terranora indicates that community services and facilities in the greater Cobaki/ Bilambil Heights/ Terranora are rudimentary, equivalent to the basic needs of a rural community (p. 58).

Area E currently has minimal population, generally restricted to rural and associated dwellings. As a consequence, the scope of social and community services located in Area E is limited to the Lindisfarne Anglican Secondary School at Mahers Lane. This school serves an educational catchment extending beyond Area E.

**Table 3-52: Shortlist Assessment of Demand for Community Services in Tweed'**

Service Type	Standards & Baseline Population thresholds	Assessment	Recommended Provision	Consultant Comments
Children's playground	Recommended provision: within 250 m straight line distance, or 400 m (5 minute) walking distance from homes. Catchment approximately 180-200 lots, based on 10 lots ha.	There is approximately 1 playground/1000 population, but recommended catchment is approximately 500 persons, requiring 140 playgrounds for 70,000 population.	Recommended provision, Draft OS Infrastructure Strategy: 4.0 Ha/1000 population (1.7 ha Structured, 2.3 ha Casual).	LES identifies need for passive and active open space in accordance with Standards and Baseline Population thresholds.
Long Day Care	1:10 children, 4-6 years 1:8 children, 2-3 years 1:5 children, 0-1 years (Regulations)	Places required: 800 Places provided: 767	Maintain increase in places in line with growth.	Day Care services provided by private enterprise based on commercial viability.
Aged Care	Consultant: none provided by Council.	Consultant: complex assessment of places provided. Actual service provided dependant on private providers though.	Current deficiency of 608.8 places, and further growth of 451 by 2016, requires:	Aged Care services provided by private enterprise based on commercial viability.
Education	1,500-2,000 new homes (DET 2000) 1 High School per 4,500-6,000 new homes.	Approximately 800 lots are subdivided annually, so that 1 primary school is required every 2 years.	Consultant: provision aligned with population rates at future year intervals.	Despite the column 'Recommended Provision', actual provision to be in accordance with DET and draft Interim Strategic Plan.
Recreation	Recommended standard 1.7 ha structured OS/1,000 people.	Consultant: No assessment appropriate to Area E provided.	Funding and Timing dependant on S94 contributions.	LES identifies need for passive and active open space in accordance with Standards and Baseline Population thresholds.
Playgroups/ Mothers Support Groups etc	1 neighbourhood baseline service for each new release area.	Consultant: general socio-demographic assessment provided only in Assessment.	Program Outcomes subject to annual assessment	New neighbourhood service at the discretion of Council, but could potentially be incorporated into an integrated community centre.
Youth Centre/ Annex	1:10,000 people	Consultant: No assessment appropriate to Area E provided; accessibility is a key tenet though.	More youth programs at facilities and halls in growing areas.	Youth Centre/ annex expected to be incorporated into Area E Community Centre.
Major Youth Centre	Currently no major Youth Centre in the Shire. 1:20,000 people.	A very under-resourced service in the Shire. The best option would appear to be a youth facility as part of a community centre.	2 major 4 youth centres located in developing urban areas by 2006. 2 further centres by 2011.	Major youth centre expected to be incorporated into Area E Community Centre.
Neighbourhood Centre	Base level of service:	Two centres required in release areas each 5 years to serve immigrant population.	By 2006: Banora Point and Bogangar. By 2011: Cobaki and Kings Beach. By 2016: Kings Forest (2).	Has been recommended by Council Strategic Planner, Robin Spragg, for provision in Area E.
Community Facilities	S94 Plan No 15: Shire Wide Community Facilities.	Draft Policy and Programme for Community Facilities, 2000-2011 proposes \$25 m expenditure on comprehensive local facilities over 10 years (incorporating existing S94 Plans), predicted on future S94 accumulation.	Consultant: none provided by Council.	For noting purposes only.
Postal Service	A neighbourhood baseline service.	1 post box per neighbourhood catchment.	Consultant: none provided by Council.	Expected provision as basic community infrastructure; location per Australia Post requirements.
Public Telephone	A neighbourhood baseline service	1 public telephone per neighbourhood catchment.	Consultant: none provided by Council.	Expected provision as basic community infrastructure; location per Telstra requirements.

Note: with the exception of the 'Consultant Comments' column, those cells identified with the word 'Consultant' indicate that the words following are the opinions of the consultant.

**Table 3-53: Summary of Section 94 Plans**

Section 94 Contribution Plan	Purpose and Applicability
Section 94 Contributions Plan No. 5 – Local Open Space	Requires contributions towards the provision of local open space across the shire. May not be appropriate in this case as a separate S94 Plan may be developed for Area E to provide for open space.
Section 94 Contribution Plan No. 6 - Street Tree Planting in Residential Areas	Requires contributions towards the provision of street trees in residential areas. Applicable to Area E as street tree plantings will act to minimise visual impacts and improve the amenity of the area.
Library Facilities Developer Contributions Plan No. 11.	Requires contributions towards the provision of library facilities in the shire. Applicable to Area E.
Section 94 Contributions Plan No. 12 - Bus Shelters	Requires contributions towards the provision of bus shelters in residential areas. Applicable to Area E as it will be serviced by buses.
Section 94 Plan No 13 – Eviron Cemetery	Requires contributions towards the provision of Eviron Cemetery. Applicable to Area E as population will generate demand for this facility
Section 94 Plan No 15 – Developer Contributions For Community Facilities	Requires contributions towards the provision of a range of community facilities such as community halls and activity centres, offices for community workers and community groups and specialist services - for children, youth and the ageing.  This S94 plan is applicable to Area E as population will generate demand for these types of facilities. A separate S94 Plan dealing with this issues may be developed for Area E.
Section 94 Plan No 16 – Emergency Facilities (Surf Lifesaving)	Requires contributions towards the provision of surf life saving facilities. Applicable to Area E as population will generate demand for these facility
Section 94 Contributions Plan - Council Administration Offices and Technical support	Requires contributions towards the provision of Council Administration Offices and Technical support. Applicable to Area E as population will generate demand for this facility
Section 94 Contribution Plan No 22 - Cycleways	Requires contributions towards the provision of cycleways. Applicable to Area E as population will generate demand for this facility
Section 94 Contributions Plan No. 26 – Shirewide/ Regional Open Space	Requires contributions towards the provision of regional open space. Applicable to Area E as population will generate demand for this facility

### 3.15.3 Summary and conclusion

The Interim Strategic Plan and the Assessment has outlined several social and community infrastructures and resources that are not present in Area E and may be required for the future development of the site. The existing infrastructure and resources for the site will be required to be augmented to adequately service the anticipated population growth for Area E.

The Interim Strategic Plan contains a number of projected facility requirements for meeting the needs of the short and long term growth population scenarios. Similarly, the 'Assessment of Demand for Community Services in Tweed' ('Assessment') identifies baseline and threshold populations together with an assessment of required facilities.

Section 94 Plans currently applicable across the Shire relation to the provision of community facilities should be applied to Area E to ensure that appropriate community facilities are provided to residents.

### 3.15.4 Recommendations

As a result of the limited facilities that are provided in Area E and the surrounding region at present the following recommendations are outlined:

- the infrastructure and resource considerations for Area E, with regard to the Interim Strategic Plan and the Assessment, should be included in the development of the site;

- Section 94 Plans currently applicable across the Shire relation to the provision of community facilities should be applied to Area E to ensure that appropriate community facilities are provided to residents; and
- the following community facilities are outlined as key necessities for the development of the site:
  - the development of a community centre;
  - Department of Community Services delineated the need to provide Terranora residents with reliable transport options so as to afford access to existing shopping and education facilities;
  - Department of Education and Training outlined the need for a primary school, aligned with the development of Area E; and
  - Department of Education and Training indicated that future residential development within Area E would require additional government school provision, potentially including a new primary school in Terranora.

### **3.16 Impacts on Surrounding Land Use**

#### **3.16.1 Surrounding land Use**

The northern perimeter of Area E is bounded by a tract of wetland vegetation fringing Terranora Broadwater. The Broadwater is a significant aquatic habitat and is currently used for oyster farming. Trutes Bay separates Area E from the residential development of Flame Tree Park, on its general northern and eastern banks.

To the east and in the vicinity of Fraser Drive, Area E is bordered by the low-density residential development of Banora Point. This development typically ceases at the Terranora Road ridgeline

Mahers Lane is located on a north-south oriented ridgeline, in the general vicinity of the western periphery of Area E. West and south west of Mahers Lane is the greater residential development of Terranora, in the form of sewerred low-density residential allotments (Terranora Village) and unsewerred rural residential allotments. Infrastructure in the vicinity of this residential area includes the Terranora Primary School (opposite northern termination of Shamara Road) and Terranora Substation (opposite southern termination of Mahers Lane).

To the south and southeast, Area E rises to the Terranora Road ridgeline, which is characterised by a mosaic of unimproved land and minor agricultural/grazing uses. These uses of are low impact and as such no physical buffering to Area E is required. The adjoining escarpment forms an important scenic context when viewed from the Pacific Highway to the south. Chambers Lookout is also situated opposite the intersection of Fraser Drive and Terranora Road.

#### **3.16.2 Potential Impacts**

##### **3.16.2.1 Landscape impacts**

The most immediate impacts of the potential development of Area E will be the impact on loss of landscape/amenity values for properties which abut Area E and have views across the site. This will impact on properties directly abutting the eastern side of Fraser Drive,

properties in Parkes Land and properties along the northern side of Terranora Road, all of which have views across Area E. These landscape impacts are discussed in previous sections of this report.

### **3.16.2.2 Limiting Agricultural Conflicts**

One of the significant issues which has led to the limitation of agricultural practices on many of the sites within Area E has been conflict between agricultural uses and encroaching residential development. Due to these conflicts farming practices have been modified over time to restrict practices such that impacts on surrounding uses are minimised. The development of Area E for urban purposes will effectively result in the complete cessation of agricultural activities in the area and conflicts with surrounding and internal land uses (particularly Lindisfarne Anglican College) will be eliminated.

Rural activities adjacent to Area E are limited to low impact grazing and other pastoral activities. Most of the operations carried out on these sites are of a low key nature and do not create significant impacts which may generate from potential residents within Area E. Consequently it is not likely that the development of Area E would restrict or curtail rural activities being carried out in the surrounding Area.

Uses located to the west of Area E will benefit from the construction of the proposed Mahers Lane/Fraser Drive road corridor as it will provide them with more direct access to the Pacific Highway and services provided in the general area.

### **3.16.2.3 Traffic impacts**

Potentially the most significant impact of the potential development of Area E on surrounding land use will be the impacts of additional traffic generated by development. The traffic section of this report has indicated that estimates for the area are that up to 9600 additional traffic movements could be generated each day. The majority of this traffic will flow towards the Pacific Highway using routes along Terranora Road, Fraser Drive, Leisure Drive and Dry Dock Road. The primary concern with this additional traffic will be the potential impacts on safety and amenity in surrounding areas. Traffic studies carried out by Council have identified that road upgrades will be required in the area to cope with additional traffic generated by Area E.

Council currently has plans to upgrade Leisure Drive to a two lane road which will carry significant traffic from Area E. The additional traffic likely to be experienced on this route will have both safety and amenity impacts which can in part be dealt with through design. Council is also currently upgrading Fraser Drive to cope with increased traffic.

Terranora Road (between Area E and Banora Point) will also be subject to increased traffic which will also have amenity and safety impacts. This can be partially addressed by improving conditions along Terranora Road.

Additional traffic using Parkes Lane is considered to be unlikely as the development of Area E will provide quicker more useable traffic routes to Fraser Drive, however Parkes Lane residents are likely to benefit by a second access into the estate.

Additional traffic travelling west along Terranora Road past Mahers Lane is likely to be minimal and few amenity impacts in this area are envisaged.

Appropriate traffic treatments will be required to ensure that through traffic does not use local streets in an attempt to shorten trips. The traffic section of this report includes recommendations to deal with this issue.



### 3.16.2.4 Further Urban Expansion

Another potential impact on surrounding land use will be pressure to allow further urban development along Terranora Road. This is partly dealt with by the fact that Area E is logical urban development area being an infill area surrounded by urban development on both its eastern and western boundaries. Parkes land and ribbon residential development along Terranora Road have also resulted in urban intrusion along much of the southern boundary of Area E.

As a consequence rather than promoting further urban expansion along Terranora Road it is considered that potential development of Area E will have positive consolidation affects on urban development in the Area.

Parkes Lane and associated Rural Living zoned Land in this vicinity is currently developed for rural residential development on lots of approximately 2000 to 4000m<sup>2</sup>. A logical benefit from the sewerage of Area E will be the extension of reticulated sewerage to service existing lots in this area. This would have beneficial impacts on water quality as it is generally accepted that septic systems commonly used throughout the shire have limited efficiency which deteriorates over time.

While the majority of houses in this estate are large and have generally not be located on site with the possibility of further subdivision in mind it is possible that land owners in this area may consider further subdivision of their lots. There are currently approximately 100 lots within this area. While no analysis has been carried out to determine the potential for further subdivision, this possibility has the potential to impact on amenity within this area and the creation of additional traffic.

On the southern side of Terranora Road the majority of lots have either been developed for rural residential development or is earmarked for this style of development. Given the size, configuration and the type of housing constructed on rural residential lots the opportunity for further high density residential development is limited to a small number of properties.

### 3.16.2.5 Impacts on Terranora Broadwater

Terranora Broadwater and Trutes bay are identified as having significant ecological values and fragile water quality. The Broadwater also includes important oyster growing grounds and fisheries. The cessation of agricultural activities will limit erosion and sedimentation as well as eutrophication caused by these activities. Residential development within Area E does however have the potential to create water quality deterioration in the broadwater unless development is appropriately controlled. Previous sections of this report have addressed the issue of stormwater management both during and post construction to ensure that water quality values for Terranora broadwater are protected and potentially improved.

### 3.16.2.6 Recommendations

The potential development of Area E will affect surrounding land use in a number of ways, in particular:

- landscape; and
- traffic impacts on surrounding areas.

Proposed road works and controls on development will limit these impacts and must be addressed in any future applications for development of the area.

Traffic and amenity impacts on land use located west of Area E are likely to be minimal.

The cessation of agriculture within Area E will have a number of positive effects ending long standing agricultural/residential land use conflict in the area.

## 4. Statutory and Policy Considerations

### 4.1 Tweed Residential Development Strategy 1991

The Tweed Residential Development Strategy 1991 is Council's adopted Strategy for urban growth. It facilitates the 'process of ensuring that suitable land is available for urban growth, when needed, in the right locations' (p.1). To achieve this, the basis of the Strategy is that a population level is projected, land identified to accommodate the expected population and appropriate strategies developed to ensure services can be provided to cater for the expected population.

The Strategy indicates that 'it is generally desirable to have urban areas that can grow to at least a minimum population of 5,000 to 7,000. Such areas can provide a wide range of community and commercial services to its residents without requiring unnecessary long travelling distances. These criteria are met where new release areas are part of an area that can grow to the abovementioned size, or where additions are made to existing large areas' (p.2).

The ability of Area E ability to achieve these criteria is clearly evident, as a result of its inclusion in the Strategy, viz:

*'Banora Point – Tweed Heads West Sewage Treatment Works Catchment...*

*Area E is located between Terranora Village and Fraser Drive, this area... is potentially the most logical extension of urban development within Part A of the Shire... The majority of the site is zoned Agricultural Protection 1(b1) and consequently the approval of the Department of Agriculture (former) would be required if this land were to be considered for urban development. As investigations are currently being undertaken with regard to the sizing and location of sewerage infrastructure for Terranora Village, it is imperative that a determination be reached regarding the area's future urban potential so that provision can be made for increased sewer capacity.*

*This area could easily accommodate an additional 8,000 persons' (p.31).*

The need for NSW Agriculture to be consulted regarding releasing lands zoned Agricultural Protection 1(b1) for urban development, is noted. Section 3.9 of this report discusses issues associated with the agricultural land values of the site.

The capacity of the Banora Point Sewerage Treatment Plant to service the proposed urban development in Area E has been previously discussed in Section 3.13 of this report.

In addition to the above Strategy extracts, page 43 of the Strategy, identifies the need for 'close consultation with the Department of Agriculture and Fisheries' for Area E.

In summary, it can be seen that the Tweed Residential Development Strategy 1991 recognises Area E as an area of urban land release with potential to accommodate a significant residential population. This is subject to addressing key environmental and infrastructure issues affecting the development of the Area.

Note, the findings and contents of the Strategy are taken in good faith. A critical analysis of the accuracy of the demographic data, Figures and key assumptions underpinning the Strategy is beyond the scope of this study.