

Overstrand to Walcott

Economic Valuations

Part II: Technical Support Information

**Report EX 4692
January 2004**

Overstrand to Walcott Strategy Study

Economic Valuations

Part II: Technical Support Information

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Summary

Overstrand to Walcott

Economic Valuations

Interim Report

January 2004

The study area consists of soft cliffs, primarily composed of sand and gravel; and land use is predominately agricultural and recreational in nature, with a number of discrete coastal settlements located on the cliff top. Immediately fronting the towns, coastal defence is provided by seawalls, revetments, and groynes in varying states of repair. For the Management Units along this frontage, coastal erosion is an issue of primary importance, and the erosion rate is highly dependent upon management options adopted for adjacent Units.

This report discusses the methodology used to value assets within the study area. These valuations later used to calculate potential economic loss and attribute that potential loss to given management scenarios. As coastal flooding is a principal issue in Walcott the approach to valuing potential flood damages adopted is also discussed herein. In addition, the report outlines the assumptions made regarding asset valuation, the likely impact of these assumptions, and the data sources that support these assumptions.

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1. INTRODUCTION

1.1 Background

The study area consists of soft cliffs, primarily composed of sand and gravel; and land use is predominately agricultural and recreational in nature, with a number of discrete coastal settlements located on the clifftop. Immediately fronting the towns, coastal defence is provided by seawalls, revetments, and groynes in varying states of repair. For the Management Units along this frontage, coastal erosion is an issue of primary importance, and the erosion rate is highly dependent upon management options adopted for adjacent Units.

The methodology and calculations presented in this report are based on the DEFRA guidance published in 'FCDPAG3 – Flood and Coastal Defence Project Appraisal Guidance – Economic Appraisal' (MAFF 1999).

1.2 Outline of report

This report is structured in the following three sections:

- **Section 2** outlines the assumptions made regarding asset valuation, the likely impact of these assumptions, and the data sources that support these assumptions.
- **Section 3** presents the methodology adopted to assess potential losses arising from different management scenarios due to flooding and erosion.
- **Section 4** - References

2. SOURCES OF ECONOMIC DATA AND ASSUMPTIONS

Assumptions and asset types within the study area fall into nine main categories:

- Selected base date;
- Appraisal period;
- Discount rate;
- Residential property;
- Transportation;
- Agricultural land and production;
- Commercial activities;
- Recreation; and
- Environmental interests.

The valuation of these assets is discussed below together with the underpinning assumptions.

2.1 Selected Base date

All costs and benefits have been converted to a Present Value (PV) assuming a base date of March 2003.

2.2 Appraisal period

An appraisal period of 100 years has been assumed in accordance with UK Treasury guidance (HM Treasury 2003).

2.3 Discount rate

The varying test discount rates given in Table 2.1 have been assumed in accordance with UK Treasury guidance (HM Treasury 2003). These rates imply that £1 in year 30 is worth 36p today, while £1 in year 100 is worth 5.1p today.

Table 2.1 Declining long-term discount rate (HM Treasury 2003)

Period of years	0-30	31-75	76-100
Discount rate	3.5%	3.0%	2.5%

2.4 Residential properties

With over 650 residential properties sited within 100 m of the cliff top, the potential damage to property from coastal erosion and cliff slides is vast. The evaluation of these losses has been based on the following data:

- **Number of properties at risk** – Across the study area the number and location of properties has been obtained from digital OS Maps (1:1000 and 1:2500 scale).
- **Property values – Write-off values** – The maximum value of any property or asset that can be included within the assessment of erosion / flood losses over the appraisal period has been capped at the present day risk free market value. This approach is in accordance with the Yellow Manual (Middlesex 1992). Therefore, to ascertain the value of each property near the cliff top in the principal coastal settlements has been obtained through property valuations conducted by Keys Auctioneers and Estate Agents (2002). The results of this assessment are provided in Appendix 1. These values relate to the individual survey dates for the towns under consideration.

- **Property damage – Recurrent losses** – Properties near Walcott are potentially exposed to flooding. The value of any recurrent damages has been calculated using the latest information from Middlesex University published within the Multi-Coloured-Manual (Middlesex, 1990). Within the MCM flood damage is related to the depth and duration of flooding, together with consideration of the flood waters source (e.g. saline or fresh). For this study, it has been assumed that, if flooded, inundation is by salt water for a period of less than 12 hours. This is a reasonable assumption reflecting the source of flood waters and the limited potential for breach.
- **Property threshold levels** – Threshold levels have been assumed to be 200mm above the surrounding ground level.
- **Future development** – Given the intensive tourism and recreational uses of the coastline there will inevitably be development pressures in various locations along the frontage. Although it is impossible to consider future developments that may or may not happen, the economic valuation should be updated in future to reflect any changes, and the options proposed should be sufficiently flexible to accommodate such change.

2.5 Amenity properties

The study area has many hotels, restaurants, and tourist attractions. The valuation of these assets has been conducted in the same manner as for the residential properties, i.e. through property valuations conducted by Keys Auctioneers and Estate Agents (2002).

2.6 Transportation – Roads

2.6.1 Temporary diversions for flooding at Walcott

The discrete coastal towns are linked by a single main coastal road the B1159. Norfolk County Council (NCC), the local highway authority, does not have detailed analysis of traffic flows on the B1159 east of Cromer. However, following the advise of NCC, annual traffic count figures for the A149 at Brancaster can be taken as representative of traffic on the B1159. For the year 1998, the annual traffic count gave 1978 vehicles per day and for the year 2001, 2002 vehicles per day. The NCC five year average is 2419 vehicles per day and the annual growth rate is predicted to be -0.2%

To determine the potential benefit of protecting the B1159 from erosion and flood inundation, it is necessary to consider the consequences associated with its lost (either temporary or permanent loss). The methodology recommended by the Multi Coloured Manual (FHRC 2003) is to consider the likely diversion that would be used, wherein the calculation of traffic disruption costs are most likely to be justified given the following three contexts:

- When the annual probability of the flood event that causes traffic disruption is greater than 20 per cent;
- When a significant part of the local network is affected; and
- When the duration of the flooding is several days or even weeks.

The cost of disruption is defined by the difference in the cost of travelling Diversion 1 compared to travelling the normal route. This 'resource travel cost' is a function of five elements:

- Distance travelled;
- Traffic flow (in one direction);
- Vehicle mix;
- Vehicle speed; and
- Duration of the diversion.

The methodology in determining these costs is described in detail in the Multi Coloured Manual, Chapter 6.2 (FHRC 2003).

If the B1159 is flooded at Walcott then there are two principal diversion routes to maintain traffic flow between Bacton and Happisburgh, assuming that the roads within the stated route are passable. Figure 2.1 plots the routes, one of which uses the local, narrow roads (2.17km in length) and the other using a safer, though longer, route (9.36km in length), which is only marginally better than local roads.

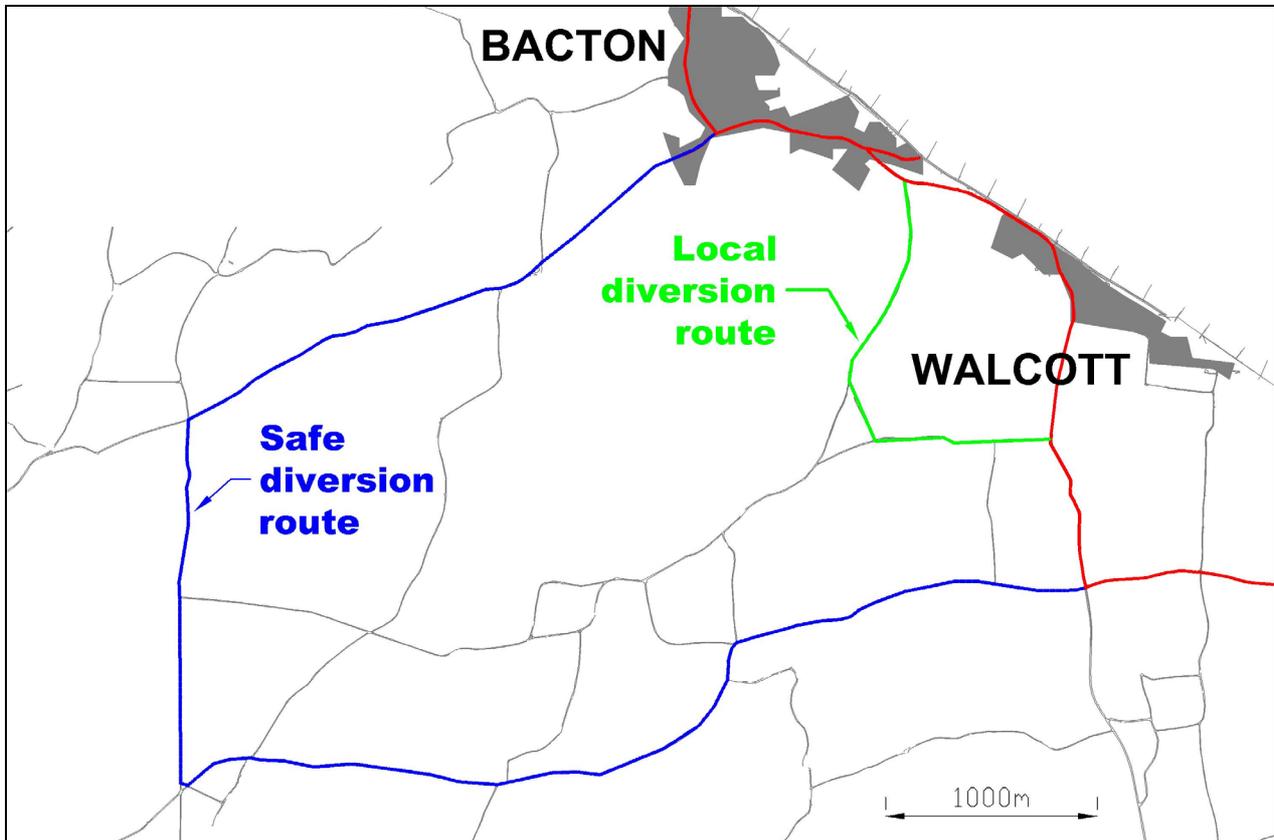


Figure 2.1 Temporary diversion routes for the B1159

Assuming that 2419 vehicles per day use the local network (as discussed above), it is further assumed that traffic on the local and safer diversion routes would move at speeds of 80 and 50kph, respectively. The cost of travel for these speeds are 15 and 22p per km, respectively, in accordance with the Multi-coloured Manual Table 6.1 (FHRC 2003). Thus, the cost of travel on the diversion for the local and safer routes will be:

$$(2419 \text{ vehicles per day}) \times 2.17\text{km} \times (£0.22 \text{ per vehicle km}) = £1,155 \text{ per day, and}$$

$$(2419 \text{ vehicles per day}) \times 9.36\text{km} \times (£0.15 \text{ per vehicle km}) = £3,396 \text{ per day}$$

respectively, for the duration of the flood. However, the costs associated with standard travel must be deducted from these to assess to the potential benefits of preventing flooding. The lengths of the standard routes for non-diverted traffic are 1.72 and 3.46km, respectively. Thus, assuming normal traffic flow on the local network progresses at 80kph, the cost of travel in the absence of flooding is

$$(2419 \text{ vehicles per day}) \times 1.72\text{km} \times (£0.15 \text{ per vehicle km}) = £624 \text{ per day, and}$$

$$(2419 \text{ vehicles per day}) \times 3.46\text{km} \times (£0.15 \text{ per vehicle km}) = £1,255 \text{ per day}$$

for the local and safer diversion routes, respectively. However, these estimates are given in terms of cost

per day and must be adjusted to reflect the true storm duration (likely to be of the order of 3 to 6 hours, depending on the event). Furthermore, the travel benefits associated with preventing flooding are the cost of the flooded condition subtracted by the costs of travel in the absence of the flood. The resulting benefits are given in Table 2.2, which also lists benefits accrued for various storm durations, in hours. From the table, it is apparent that the benefits for the safer route are approximately four times greater than for the local route.

Table 2.2 Travel benefits for road diversions at Walcott

Diversion type	Costs (£/day)		Benefits for given flood duration (£)				
	Diversion	Normal	24	12	6	3	1
Local	1155	624	531	265	133	66	22
Safer	3396	1255	2141	1070	535	268	89

2.6.2 Permanent diversions to replace eroded infrastructure

If the B1159 at either Trimingham, Mundesley, and Walcott is lost following failure of the coastal defences and, in the cases of Trimingham and Mundesley, subsequent cliff failure the principal transportation links will be lost. At all three sites, the alternative roads available off the B1159 are minor single-track rural roads not fit for through traffic. Thus, there is no spare capacity on these roads (i.e. no existing alternatives) and the loss avoided is the least cost of building new roads to bypass the damaged and impassable B1159 at these three coastal towns. The estimated costs of providing permanent single carriageway rural all-purpose diversions are given in Table 2.3.

Table 2.3 Least Cost Highway Diversions

Location	Length (metres)	Least Cost (March 2003)
Trimingham	2054	£2,403,272
Mundesley	1078	£1,268,421
Walcott	1091	£1,283,717

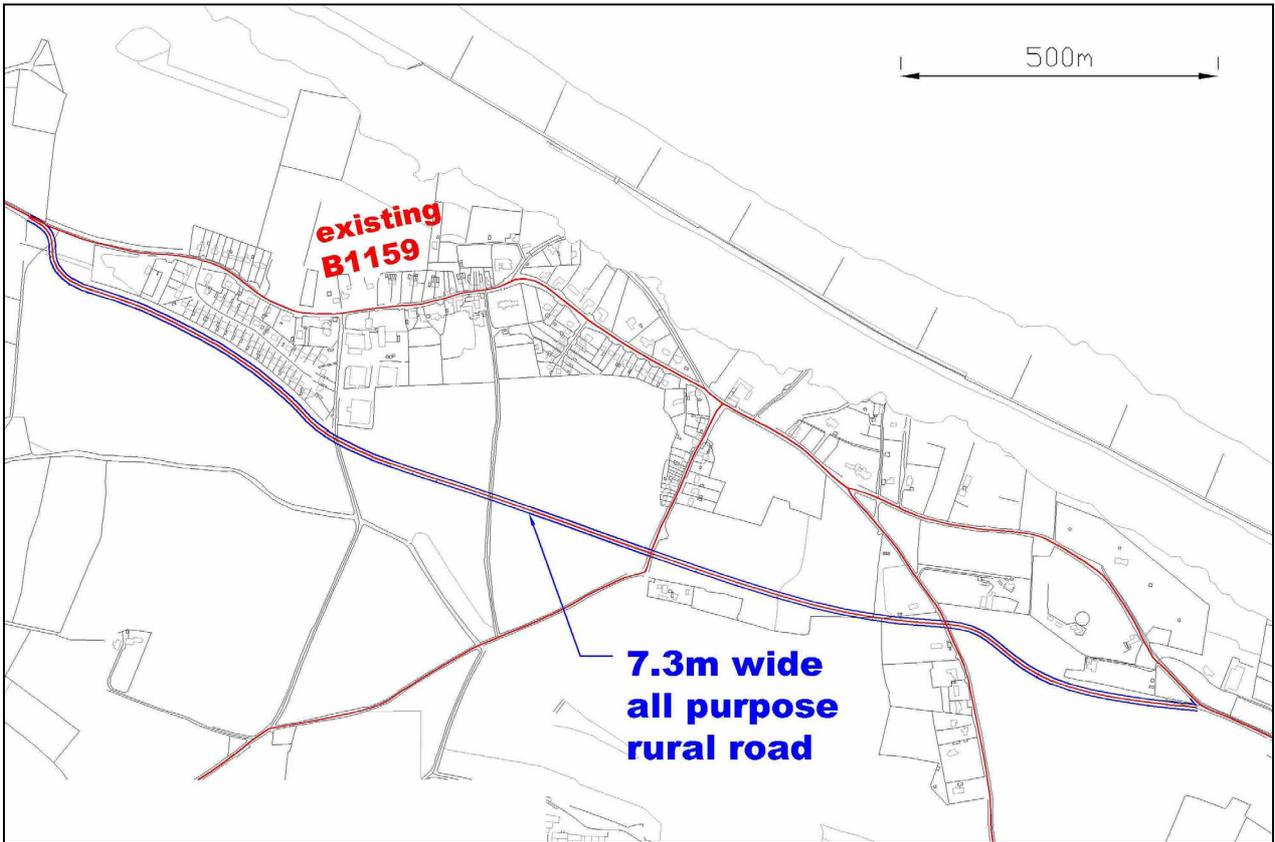


Figure 2.2 Trimingham, B1159 permanent diversion

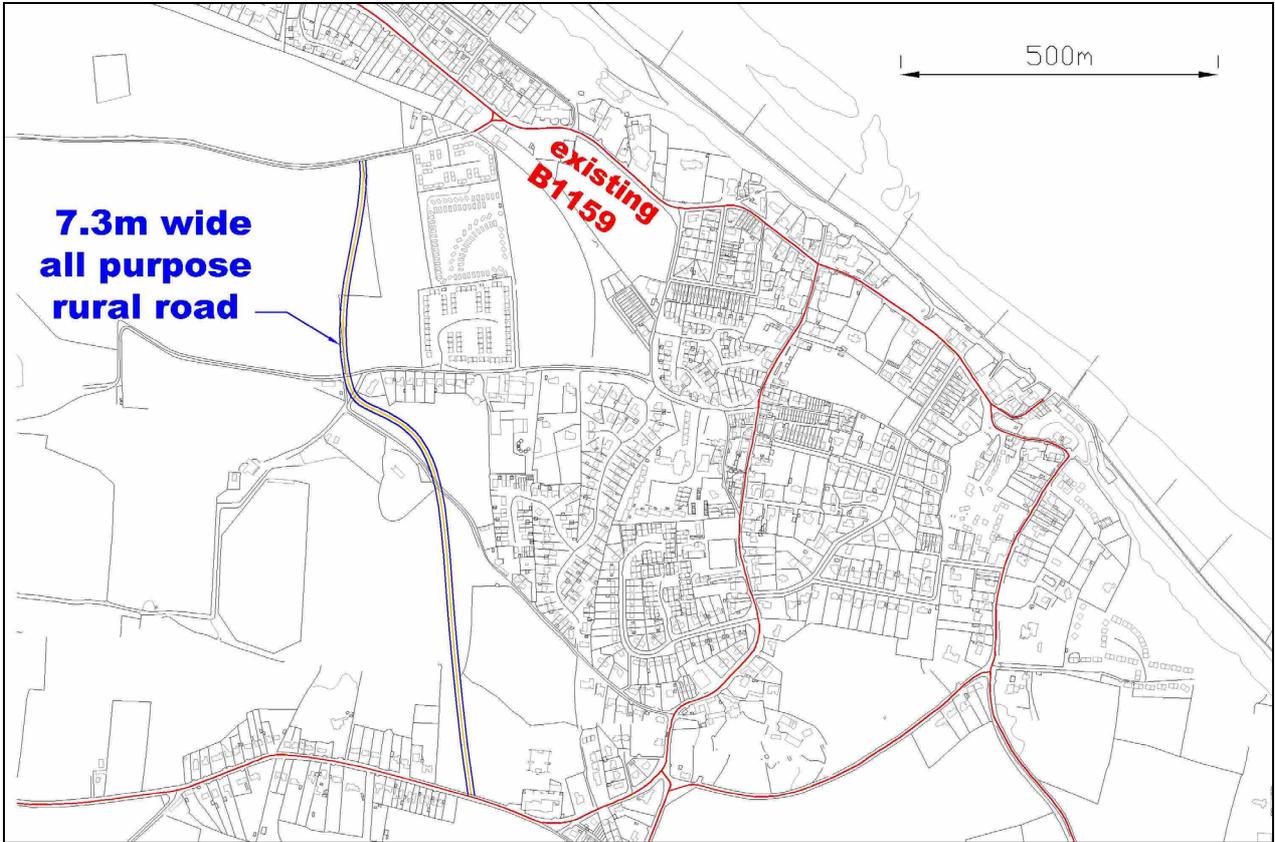


Figure 2.3 Mundesley, B1159 permanent diversion

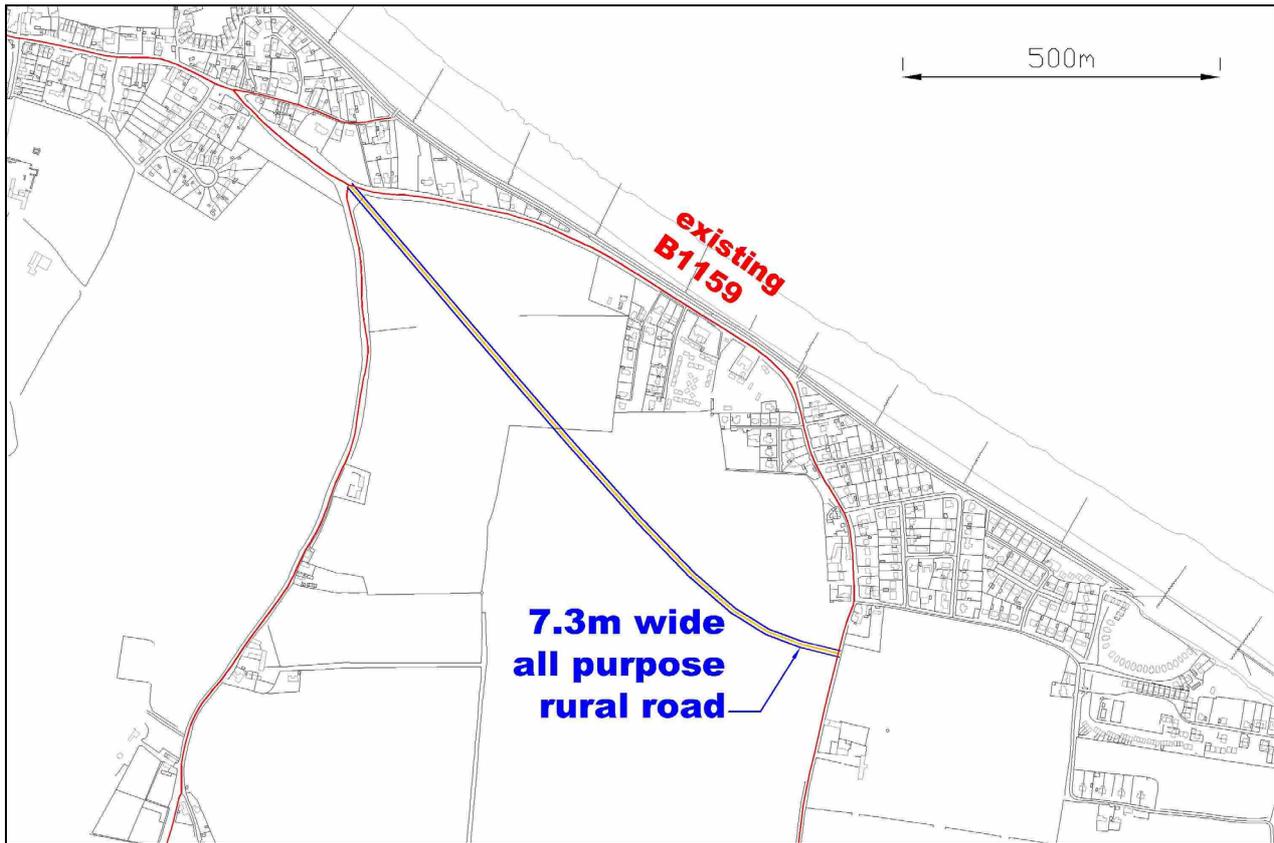


Figure 2.4 Walcott, B1159 permanent diversion

2.7 Water provision and wastewater treatment

2.7.1 Outfalls and pumping stations

In the event of continued erosion, Anglian Water’s treated effluent outfall at Mundesley could be lost, together with its supporting infrastructure. The cliff-top location of the pumping station at Mundesley is dictated by the layout of the existing sewerage network. Given that the existing network all flows towards the current point of discharge, the pumping and outfall facilities can not simply be reconstructed inland, if the present site behind a seawall, were to be lost. Similarly, the terminal pumping station at Overstrand will be lost if the seawall fails followed by the inevitable cliff failure. Again, the pumping station itself cannot simply be relocated given the layout of the sewerage system in Overstrand.

The replacement for these pumping stations would involve the building of new sewers and taking effluent inland rather than towards the sea. In addition, for Overstrand, a new intermediate pumping station with a rising main and a new terminal pumping station on the existing main would need to be built to carry the effluent to Cromer for treatment. The nominal replacement values of these structures are given in Table 2.4.

Table 2.4 Outfalls and pumping stations – replacement costs

Location	Owner	Capital Replacement Cost
Mundesley	Anglian Water	£1,428,681
Overstrand	Anglian Water	£1,654,714

2.8 Commercial activities

Apart from agriculture and tourism, various significant commercial operations are undertaken within the study area. These are discussed below.

2.8.1 Bacton Natural Gas Terminal

The Bacton Gas Site, operated by three international petroleum companies, is the United Kingdom's principal processing site for natural gas extracted from the North Sea. The site represents a multi-million pound investment in the national economy, generating millions of pounds in revenue. In addition, the Interconnector pipeline, used for the movement of gas between the UK and mainland Europe, has its landfall at this site. This pipeline will become increasingly important as the gas reserves of the North Sea become depleted and more gas is imported from Eastern Europe. The site is also the location of a major TRANSCO facility that acts as the wholesale distributor of gas for the UK gas industry.

Following both formal and informal consultation, only one of the three gas site operators volunteered information on the economic value of the site as a whole. The following comments and values are an extrapolation of the information given by that one operator. A fourth operator, Interconnector, was not directly consulted, as the facility under consideration is simply the landfall for a pipeline that exports or imports treated gas processed at the nearby British Gas facility rather than a processing facility.

The operators all review the productive life and, hence, decommissioning programme of their respective facilities on an annual basis. However, the actual decommissioning programmes and the respective timings are commercially sensitive information. Table 2.5 indicates the likely decommissioning date of each of the seaward frontage facilities.

Table 2.5 Bacton Gas Site – likely decommissioning dates

Operator	Decommissioning Date
Phillips Petroleum	2013
BP/Amoco	2013
Shell	2043
Interconnector	2043+

The three sites receive raw gas from various North Sea gas fields and process it for sale and distribution through the adjacent inland British Gas facility. Various by-products are also pumped to a railhead at North Walsham for distribution. It is estimated that one of the three facilities produces gas worth, to the nation, of at least £390,000 per day. Extrapolating this to the three sites produces a revenue stream of £1,170,000 per day (based on an estimated £1,300/million standard ft³).

The Bacton Gas Site is a unique infrastructure facility, of enormous economic importance, serving the UK as a whole. It is the landfall for most of the gas production of the North Sea and there is no viable alternative to the facility. The DEFRA publication FCDPAG3 states:

“A transfer payment occurs when a change simply affects either who gets the consumption or who provides the resources, but there is no change in the national total of either all consumption or all the resources required to generate that consumption.”

If the production of the Bacton gas site were to be lost, there would be a dramatic change to consumption of the resource, natural gas, and a consequent impact to the nation's economy. Hence, a loss of production at the Bacton Gas Site is not a transfer payment, and the economic value of the facility is the annual use of the infrastructure (i.e. the revenue stream generated by the site).

The replacement value of the Bacton Gas site facility as a whole is hundreds of millions of pounds. In the coast erodes it is likely that the components under threat would be relocated rather than the whole plant

reconstructed, at least initially. Figure 2.5 shows the buffer zone for the three production sites and Interconnector. This buffer zone has been set as the site for the landfall of the various gas pipelines, with the assumption made that, when the cliff top has receded to this point, economic losses are incurred.

When first constructed, the pipelines at the site were laid in trenches on the seabed and in cofferdams on the beach. A pipe was then tunnelled from the cofferdam to a shaft (riser) within the boundaries of the three processing sites or, in the case of Interconnector, to the distribution site. Including the Interconnector landfall, it is estimated that fifteen risers could be affected by cliff recession or beach platform lowering. (In 2002, the operators removed elements of cofferdams previously left, it is understood, below the beach platform level.) The estimated cost of relocating a single riser, excluding any loss of revenue resulting from temporarily shutting down that pipeline is £4,875,000 (March 2003). This equates to a replacement cost, for the risers alone, of £73,125,000.

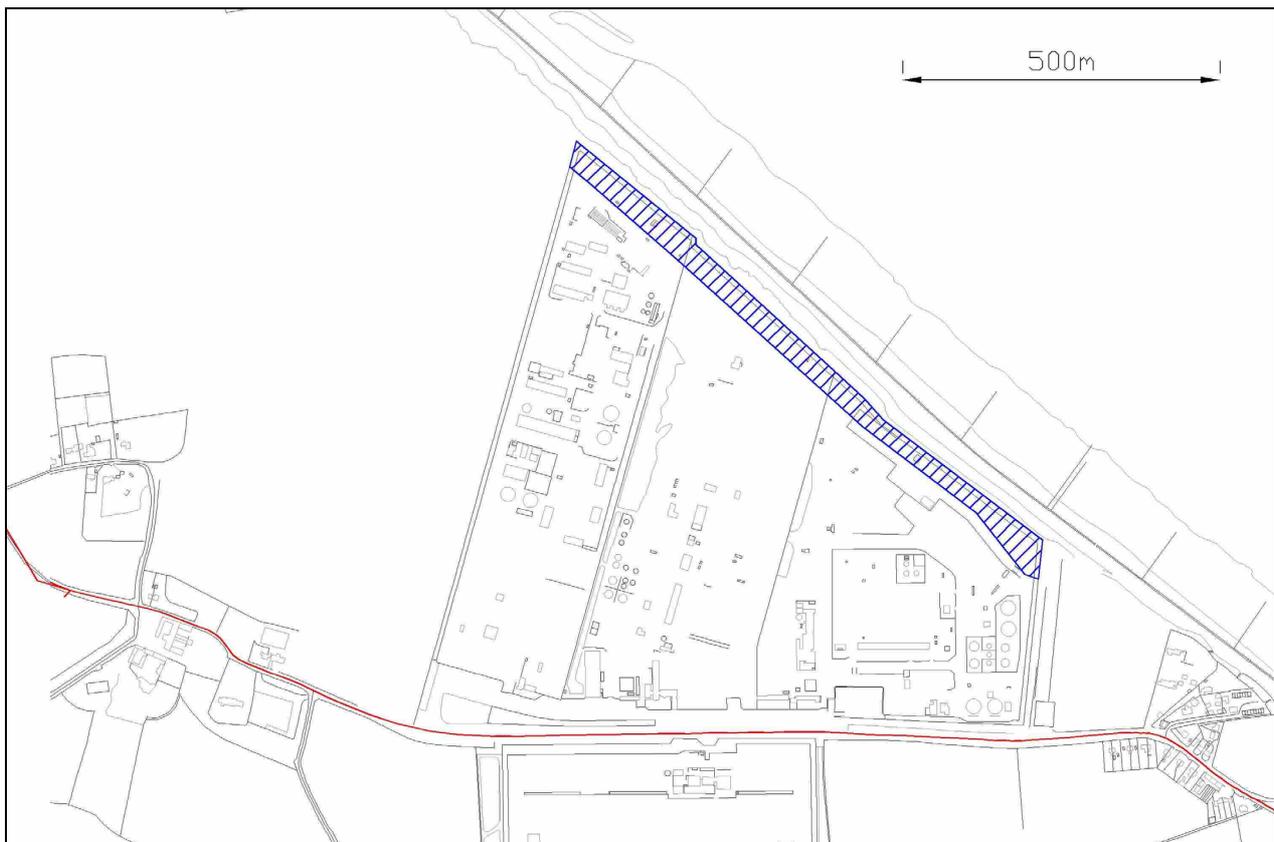


Figure 2.5 Bacton Gas Site – buffer zone for estimation of erosion benefits

2.8.2 Manufacturing and distribution

There are no economically significant manufacturing or distribution businesses within the study area.

2.8.3 Commercial fishery activities

It is understood that there are no full time fishermen operating from the beaches of the study area. However, a number of part time fishermen operate from Overstrand, Mundesley, and Trimingham. While the extent of this activity is unknown, it is unlikely to be economically significant. (See the interim report on Environmental Value for a discussion of commercial fishing activities.)

2.8.4 Tourism

The tourism industry is extremely important to the economy of North Norfolk. The following points have been taken from a document prepared by the East of England Tourist Board for North Norfolk District

Council (NNDC) in 2001. The statistics give an indication of the significance of the tourist trade and importance of the tourism infrastructure.

- The overall value of tourism to North Norfolk District in 1999 was an estimated £186.4 million;
- Of this, approximately £101.3 million (i.e. 54%) was generated by staying visitors and approximately £85.1 million (i.e. 46%) was generated by day visitors;
- Approximately 844,000 trips were made by staying visitors, accounting for approximately 3.9 million nights and £101.3 million;
- Approximately 4.1 million trips were made by day visitors, generating £85.1 million of expenditure;
- The total expenditure supported an estimated 4,160 full time job equivalents (FTEs). Of these:
- 68% were supported by direct expenditure, 23% by linkage (or indirect) expenditure and the remainder by multiplier expenditure; and
- 40% were in the catering sector, 28% in accommodation, 14% in the attractions/entertainment sector, 13% in retail, and 5% in the transport sectors.

When part time and seasonal jobs are considered, the tourism industry supports an estimated 5,690 actual jobs within the North Norfolk District.

2.9 Ministry of Defence property – Radar Station Trimmingham, RAF Neatishead

RAF Neatishead is a semi-permanent radar station on the cliff top in Trimmingham. Thus, the economic value of the station is in the cost of the land, associated permanent dwellings, office buildings, and the cost of relocating the facility. The MoD has not provided an estimate of the cost of relocating the facility.

2.10 Agricultural production

Economic losses may be associated with the erosion or flooding of land, thus leading to abandonment of that land and subsequent loss for agricultural purposes. In this study, full loss of agricultural value is lost when land is lost to erosion. If lost, the value of the loss is assumed to be the risk-free market value of the land multiplied by a factor of 0.45. This factor reflects the inflated price of agricultural land resulting from Government subsidy (PAG3 1999). Based on the September 2002 DEFRA survey of land values for the eastern region (DEFRA 2003) the average risk-market value of agricultural land has been assumed to be £6,769/ha (2002). This has been assumed as a constant across the study area.

2.11 Recreation and tourism

In addition to the recreational sports it supports, the study area has high amenity value in terms of its tourist attractions, tourist accommodation, cliffs, beaches, and promenades. Based on the baseline environmental review, the principal recreational facilities and their importance (as determined by visitor numbers) are presented in Table 2.5.

As demonstrated in Table 2.6, the study area is of high recreational and amenity value. At a strategic level, it is not appropriate to further refine these estimates.

From the approximate tourist numbers in Table 2.6 and discussions with NNDC, a conservative (i.e. low) assessment of total tourist numbers visiting the study area is of the order of 4,100,000 day visitors pa and 844,000 staying visitors pa. However, no figures are available to quantify local visitors.

Tourists are primarily attracted to the sandy beaches the study area offers. Using standard values from The Yellow Manual (MUFHRC 1990) (updated to March 2003), loss of this amenity would jeopardise an annual benefit of £3.18million for day visitors and £1.53million for staying visitors (a total loss of £4.71million pa). While these standard values are rather large, they are indicative of the importance of recreation activities to the study area. Discounted over one hundred years, this annual recreational benefit of £4.71million would yield a Present Value benefit of £32million. However, without a scheme specific Contingent Valuation Survey it is difficult to attribute these benefits to particular areas or to determine the

loss in value associated with defence failure. Therefore, for the purpose of the Strategy these benefits have been assumed to apply at a study wide scale.

Table 2.6 Key recreational and amenity resources – Day Visitors

Recreational Asset	Visitor numbers (x 1000)
City/Town	1,251
Coastal	860
Countryside	1,989
Total	4,100

2.11.1 Golf Courses

The Royal Cromer golf course is located in the western portion of the study area, east of Cromer. This has significant local importance, attracting tourists and employing staff. A site specific valuation is not considered appropriate here, however for the purposes of the Strategy the value of the golf club land has been assumed to be five times agricultural value.

2.11.2 Playing field and open recreation areas

There are a number of playing fields and pitches (including tennis courts) within the study area, some of which may be at risk from erosion during the 100-year appraisal period. As for the residential properties, two of the potentially most vulnerable recreational fields have been surveyed by Keys Auctioneers and Estate Agents (2002), providing values of £35,000 and £50,000. Thus, the value of remaining playing fields and open recreational areas not surveyed has been assumed to be an average of this two, i.e. £42,500.

2.12 Caravans

There are around 900 caravans located within the study area. Their national economic value has been estimated as discussed below.

The economic value associated with erosion of these assets is often considerably less than the risk-free market value as it is reasonable to assume that caravans may be moved to lower risk areas. Therefore, the national economic value of a caravan has been assumed equivalent to the cost of moving it to a new site and establishing the site. It is also the case that caravan parks are depreciating assets and, in accordance with MAFF guidance, should only be considered as worth half their replacement costs. Using this approach the following three items have been considered in estimating the likely damage associated with the write-off by inundation or erosion of a caravan park:

- The value of the land occupied by the caravan (risk-free market value of agricultural land factored by 0.45);
- The cost of removing and transporting each caravan to another hypothetical site; and
- The installation of each caravan at that site: assumed 50% of the cost of pouring a concrete slab, fixing the caravan to the slab, and connecting main services.

Based on these considerations the value of each caravan has been estimated as £2000. However, permanent facilities such as toilet/shower blocks, swimming pools bars, restaurants, etc. cannot be moved. Therefore, the write off costs associated with the permanent facilities have been considered as for residential property and have been given a value in Appendix 1.

Note: The difficulty of relocating large numbers of caravans is a potential problem. For the purpose of this cost benefit analysis, it is assumed that any caravan can be relocated to a ‘new hypothetical site’ within the study area.

2.13 Chalets

There are about 90 chalets within the study area. As with caravans, Defra guidance to assessing the national economic value of chalets is to assume chalets are depreciating assets and, on average, worth 50% of their replacement cost. For the purposes of this study, it has been assumed that the replacement cost of a chalet is £50,000 (based on the purchase price of a new two-bedroom mobile home). Therefore, the national economic loss associated with loss of a chalet is 50% of £50,000 (i.e. £25,000).

2.14 Heritage

The study area contains many Listed Buildings, Schedule Ancient Monuments, and archaeological features. For many of these features, there is a Statutory Duty to protect them. Table 2.6 below is a listing of all identified heritage features (see Figure 1 at the rear of the report) together with their respective grading, which are assigned in accordance with the following guidelines:

- Grade I buildings are those of exceptional interest;
- Grade II* are particularly important buildings of more than special interest; and
- Grade II buildings are of special interest, warranting every effort to preserve them.

Table 2.6 Heritage Features

Name	Location	Listed Building Grade	NGR (E,N)
Cromer Lighthouse	Cromer	2	620333,341512
Overstrand Hall	Overstrand	2	624062,340885
Pleasuance Gazebo	Overstrand	2	624655,340987
Pleasuance, Rose Garden	Overstrand	2	624693,340987
Pleasuance, Covered Walk	Overstrand	2	624713,340901
The Pleasuance	Overstrand	2	624752,340906
Pleasuance, Clock Tower	Overstrand	2	624791,340912
Methodist Chapel	Overstrand	2	624818,340782
Sea Marge (hotel)	Overstrand	2	624966,340770
Church of St. Michael	Sidestrand	2	624959,340715
Garden Close, Main Road	Sidestrand	2	625890,339718
18-20 Ivy Cottages	Sidestrand	2	626557,339212
Hall Farmhouse	Trimingham	2	627720,338723
St John the Baptist Church	Trimingham	2*	627938,338755
Brick Kiln, Kiln Cliffs	Mundesley	2	630310,337452
WWII Underground HQ	Mundesley	Historic site – not graded	630950,337100
Church of All Saints	Mundesley	2	631062,336946
14 The Dell	Mundesley	2	631545,336545
Great Barn	Paston	Ancient Monument,	632191,334540
Great Barn at Paston Hall	Paston	2*	632191,334540
Church of St. Margaret	Paston	1	632283,334434
Manor Farm Barn	Bacton	2	634167,333660
Manor House	Bacton	2	634192,333637
Manor House	Bacton	2	634178,333637
Bromholme (house)	Bacton	2	634629,333516
The Pilgrim House	Bacton	2	634732,333471
Barn at Pilgrim House	Bacton	2	634751,333493
1-4 Keswick Cottages	Bacton	2	635075,333389
Malthouse Farmhouse	Walcott	2	636011,332366

3. METHODOLOGY

The methodology to evaluating the potential combined losses from erosion and flooding is discussed below.

3.1 Evaluating flood losses

In the study area, the length of coastline at risk from coastal flooding is at risk due to overflow or overtopping of the coastal defences. An estimate of the expected annual damages that considers all possible damages and storm events has been undertaken using the standard methodology given in PAG3 (MAFF 1999), and this is described in the accompanying report on flood probability and losses.

3.2 Evaluating erosion losses

Based on geomorphologic analyses of cliff behaviour along the frontage, a numerical assessment of cliff recession and expert judgement the future coastline evolution has predicted. Based on the predictions of clifftop position at 10-year intervals over the 100-year appraisal period, the economic damage incurred has been established by valuing the assets within the eroded area as discussed below.

Given the cliff recession analysis and analysis of cliff behaviour, a stochastic model of cliff evolution was applied to provide probabilistic predictions of clifftop location. This approach allows the simulation of clifftop position for multiple regional management scenarios, the results of which may be compared against that of the 'Do Nothing' scenario for calculation of erosion losses.

The consequences of cliff recession were evaluated in terms of the discounted risk of clifftop assets being eroded. In addition to the eroded area, it has been assumed that any asset within 5m of the erosion contour is deemed unsafe and completely lost (i.e. a buffer zone). Thus, the present value of the loss in any year is given by

$$\text{Present Value} = \text{Asset value} \times \text{Probability of loss} \times \text{Discount factor.}$$

An example section through the cliff, showing the present day and possible future cliff positions as solid and dashed lines (respectively), is presented in Figure 3.1. The accompanying probability density function represents the probability of a given clifftop location as a function of distance from the present day cliff toe. Further discussion of cliff behaviour and the probabilistic approach adopted is provided in the accompanying reports 'Cliff processes' and 'CliffSCAPE modelling and clifftop recession analysis.'

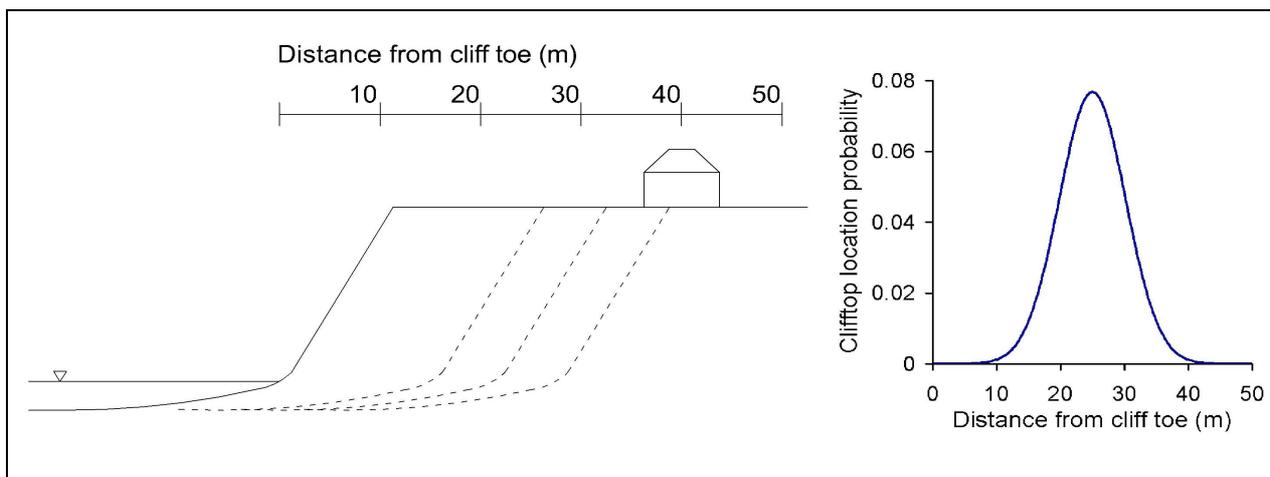


Figure 3.1 Example section through cliff showing probability of cliff recession (Hall, Lee, & Meadowcroft 2000)

4. REFERENCES

Hall JW, Lee EM, and Meadowcroft IC 2000 Risk-based benefit assessment of coastal cliff recession. Proc. ICE: Water and Maritime Engineering, Vol. 142 (September) pp.127-139.

Halcrow 1996 Sheringham to Lowestoft Shoreline Management Plan Sediment Sub-cell 3B: Phase 2, Shoreline Management Plan Strategy Document. North Norfolk District Council, Great Yarmouth Borough Council, Waveney District Council, & the National Rivers Authority.

HM Treasury 2003 The Green Book: Appraisal and evaluation in central government: Treasury guidance. London: TSO.

MAFF 1999 Flood and coastal defence project appraisal guidance: Economic appraisal: A procedural guide for operating authorities. FCDPAG3. December.

Appendices

Appendix 1

Keys reports



Section

A Report

1	Instructions
2	Summary
3	Location
4	Description and Accommodation
5	Condition and State of repair
6	Tenure and Report on Title
7	Town Planning and Development
8	Environmental Matters
9	General Remarks
10	Valuation Commentary

B Plans

Date of Inspection: 14th March 2002
and subsequent

Inspected by: A J Hird MRICS and A M Bond FNAEA

Report on _____

Overstrand Strategic Study.

Section A

1. General _____

1.1 Our instructions are, as set out in Mr P Lawton's letter of the 5th February 2002 on behalf of St La Haye Ltd these being to carry out, where practical, a brief external inspection of the buildings located within the area of interest as shown on the plans supplied, with a view to providing an outline indication only of current open market values.

1.2 The figures stated are on the basis of your instructions, with, as previously agreed, no liability to ourselves from yourself or any other party. The report is prepared solely on this basis.

2. Summary _____

2.1 Overstrand is a favoured coastal village situated on the North Norfolk Coast some 2 miles or so to the east of the town of Cromer.

The properties within the area of interest, lie to the north of the B1159 coast road being from Paul's Lane in the west to Sidestrand Hall in the east. This section comprises most of the original village together with later development including recent construction. Included in the village centre are various commercial premises, retail, hotels, and bed and breakfast.

2.2 As with our previous report to you on Cromer dated February 2001, we have excluded infrastructure but have included some buildings open to the public such as conveniences and the pavilion to the cricket ground.

2.3 We have included in our figures certain areas of land where planning permission for development has been or would be granted. Additionally new dwellings not on your plan are shown.

2.4 Where sums are shown for two of the main properties - The Pleasuarance and Sidestrand Hall, these are not based on any external inspection reflecting their settings and are an outline indication only.

3. Location _____

3.1 The buildings as stated, form the main part of the original village of Overstrand lying to the north of the B1159 and comprising predominantly residential with some commercial buildings.

3.2 The village is a favoured holiday resort situated on the North Norfolk Coast being well placed for the many areas of interest in the locale.

Report on _____

Overstrand Strategic Study.

4. Description and Accommodation _____

4.1 No internal inspection has been made of any of the buildings, our brief inspections being solely external, either on foot or by car. From our knowledge of a percentage of these properties in past years, we are reasonably aware of the level of accommodation.

5. Condition and State of repair _____

5.1 We have, for the purposes of this report, assumed the various buildings to be in satisfactory order, this with the exception of those where it is clear from the outside that maintenance or more major works are required.

6. Tenure and Report on Title _____

6.1 Our valuation assumes that there is a satisfactory title to each property, either freehold or long leasehold with no defects. The figures shown reflect vacant possession and/or, with regards to the businesses, ongoing use.

7. Town Planning and Development _____

7.1 Our report has regard to the existing use of the various buildings, both residential and commercial, with, where sites are vacant, the appropriate use as shown on the town planning policy reflected.

We have also taken into account potential in respect of certain sites where redevelopment is considered the most appropriate.

8. Environmental Matters _____

8.1 Our valuation assumes that there are no deleterious or hazardous materials or techniques which may have been used in the construction of the various properties.

8.2 Our initial enquiries have not indicated any major contamination affecting the locale or neighbouring areas which would affect our valuations. Should it be established that contamination exists or that premises have been or are being put to any contaminative use, this might reduce the figures now indicated. Should further information be forthcoming we would be pleased to deal with this by means of a side letter.

8.3 Our figures also assume that no dwellings are at risk from any collapse to the coastal slope and that this situation will not arise in the future.

Report on _____

Overstrand Strategic Study.

9. General Remarks

9.1 You have requested that we provide an indication of the potential value of the dwellings within the study area, these as noted earlier being predominantly residential with some commercial. In each case the potential value is as indicated on the plans attached and is for the bricks and mortar only. No account has been taken of any business goodwill and the increased value this could bring, particularly in relation to hotels and other ongoing businesses. This would provide an addition to the overall value and is a factor that should be borne in mind, similarly contents.

9.2 In addition, where appropriate, we have included dwellings on the edge of the area boundary line where, we consider these would be affected.

10. Valuation _____

10.1 On the basis of the inspections undertaken, we would anticipate the potential for a value of some **£57,940,000 (fifty seven million nine hundred and forty thousand pounds)**, this having regard where practical to comparable sale prices and our knowledge of a percentage of the buildings during the past few years.

10.2 As you will appreciate, there is potential for a substantial variation on this sum which will only become apparent following more investigation and a detailed inspection of each unit. We would anticipate any change on this basis likely to be in a upward direction.

10.3 Copies of your plan - Area of Interest, are attached to this report, with, on each section, individual guide figures stated.

Notes:

1. Our report is provided for the stated person and for the sole use of the named client. It is confidential to the client and professional advisers and the valuer accepts no responsibility whatsoever to any persons.
2. Neither the whole nor any part of this report may be included in any published document, circular or statement, nor published in anyway without the valuer's written approval of the formal context in which it may appear.
3. No allowance has been made for the cost of disposal, nor for any liability for taxation which may arise on disposal.

Signed:
A J Hird MRICS
on behalf of Messrs G A Key

Dated: 15.04.02

ke s

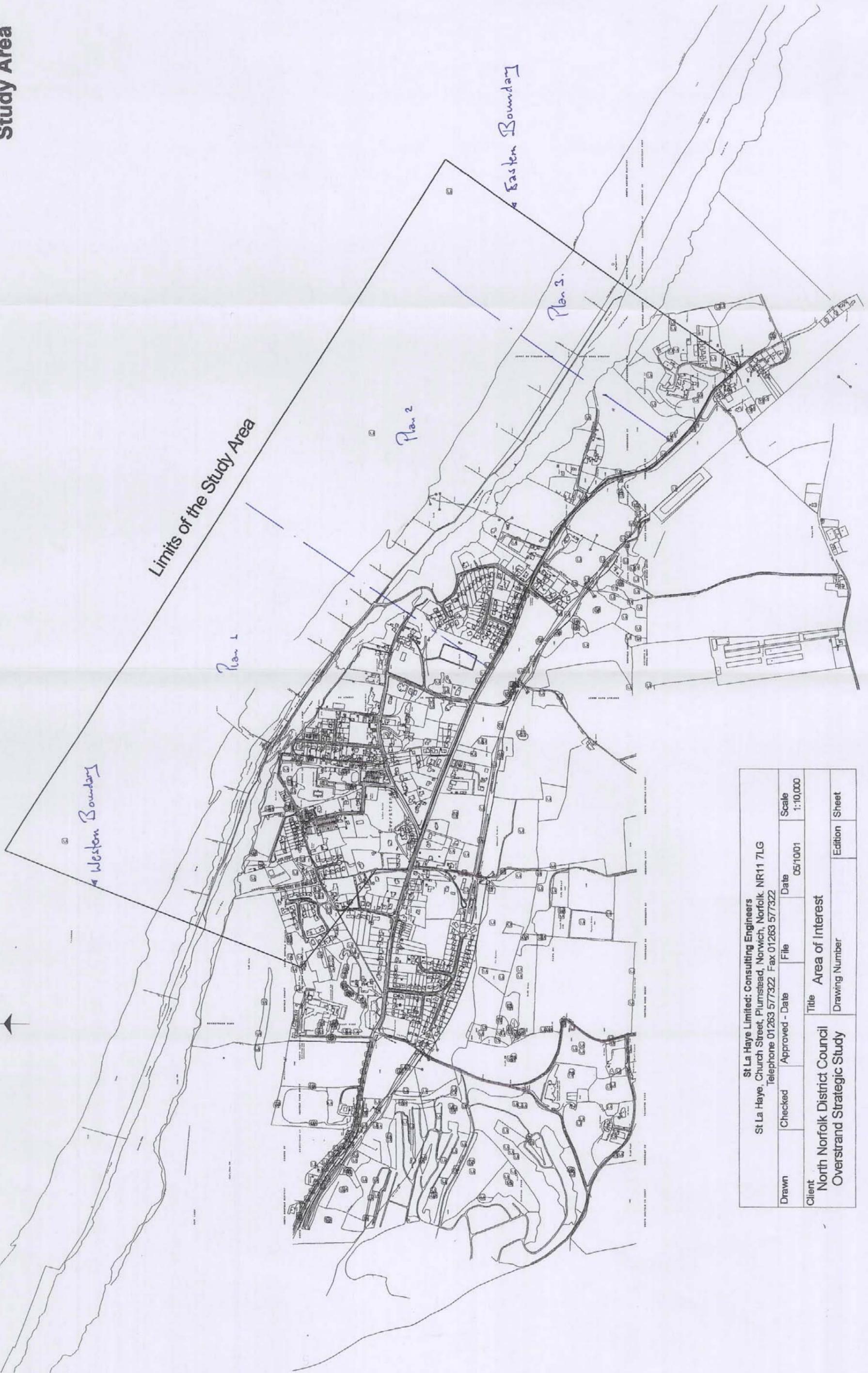
8 Market Place Aylsham Norwich Norfolk NR11 6EH

Report on _____

Overstrand Strategic Study.

Section B

Study Area

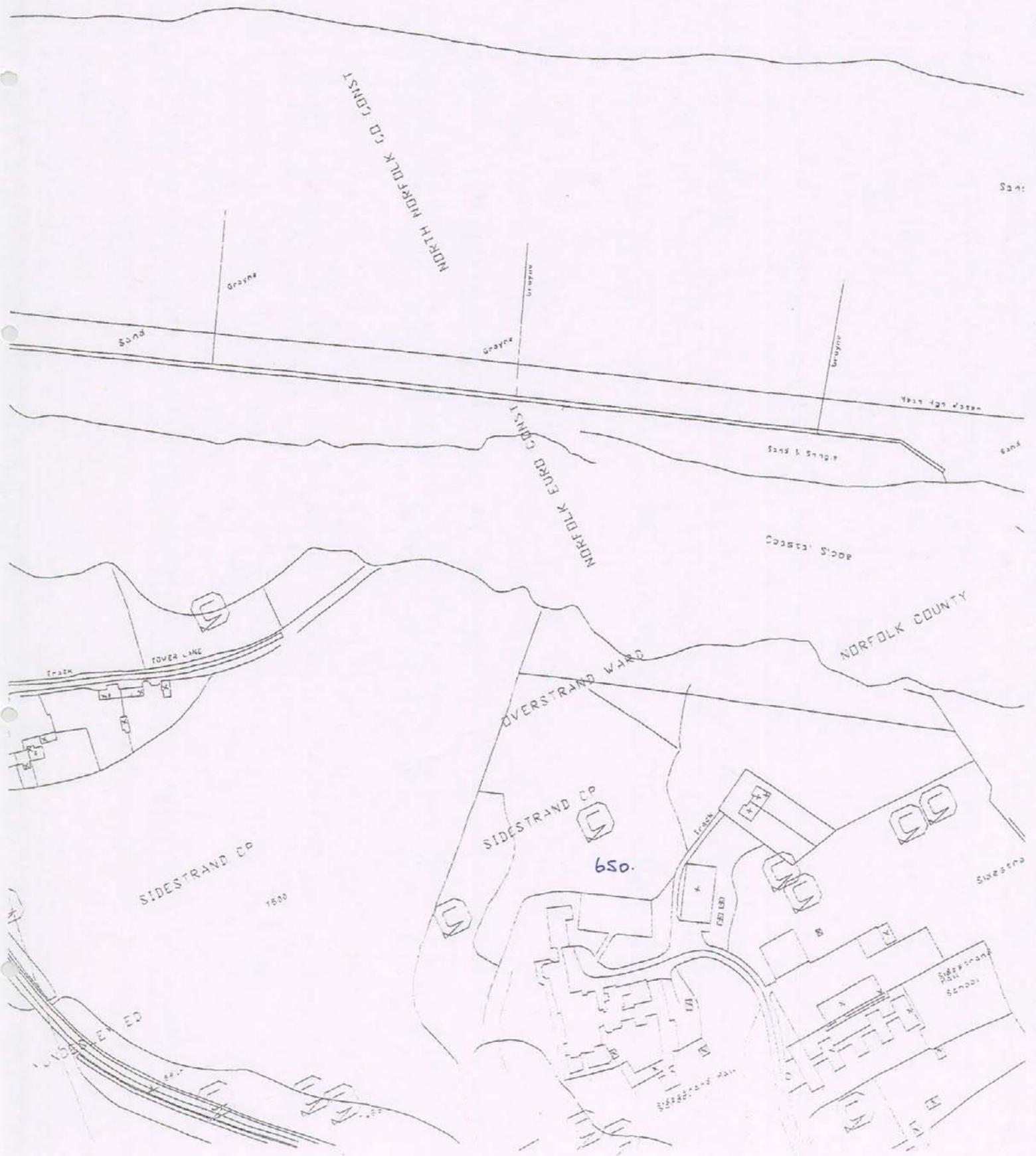


St La Hays Limited: Consulting Engineers St La Hays, Church Street, Plumstead, Norwich, Norfolk NR11 7LG Telephone 01263 577322 Fax 01263 577322		Checked Approved - Date File Date Scale 1:10,000
Client North Norfolk District Council Overstrand Strategic Study	Title Area of Interest Drawing Number	Edition Sheet

Plan 2



Plan 3



Section

A Report

- | | |
|----|-------------------------------|
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| 2 | Summary |
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| 6 | Tenure and Report on Title |
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| 8 | Environmental Matters |
| 9 | General Remarks |
| 10 | Valuation Commentary |

B Plans

Date of Inspection: 14th March 2002
and subsequent

Inspected by: A J Hird MRICS and A M Bond FNAEA

Report on _____

Mundesley Strategic Study.

Section A

1. General _____

1.1 Our instructions are, as set out in Mr P Lawton's letter of the 5th February 2002 on behalf of St La Haye Ltd. These being to carry out, where practical, a brief external inspection of the buildings located within the area of interest as shown on the plans supplied, with a view to providing an outline indication only of current open market values.

1.2 The figures stated are on the basis of your instructions, with, as previously agreed, no liability to ourselves from yourself or any other party. The report is prepared solely on this basis.

2. Summary _____

2.1 The properties comprised within the Mundesley Strategic Study, are predominantly residential with some commercial, the latter relating to shops close to the sea front and also include commercial hotels, church and other public buildings. The village is a popular holiday resort situated on the North Norfolk Coast some 5 miles from the inland town of North Walsham.

2.2 We have, for the purposes of our report excluded the infrastructure together with the church, lifeboat shed and other structures, but have included various public buildings included amongst other conveniences.

2.3 Within the subject area are a number of building plots where permission has been or would in our opinion be granted. Figures have been included for these reflecting capital values.

2.4 Included within the values are a number of new dwellings which are not shown on the drawings provided, but to which reference has been made.

3. Location _____

3.1 The subject area extends from Albion Road to the west terminating to the east just beyond East Cliff, lying in the main to the north of Cromer Road with the centre section bisected by Beach Road this bounded to the south by the village shopping centre and Gold Park.

Report on _____

Mundesley Strategic Study.

4. Description and Accommodation _____

4.1 No internal inspection has been made of any of the buildings, our inspection being solely external, either on foot or by car. From our knowledge of a number of these properties in past years, we are reasonably aware of the level of accommodation.

5. Condition and State of repair _____

5.1 We have, for the purposes of this report, assumed the various buildings to be in satisfactory order, this with the exception of those where it is clear from the outside that maintenance or more major works are required.

6. Tenure and Report on Title _____

6.1 Our valuation assumes that there is a satisfactory title to each property, either freehold or long leasehold with no defects. The figures shown reflect vacant possession and/or, with regards to the businesses, ongoing use.

7. Town Planning and Development _____

7.1 Our report has regard to the existing use of the various buildings, both residential and commercial, with, where sites are vacant, the appropriate use as shown on the town planning policy reflected.

We have also taken into account potential in respect of certain sites where redevelopment is considered the most appropriate.

8. Environmental Matters _____

8.1 Our valuation assumes that there are no deleterious or hazardous materials or techniques which may have been used in the construction of the various properties.

8.2 Our initial enquiries have not indicated any major contamination affecting the stated locale or neighbouring areas which would affect our valuations. Should it be established that contamination exists or that premises have been or are being put to any contaminative use, this might reduce the figures now indicated. Should further information be forthcoming we would be pleased to deal with this by means of a side letter.

8.3 Our figures also assume that no dwellings are at risk from any collapse to the coastal slope and that this situation will not arise in the future.

Report on _____

Mundesley Strategic Study.

9. General Remarks

9.1 You have requested that we provide an indication of the potential value of the dwellings within the study area, these as noted earlier being predominantly residential with some commercial. In each case the potential value is as indicated on the plans attached and is for the bricks and mortar only. No account has been taken of any business goodwill and the increased value this could bring, particularly in relation to hotels and other ongoing businesses. This would provide an addition to the overall value and is a factor that should be borne in mind, similarly contents.

9.2 In addition, where appropriate, we have included dwellings on the edge of the area boundary line where, we consider these would be affected.

10. Valuation _____

10.1 On the basis of the inspections undertaken, we would anticipate the potential for a value of some **£35,165,000 (thirty five million one hundred and sixty five thousand pounds)**, this having regard where practical to comparable sale prices and our knowledge of a percentage of the buildings during the past few years.

10.2 As you will appreciate, there is potential for a substantial variation on this sum which will only become apparent following more investigation and a detailed inspection of each unit. We would anticipate any change on this basis likely to be in an upward direction.

10.3 Copies of your plan - Area of Interest, are attached to this report, with, on each section, individual guide figures stated.

Notes:

1. Our report is provided for the stated person and for the sole use of the named client. It is confidential to the client and professional advisers and the valuer accepts no responsibility whatsoever to any persons.
2. Neither the whole nor any part of this report may be included in any published document, circular or statement, nor published in anyway without the valuer's written approval of the formal context in which it may appear.
3. No allowance has been made for the cost of disposal, nor for any liability for taxation which may arise on disposal.

Signed:
A J Hird MRICS
on behalf of Messrs G A Key

Dated: 15.04.02

keys

8 Market Place Aylsham Norwich Norfolk NR11 6EH

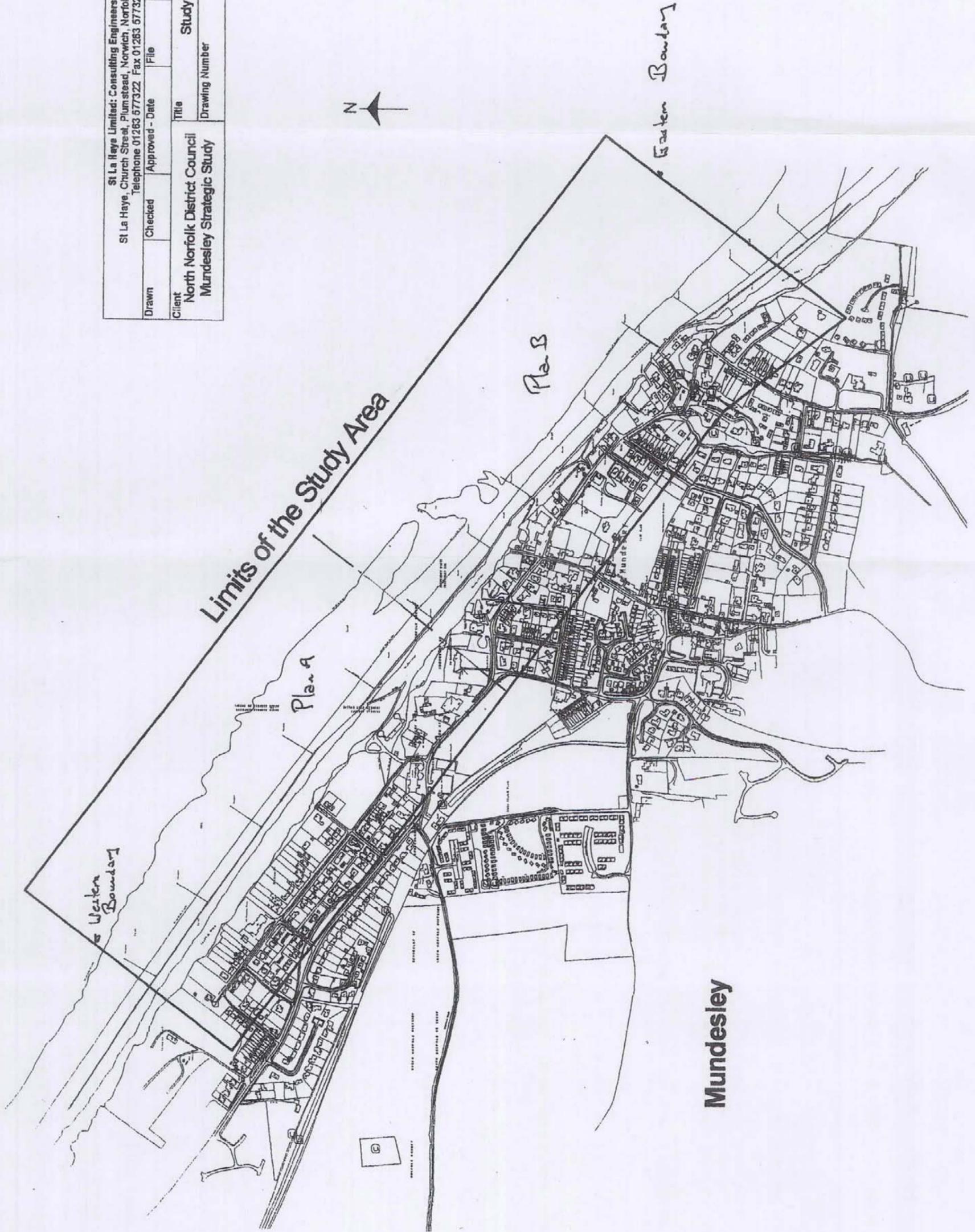
Report on _____

Mundesley Strategic Study.

Section B

Study Area

St La Hays Limited: Consulting Engineers St La Hays, Church Street, Plumstead, Norwich, Norfolk, NR11 7LG Telephone 01263 577322 Fax 01263 577322			
Drawn	Checked	Approved - Date	Scale
		5/10/01	1:10,000
Client North Norfolk District Council Mundesley Strategic Study		Title Study Area	Edition Sheet





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B Location Plans

Date of Inspection: 10th December 2002 and subsequent

Inspected By: A J Hird MRICS
A M Bond FNAEA

1. Instructions _____

1.1 Our instructions as given to us verbally by Mr Peter Lawton and subsequently confirmed, are to carry out where practical a brief 'drive by' external inspection of the buildings located within the area of interest, this with a view to providing an outline indication of potential current open market values.

1.2 The figures provided are on the basis of your instructions, with as agreed, no liability to ourselves from yourself or any other party. The report is solely on this basis.

2. Summary _____

2.1 The study area extends from Sidestrand Hall in the west to the eastern side of Mundesley close to Albion Road. The main residential section comprises the village of Trimingham, remaining dwellings being rural or semi-rural, this with the exception of the small part of Mundesley.

2.2 The study comprises all residential buildings to the north of the line shown on your drawing and includes figures for the two Parish Churches, together with one substantial set of farm buildings. We have excluded all infrastructure, this with the exception of a spot figure for the caravan sites between Trimingham and Mundesley.

3. Location _____

3.1 As stated, the site extends from Sidestrand Hall to the outskirts of Mundesley and forms part of the coastal belt comprising agricultural land together with the village of Trimingham. The buildings are predominantly residential.

4. Description and Accommodation _____

4.1 No internal inspection has been made of any of the buildings, our inspection being solely external, either on foot or by car. From our knowledge of many of these properties in past years, we are reasonably aware of the levels of accommodation.

5. Condition and State of Repair _____

5.1 We have, for the purposes of this report, assumed the various buildings to be in satisfactory order, this with the exception of those where it is clear from the outside that substantial maintenance or more major works are required.

Report on _____
Overstrand to Mundesley
Strategic Study

6. Tenure and Report on Title _____

6.1 Our valuation assumes that there is a satisfactory title to each property, either freehold or long leasehold with no defects. Figures reflect vacant possession and/or, with regards to business premises, ongoing use.

7. Town Planning and Development _____

7.1 Our report has regard to the existing use of the various buildings, both residential and commercial, with, where sites are vacant, the appropriate use as shown on the town planning policy reflected. We have also taken into account potential in respect of certain sites where redevelopment is considered the most appropriate.

8. Land Contamination and other Environmental Matters _____

8.1 Our valuation assumes that there are no deleterious or hazardous materials or techniques which may have been used in the construction of the various properties.

8.2 Initial consideration has not indicated major contamination affecting the properties which would affect our valuation. However, should it be established that contamination exists or that the premises have been or are being put to any contaminative use, this might reduce the figures now indicated. Should further information be forthcoming we would be pleased to deal with this by means of a side letter.

8.3 Our figures also assume that no dwellings are at risk from any collapse to the coastal slope and that this situation will not arise in the future.

9. General Remarks _____

9.1 This exercise comprises in excess of 270 units, the substantial majority being residential. In each case the potential values indicated, these set out on the attached plans, are for the bricks and mortar only. No account is taken of business goodwill or other trading factors and the increased value that these could bring. Similarly no value has been included for agricultural land, although as a guide we would suggest a figure of £7,500 (seven thousand five hundred pounds) per hectare.

9.2 In addition we have included within our figures dwellings which are affected by the boundary line.

Report on _____
Overstrand to Mundesley
Strategic Study

10. Valuation Commentary _____

10.1 On the basis of the inspections undertaken, and as set out in this report, we would anticipate the potential for a total value of some **£40,995,000 (forty million nine hundred and ninety five thousand pounds)**, this having regard where practical to comparable sale prices and our knowledge of a percentage of the buildings during past years.

10.2 As you will appreciate, there is potential for a substantial variation on this sum which will only become apparent following more investigation and a detailed inspection of each unit. We would anticipate any change on this basis likely to be in a upward direction.

10.3 As agreed, copies of the plan provided by yourself are attached to this report, with, on each section, individual guide figures marked.

Notes:

1. Our valuation report is provided for the stated person and for the sole use of the named client. It is confidential to the client and professional advisers and the valuer accepts no responsibility whatsoever to any other persons.
2. Neither the whole nor any part of this report may be included in any published document, circular or statement, nor published in anyway without the valuer's written approval of the formal context in which it may appear.
3. No allowance has been made for the cost of disposal, nor for any liability for taxation which arise on disposal.

Signed:
A J Hird MRICS
on behalf of Messrs G A Key

Dated: 14.01.03

**Report on _____
Overstrand to Mundesley
Strategic Study**

Section B

STUDY AREA



PLAN 1



PLAN 2



PLAN 3



PLAN 4



PLAN 5



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B Copy of Letter of Instruction

C Location Plans

Date of Inspection: 12th February 2003 and subsequent

Inspected By: A J Hird MRICS
A Cutting

1. Instructions _____

1.1 Our instructions as given to us verbally by Mr Peter Lawton and as set out in his letter of the 5th February 2003, are to carry out where practical a brief 'drive by' external inspection of the buildings located within the area of interest, this with a view to providing an outline indication of potential current open market values.

1.2 The figures provided are on the basis of your instructions, with as agreed, no liability to ourselves from yourself or any other party. The report is solely on this basis.

2. Summary _____

2.1 The study area extends from the eastern side of Mundesley incorporating Hillside Chalets and Mundesley Holiday Camp through to the eastern boundary of Walcott and the Coastline village at Ostend Gap.

2.2 The study comprises all residential buildings to the north of the line shown on your drawing and includes part of Bacton Gas Terminal. We have indicated a figure for the terminal although this is no more than a guess reflecting the complex and specialist nature of the site together with the buildings and other matters. There is of course the potential for substantial variation on this particular aspect.

2.3 We have excluded all infrastructure this with the exception of spot figures for the caravan sites located in Bacton and Walcott.

3. Location _____

3.1 As stated, the site extends from Hillside in Mundesley to the eastern side of Walcott at Ostend Gap. It comprises the two Coastal villages of Bacton and Walcott together with agricultural land. The buildings are predominantly residential, some used for holiday purposes and including a number of chalets and caravan sites.

4. Description and Accommodation _____

4.1 No internal inspection has been made of any of the buildings, our inspection being solely external, either on foot or by car. From our knowledge of many of these properties in past years, we are reasonably aware of the levels of accommodation.

Report on _____
Mundesley to Walcott
Strategic Study

5. Condition and State of Repair _____

5.1 We have, for the purposes of this report, assumed the various buildings to be in satisfactory order, this with the exception of those where it is clear from the outside that substantial maintenance or more major works are required.

6. Tenure and Report on Title _____

6.1 Our valuation assumes that there is a satisfactory title to each property, either freehold or long leasehold with no defects. Figures reflect vacant possession and/or, with regards to business premises, ongoing use.

7. Town Planning and Development _____

7.1 Our report has regard to the existing use of the various buildings, both residential and commercial, with, where sites are vacant, the appropriate use as shown on the town planning policy reflected. We have also taken into account potential in respect of certain sites where redevelopment is considered the most appropriate.

8. Environmental Matters _____

8.1 Our valuation assumes that there are no deleterious or hazardous materials or techniques which may have been used in the construction of the various properties.

8.2 Initial consideration has not indicated major contamination affecting the properties which would affect our valuation. However, should it be established that contamination exists or that the premises have been or are being put to any contaminative use, this might reduce the figures now indicated. Should further information be forthcoming we would be pleased to deal with this by means of a side letter.

8.3 Our figures also assume that no dwellings are at risk from any collapse to the coastal slope and that this situation will not arise in the future.

9. General Remarks _____

9.1 This exercise comprises in excess of 920 units, the substantial majority being residential, with in some instances more than one dwelling in a unit, particularly to some of the holiday and caravan sites. In each case the potential values indicated, these as set out on the attached plans, are for the bricks and mortar only. No account has been taken of business goodwill or other factors and the increased value that these could bring. Similarly no value has been included for agricultural land, although as a guide we would suggest a figure of £7,500 (seven thousand five hundred pounds) per hectare.

**Report on _____
Mundesley to Walcott
Strategic Study**

9.2 In addition we have included within our figures dwellings which are affected by the boundary line.

9.3 Reference has been made earlier to the Bacton Gas site.

10. Valuation Commentary _____

10.1 On the basis of the inspections undertaken, and as set out in this report, we would anticipate the potential for a total value of some **£75,400,000 (seventy five million four hundred thousand pounds)**, this having regard where practical to comparable sale prices and our knowledge of a percentage of the buildings during past years.

10.2 We have further stated a figure of **£250,000,000 (two hundred and fifty million pounds)** this in respect of Bacton Gas Terminal as an ongoing operation, although as stated this could be somewhat pessimistic or indeed optimistic.

10.3 As you will appreciate, there is potential for a substantial variation on this sum which will only become apparent following more investigation and a detailed inspection of each unit. We would anticipate any change on this basis likely to be in a upward direction.

10.4 As agreed, copies of the plan provided by yourself are attached to this report, with, on each section, individual guide figures marked.

Notes:

1. Our valuation report is provided for the stated person and for the sole use of the named client. It is confidential to the client and professional advisers and the valuer accepts no responsibility whatsoever to any other persons.
2. Neither the whole nor any part of this report may be included in any published document, circular or statement, nor published in anyway without the valuer's written approval of the formal context in which it may appear.
3. No allowance has been made for the cost of disposal, nor for any liability for taxation which arise on disposal.
4. It should be fully borne in mind that the value of the property can rise and fall due to political and fiscal policies.

Signed:
A J Hird MRICS
on behalf of Messrs G A Key

Dated: 28.02.03.

keys

8 Market Place Aylsham Norwich Norfolk NR11 6EH

**Report on _____
Mundesley to Walcott
Strategic Study**

Section B

Peter A J Lawton C.ENG. M.I.C.E. consulting engineer

Mr. A.J. Hird
Keys
8 Market Place
Aylsham
NR11 6EH

Your reference
Our reference

05 February 2003

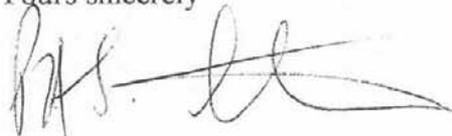
Dear Tony

Mundesley to Walcott Strategic Studies

I have enclosed a copy two copies of 1:25,000 scale plans showing the extent of the next property value assessment area. I have also enclosed an A4 plan for reference purposes. This area abuts both the Mundesley and Happisburgh study areas. I hope that I have shown the boundaries properly but, just in case, would you mind checking your earlier work to ensure that there is not a gap? As discussed yesterday, it is important that this exercise be completed by 24 February 2003.

I have also enclosed a cheque for the sum of £352.50 in respect of your invoice number A4/03, the fee for the Overstrand to Mundesley valuation.

Yours sincerely



Peter A.J. Lawton

St La Haye
Church Street
Plumstead
Norwich
Norfolk NR11 7LG

t 01263 577322
f 01263 577322
e pajl@paston.co.uk

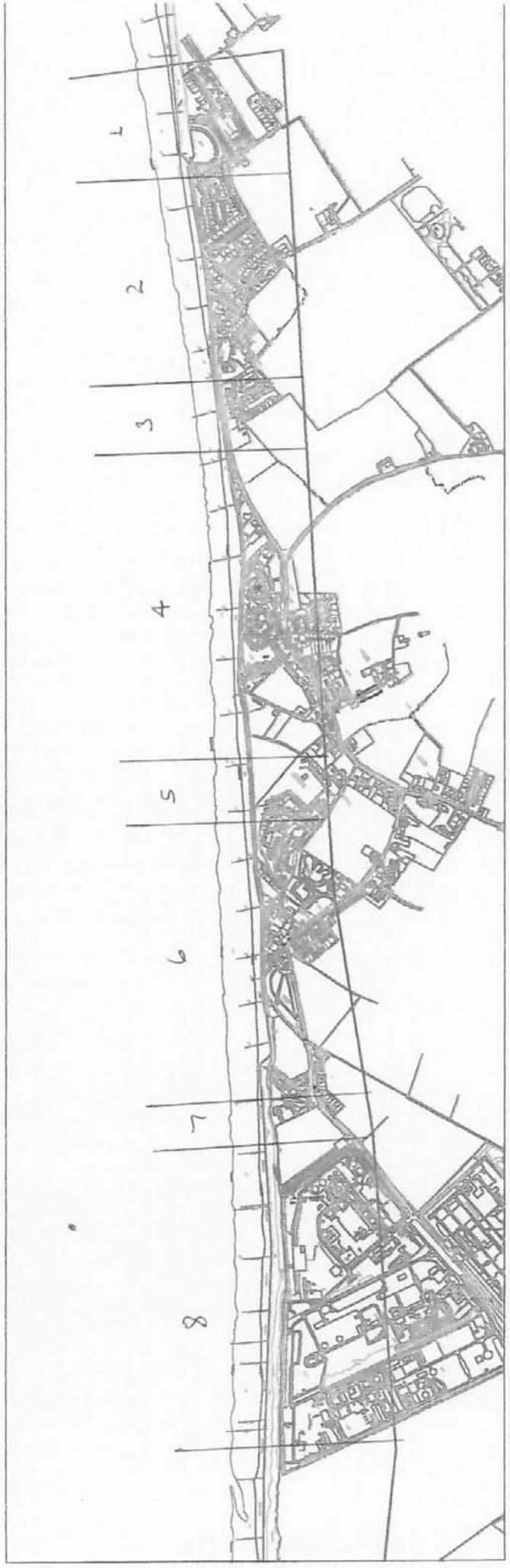
St La Haye Limited
Registered in England
Number 3568387

Report on _____
Mundesley to Walcott
Strategic Study

Section C



1:20,000



PLAN 1



Check overlap with the
Happisburgh study!

PLAN 3

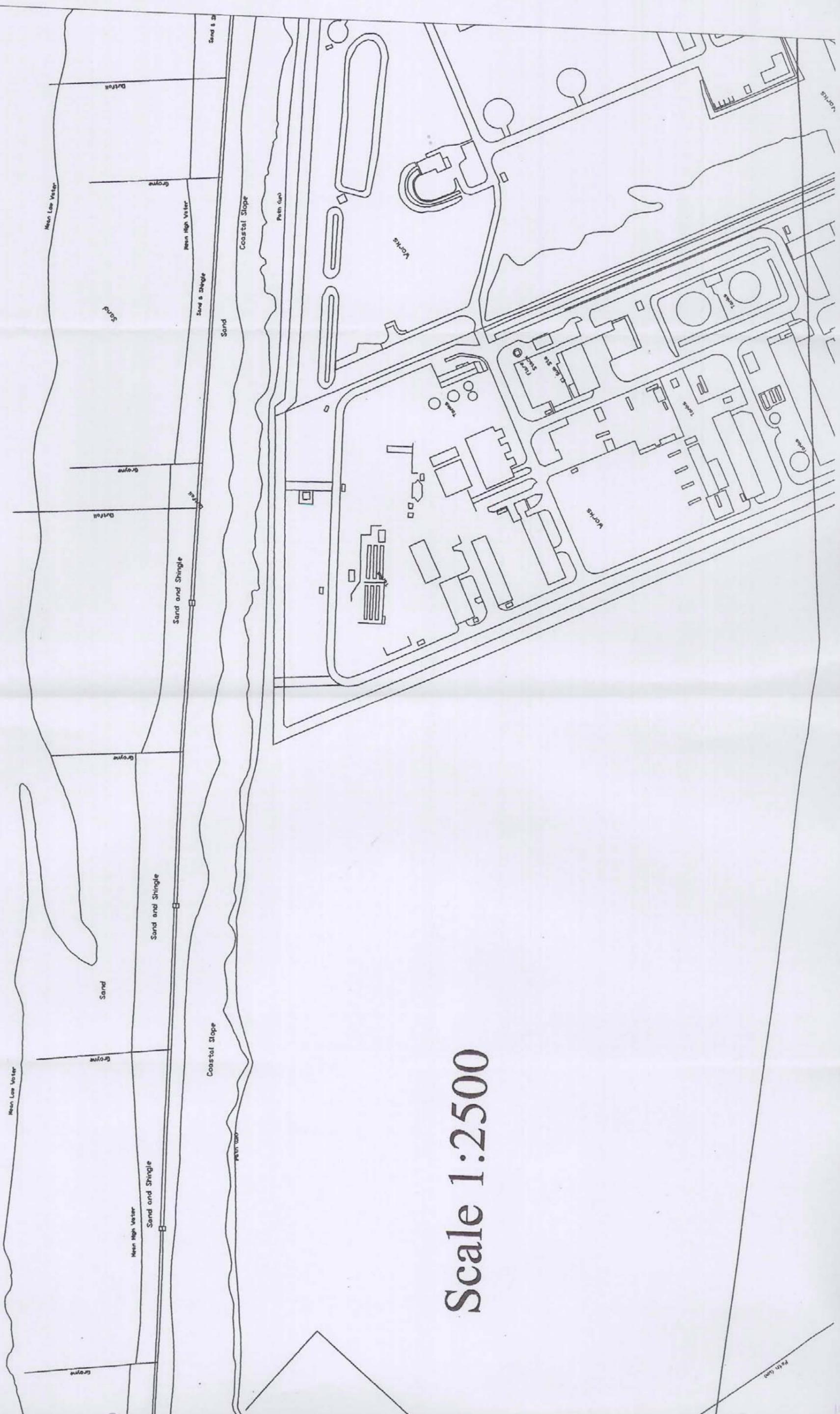


1:2500

PLAN 7



PLAN 8



Scale 1:2500

PLAN 9



