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i. Executive Summary

Shingle beaches provide a vital element of the flood and coastal erosion defences along the Hythe and Folkestone frontage. With the past completion of the two major coast protection schemes in 1996 and 2004 the frontage is now entirely dependant on the successful implementation of beach management through a sediment recycling program. These works are essential in maintaining the current high standard of protection provided by the beaches and seawalls along this frontage and ensuring the level of risk is maintained at an acceptably low level. However, with this form of beach management now in its infancy, it is imperative that the monitoring is continued to ensure the full analysis of beach performance. This data will subsequently facilitate the refinement of present works and allow for a more informed decision on any future recycling procedures undertaken.

The condition and performance of different beach sections are currently monitored through the Strategic Regional Coastal Monitoring Programme. This report evaluates changes along the coastline in the previous year (2005-2006) and compares these to baseline surveys conducted at the outset of the project in 2003. The key findings are listed below:

- There are a number of dominating features highlighted by the analysis of the data collected by as part of this monitoring programme. The most significant is the overall net increase in beach volume that has occurred in the first reporting period, which is primarily due to the capital beach renourishment scheme that took place during the summer of 2004.

- During the second reporting period (2004 to 2005) the analysis shows an erosion trend along the majority of the frontage. This is postulated to be as a result of the initial losses incurred through the washing out of fine material from the dredged renourishment material.

- During the present reporting period (2005 to 2006), the data collected illustrates a similar trend of erosion although at a far reduced rate, approximately 87% of that experienced between 2004 & 2005. This therefore indicates a stabilisation in beach volume following on from the loss of fines.

- The general trends that are shown from the CSA analysis reflect the predominant drift of material from west to east. This is highlighted close to the larger groynes along the frontage, where accretion is evident on the updrift side and erosion downdrift.

- The effects of the beach recycling operations are also clearly evident from the profile CSA analysis and from this data it is possible to make some preliminary observations as to the effectiveness of the beach management. On a whole the beach management units remain relatively stable with the beach management works maintaining current crest levels.

It is important to recognise the inconsistency in short-term trends. As with many coastal areas a lot of annual variability is expected, thus drawing conclusions with increased confidence will become possible as more data is collected.
1. **Introduction**

The coastal frontage of Unit MU20 extends between Hythe in the west and Folkestone in the east and is located on the south Kent coast and comprises two distinct characteristics. The western part of the frontage is a continuation of the marine storm gravels that extend from the shingle cuspate of Dungeness. Extensive coastal development has taken place on the low alluvial plain at Hythe and at the foot of the cliffs at Sandgate. Here, where the cliffline meets the coastline, the problem of flooding is replaced by the risk of coastal erosion.

The shoreline in this area has been defended since the middle of the 19th Century so the high water line has become coincident with the line of the seawalls. The net littoral drift of shingle is eastwards but the supply from the west, Dungeness to Hythe, has been declining in the recent past. This continued loss in beach volume has caused beach levels in front of the walls to drop, and as a result of this “coastal squeeze” the seawalls have been subject to considerable wave attack. The frontage has frequently suffered localised flooding and the seawall, which is in a poor state of repair, has failed numerous times.

Historically the narrow shingle beach that extended between the western harbour arm and the western end of Hythe was retained by a comprehensive groyne field. However, as part of the 1996 Hythe coast protection scheme the groynes between Hythe and Sandgate were removed and two large rock groynes constructed in their place. These were to act as terminal groynes and performed a vital function in the newly introduced ‘open managed beach’ approach adopted for this frontage. To increase the level of protection provided by the beach to the seawalls approximately 1 million m$^3$ of shingle was placed on the beach as part of the capital renourishment scheme.

Ever since 1996 beach management has been ongoing and in 2004 the Hythe to Folkestone coast protection scheme extended this approach all the way to Folkestone harbour with an additional 326,000m$^3$ and the construction of additional rock groynes. Shingle recycling now takes place twice each year; in the spring and autumn, and the topographic data collected as part of the Strategic Regional Coastal Monitoring Programme is used to inform and refine these operations.

At the eastern extent of the management unit, on the other side of Folkestone Harbour, there is wide sandy beach that is backed by a series of concrete arches that provide erosion protection to the cliffs. This beach is relatively stable and whilst it is included within the boundaries of Management Unit 20, it is not subject to any beach management practices. The condition of the beach and any erosion or accretion trends are, however, discussed in this beach management report.

The location of the frontage is shown on Figure 1.1 and 1.2, which show the subdivision of the management unit used to describe beach movement in this report and the position of the nearest wave recorder in the Hythe Bay.
2. **Design Conditions**

Tide levels for Folkestone are shown in Table 2.1 below.

<table>
<thead>
<tr>
<th>Tide Level</th>
<th>Folkestone Tide Height (m above ODN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MHWS</td>
<td>3.45</td>
</tr>
<tr>
<td>MHW</td>
<td>3.40</td>
</tr>
<tr>
<td>MHWN</td>
<td>1.95</td>
</tr>
<tr>
<td>MSL</td>
<td>0.17</td>
</tr>
<tr>
<td>MLWN</td>
<td>-1.65</td>
</tr>
<tr>
<td>MLW</td>
<td>-2.35</td>
</tr>
<tr>
<td>MLWS</td>
<td>-3.05</td>
</tr>
</tbody>
</table>

*Table 2.1 – Admiralty tidal levels at Folkestone*

Extreme water levels have been derived for this frontage on many occasions as part of a number of studies and strategies. In 2003 to ensure that the design of the Hythe to Folkestone coast protection scheme was both robust and not overly conservative, Halcrow were commissioned to undertake a detailed review of previous studies as well as analysing new wave and water level records. The results of this study provided marginal extreme values for both offshore and inshore wave conditions as well as extreme water levels. In addition to this, comprehensive probabilistic analysis was carried out on the data sets to provide joint probabilities for wave and water level extremes. A plot showing the relationship between these two values at the offshore analysis location is shown in Figure 2.1 below.

![Joint probability curves at the offshore analysis location](image)

*Figure 2.1 – Joint probability curves at the offshore analysis location*

3. **Surveys**

All topographic and bathymetric surveys are referenced to a Global Positioning System (GPS) control grid, established for the Regional Monitoring Programme and conducted according to the current Environment Agency’s National Specification, as summarised in the Explanatory Notes (Annex A). The schedule of completed surveys since the commencement of the programme is shown in Table 3.1.
Table 3.1 – Completed surveys within Unit 20

Digital Terrain Models (DTMs) of the 2006 Beach Management Plan (BMP) survey can be found in Figure 3.1 which have been superimposed upon the ortho-rectified aerial photographs of 2005. The methodology for deriving DTMs is given in the Explanatory Notes.

### 4. Difference Models

Now that a sufficient data set has been collected, it has been possible to overlay the results of the baseline survey with successive year’s data. This enables comparative volumetric analysis to be undertaken to determine change over a given period. The combination of three dimensional ground models and ortho-rectified aerial photographs allows visual representations of volumetric changes that have occurred during each analysis period. This is shown in Annex C Figure 4.1, which indicate areas of net erosion or accretion (note that 0.25m difference in elevation is considered as 'no change').

Figure 4.1 is the difference model of the 2006 survey minus the previous year survey (2005), with negative and positive values representing erosion and accretion during this period respectively. This final figure represents the overall erosion or accretion that has taken place since the start of the monitoring programme.

Whilst these figures show an overall change in beach volume within each discrete ‘area change boundary’ it should be recognised that these data are based on the beach plan surveys, which have been undertaken once a year (Table 3.1). The figures are only a snapshot in time of the region, and therefore the particular dynamics of each frontage need to be additionally considered. This will ensure that the information shown in the difference models represents the net change rather than capturing a particular extreme variation caused by a large event.

The remainder of this chapter contains a narrative summarising the changes that have taken place over the last two years, and hypotheses of the processes driving these changes. Also,
to ensure that the results from the difference models are representative of the year’s change rather than a particular event that may have been captured by the survey, the difference models have been cross referenced with the other beach profile surveys that have been carried out three times a year, thus providing an indication of seasonal beach variability. The Hythe and Folkestone frontage has been divided up into a series of 14 sub management units and these are shown Figure 1.1. The following section of this report discusses the changes shown by the difference models for each of these 14 sub units in turn.

4.1 Section MU20/01

Following an initial increase in beach volume in the period between 2003-2004, this section has continued to loose material with a loss of 3,199m$^3$ of material between 2005-2006. The material collects against the western side of the Stade Street rock groyne and is likely to pass around the groyne into section MU20/02, which is evident by the net loss of 4,681m$^3$ since 2003.

4.2 Section MU20/02

During the previous period (2004-2005) there was a reported loss of beach material in the region of 4,466m$^3$, which has increased in this period (2005-2006), with a further 6,251m$^3$ of beach material being lost from the frontage. As is the case for section MU20/01, beach material in section MU20/02 also collects of the western side of the rock groyne (Twiss Road) and inevitably bypasses the groyne into Section MU/03. Despite the initial increase in beach volumes as a result of material displacement due to the construction of the Stade Street groyne, the section has had a net loss of 1,810m$^3$ since 2003.

4.3 Section MU20/03

It was highlighted in the 2004-2005 report that due to the lack of mechanical shingle recycling during the coast protection works in 2003-2004 the western end of the frontage had experienced erosion with material building up along the western side of the rock groyne at Battery Point, filling the groyne to capacity. Following this build up of material the shingle has been allowed to bypass the rock groyne, leaving section MU20/03 and entering section MU20/04. The result of this was a loss of 8,315m$^3$ during the period 2004-2005 from section MU20/03.

However, with beach recycling taking place in 2005 the mechanical transport of material against the flow of the littoral drift has reduced the amount of shingle up against the western side of the Battery Point rock groyne. In turn there has been a significant reduction, in comparison to the previous year, in the erosion of material from the western end of section MU20/03 (loss of 1,203m$^3$). There has however, been a small accretion of material at the eastern side of the section (1,911m$^3$). Therefore, the overall net volume for section MU20/03 for reporting period 2005-2006 is 708m$^3$, with the overall net total since 2003 yielding an accretion of 4,160m$^3$.

4.4 Section MU20/04

In this reporting period 2005-2006 the difference model indicates a loss of 2,104m$^3$ of beach material in this section east of Battery Point rock groyne to the western buried rock groyne at Sandgate. This loss is significantly lower than the 11,094m$^3$ loss report between 2004-2005. There are a number of reasons for this reduction.

The initial beach renourishment in 2003/4, carried out as part of the 03/04 coast protection works, highlighted a significant accretion of 20,221m$^3$. During the following reporting period,
04-05, a significant loss of material was experienced along this section (11,094\text{m}^3), likely to be as a result of the loss of finer material and the natural littoral drift from west to east.

With mechanical beach recycling carried out in 2005 depositing approximately 4,087\text{m}^3, and the beach becoming more established, the erosion rate has dramatically decreased during this reporting period.

The overall total net volume from 2003-2006 for this section is 10,807\text{m}^3.

4.5 Section MU20/05

As reported previously, this section of frontage comprises four near-buried rock groynes which were constructed in response to the Encombe landslip in the 1980s. The previous reports indicate an accretion of beach material in this location, although it should be noted that during the period 2004-05 there was a loss of material from the active profile below MHW, resulting in a net loss of 1,078\text{m}^3.

During this reporting period 2005-06 this section has experienced an accretion of 1,217\text{m}^3, but attention should be drawn to the mechanical recycling that was carried out in October 2005, where approximately 562\text{m}^3 of beach material was deposited in this section (extracted from west of the Riviera rock Groyne – Gry B).

In addition, this section has benefited from the littoral drift of material deposited to the eastern side of Battery Point rock groyne (4,087\text{m}^3). The net littoral drift of this shingle from west to east will inevitably help to maintain the supply of available shingle.

Over the entire reporting period (03-06) this section has accreted by 2,403\text{m}^3.

4.6 Section MU20/06

This management unit extends from the Sandgate rock groynes in the west to Groyne B in the east.

Following the major capital coast protection works May 2003 to November 2004, a significant amount of capital renourishment of the beaches was undertaken in this management unit. The accretion of 44,166\text{m}^3 shown in the first reporting period is therefore as a result of these works.

During the following period (2004-05) this frontage remained relatively stable, although a slight loss of 235 \text{m}^3 may have been a result of the finer material being ejected from the beach and no beach recycling taking place. In this reporting period (2005-06) it is evident that this section of beach has accreted by 297 \text{m}^3, giving an overall volume in this section of 45,800\text{m}^3.

One reason for this increase is likely to be the mechanical recycling operations undertaken in October 2005, which deposited material on the western end of this section to create a haul road at the Riviera beach. The total deposited was 3,515 \text{m}^3 and, although extracted from the eastern end of the section, the combined down drift of material from Sections MU20/04 to 05 has resulted in this section displaying little volumetric change.
4.7 Section MU20/07

This section extends between Groyne B and Groyne C, the new rock groynes that were constructed as part of the 2004 coast protection scheme.

During the period of 2005-2006 this section has seen a clear redistribution of material as it has continued to migrate west to east following the trends found in the previous reporting periods. However, when analysing the difference model data for all reporting periods it is evident that although there appears to have been a net accretion of material, the rate at which this beach section has been accreting has decreased. This can be attributed to two primary reasons, firstly through beach stabilisation following the capital recharge scheme, and secondly, due to the beach management procedures undertaken.

The rate of accretion has evidently decreased as the ‘wash out’ of the finer material has counteracted the long shore migration of material thus bringing the sediment volume into a state of equilibrium. In addition, although the beach management works undertaken in March 2006 resulted in the bypass of 5025 m$^3$ over Groyne B into this management unit, there was also approximately 2642 m$^3$ transported over Groyne C into the crenular bays. This has therefore resulted in a net increase of only 2642 m$^3$ compared to the 3,300 m$^3$ increase incurred due to the March 2005 beach management.

It can therefore be deduced that without the implementation of the recycling programme, between 2004-2005 there would have been a net loss of 1093 m$^3$, and between 2005-2006 a net loss of 1085 m$^3$, thus indicating a natural trend of beach erosion for this unit.

4.8 Section MU20/08

Section MU20/08 was again significantly modified as part of the 2004 coast protection scheme when the three large rock headland structures (Groynes C, D and E) were constructed. Groynes C and E mark the western and eastern boundaries of this management unit respectively.

The analysis for this section is particularly difficult to conclude due to the inaccuracies incurred during the first reporting period with the creation of the difference models. However, although the data may illustrate limited change along this section, the implementation of the beach management programme has evidently played a significant role in maintaining status quo.

During the present reporting period (2005-2006) this section of frontage shows a total decrease in beach volume by 189 m$^3$, however when considering the addition of 3266 m$^3$ due to the 2005-2006 beach management programme, the overall decrease with the absence of beach management would have equated to a approximately 3455 m$^3$. This data therefore highlights the significance that the beach management programme plays in maintaining the current high standard of protection.

<table>
<thead>
<tr>
<th>Crenular Bay</th>
<th>2005-2006 Difference Model (m$^3$)</th>
<th>Addition of material due to Beach Recycling 2005-2006 (m$^3$)</th>
<th>Estimated Change without Beach Management (m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between C &amp; D</td>
<td>+171</td>
<td>+2394</td>
<td>-2223</td>
</tr>
<tr>
<td>Between D &amp; E</td>
<td>-360</td>
<td>+872</td>
<td>-1232</td>
</tr>
<tr>
<td>Total</td>
<td>-189</td>
<td>+3266</td>
<td>-3455</td>
</tr>
</tbody>
</table>
4.9 Section MU20/09

Since the construction of the Folkestone Harbour, which acts as large terminal groynes at the eastern boundary of this unit, this beach has accreted significantly because of the continual feed of material from the west. However, after the completion of the coast protection scheme in 2004 the natural supply of material to this frontage has been reduced. During the present reporting period there has been a continued trend of accretion along this section with approximately 3182m$^3$ of material primarily building up on the western extremity, although the rate of accretion appears to be decreasing. This trend possibly represents the gradual starvation of material due to the successful intervention of the terminal groynes and beach management works, although only through continued monitoring can this hypothesis be supported.

4.10 Section MU20/10 (Coronation Parade)

Coronation Parade is a wide sandy beach on the eastern side of the Folkestone Harbour and because of its sheltered nature, combined with the fact that there is no contemporary feed of sediment into this management unit, it has remained relatively stable for the last few decades. The results of the volumetric analysis have shown that during the present reporting period this section has seen a net accretion of material by 1030m$^3$.

4.11 Frontage Overview (difference models)

The graph shown below in Plate 4.1 shows the volumetric change per linear metre of the Hythe and Folkestone frontage. From inspection of this plot and the region-by-region discussion above, it is possible to draw some general conclusions as to how the frontage is behaving.

![Plate 4.1 – Beach volume change per linear metre from Fisherman’s Beach, Hythe to Folkestone Harbour. Dotted vertical lines represent section subdivisions.](image)

Plate 4.1 – Beach volume change per linear metre from Fisherman’s Beach, Hythe to Folkestone Harbour. Dotted vertical lines represent section subdivisions.
• There are a number of dominating features of the above graph and the most significant is the overall net increase in beach volume that has occurred in the first reporting period. This is due to the capital beach renourishment scheme that took place during the summer of 2004.

• The plot for the second reporting period shows an erosion trend along the majority of the management unit and this is primarily due to the initial losses incurred through the washing out of fine material from the dredged renourishment material.

• Now that there has been sufficient data collected between 2003 and 2006 the overall effects of the capital renourishment scheme can begin to be analysed. What is evident from the above graph is that there has been a trend of constant erosion at the western end of MU20/01-03. This erosion changes gradually back to accretion towards the eastern end of the management unit and is representative of the west-east sediment transport regime that is present along this frontage.

• When the beach volume change is examined over the entire frontage it can be seen that there has been an overall increase of material. The net changes for each management sub-unit are shown in Table 4.1 below, and when these are summed, the totals show that there has been an accretion of approximately 260,000m³ during the first analysis period and this is primarily as a consequence of the capital beach renourishment that took place during the summer of 2004.

• The beach volume losses that are shown by the difference model during the period immediately after the capital scheme are primarily related to the performance of the newly renourished beach and represent the initial loss of finer material from the grading envelope.

• When considering the present reporting period (2005-2006) it is evident from the table below that the beach now appears to be showing a differing response to the initial recharge. The rate of beach erosion has significantly decreased since the 2004-2005 reporting period, and for over 50% of the frontage an increase in sediment volume has actually occurred. Overall there is still a slight trend towards erosion but as the data illustrates, the beach appears to be developing towards a state of sediment equilibrium. However, what remains to be established is to whether this trend represents the natural development of the beach, or whether the data signifies the role that Beach Management has played in maintaining critical beach levels.

<table>
<thead>
<tr>
<th>Beach volume change (all m³)</th>
<th>2003/04</th>
<th>2004/05</th>
<th>2006-05</th>
<th>2003/06</th>
</tr>
</thead>
<tbody>
<tr>
<td>MU20/01 &amp; 02</td>
<td>862</td>
<td>-2,501</td>
<td>-3199</td>
<td>-4838</td>
</tr>
<tr>
<td>MU20/03</td>
<td>9,287</td>
<td>-4,466</td>
<td>-6251</td>
<td>-1430</td>
</tr>
<tr>
<td>MU20/04</td>
<td>10,893</td>
<td>-8,315</td>
<td>708</td>
<td>3286</td>
</tr>
<tr>
<td>MU20/05 &amp; 06</td>
<td>20,881</td>
<td>-11,094</td>
<td>-2104</td>
<td>7683</td>
</tr>
<tr>
<td>MU20/07</td>
<td>2,122</td>
<td>-1,078</td>
<td>1217</td>
<td>2261</td>
</tr>
<tr>
<td>MU20/08 to 11</td>
<td>44,166</td>
<td>-235</td>
<td>297</td>
<td>44228</td>
</tr>
<tr>
<td>MU20/12</td>
<td>43,576</td>
<td>2,207</td>
<td>1557</td>
<td>47340</td>
</tr>
<tr>
<td>MU20/13</td>
<td>133,724</td>
<td>-7,983</td>
<td>-189</td>
<td>125552</td>
</tr>
<tr>
<td>MU20/14</td>
<td>-4,628</td>
<td>4,369</td>
<td>3182</td>
<td>2923</td>
</tr>
<tr>
<td>All regions</td>
<td>260,223</td>
<td>-29,096</td>
<td>-5376</td>
<td>227005</td>
</tr>
</tbody>
</table>

Table 4.1 – Region by region and overall beach volume changes along the Hythe and Folkestone frontage from 2003-2006.
5. **Wave Climate**

Wave records for the Folkestone and Hythe frontage are recorded by the Datawell Directional WaveRider that was first deployed on 08 July 2003.

The wave directions recorded by the buoy in its first year were found to be contaminated by a significant tidal signature, compounded by the on-board data processing. The buoy received new electronics to fix this problem in February 2004; wave directions measured before March 2004 have been excluded from the analysis.

In late June 2004, the buoy was cut from its moorings and recovered a week later in the southern North Sea, 35nm east of Ipswich. The buoy was serviced and refurbished and redeployed in early October, approximately 100m away from its earlier location.

A detailed report containing the recorded wave statistics is included in Annex D of this report. However, in summary, there were two storm events above the threshold during the reporting period. These storms occurred in succession at the beginning and end of December and their analysis can be seen in Annex D.

6. **Beach Design Conditions**

The design philosophy of the 1996 and 2004 coast protection schemes relies upon there being a sufficiently wide crest to the beach to provide protection to the seawall and to reduce wave overtopping to acceptable levels. The design width varies depending on the location, the form of defence and the risk of flooding behind the seawall. These crest width criteria are shown in Table 6.1 below.

<table>
<thead>
<tr>
<th>Management Unit</th>
<th>Critical crest width (m)</th>
<th>Recorded crest width above 4.5mOD (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Narrowest profile</td>
<td>Widest profile</td>
</tr>
<tr>
<td>MU 20/01</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MU 20/02</td>
<td>15.0</td>
<td>10</td>
</tr>
<tr>
<td>MU 20/03</td>
<td>15.0</td>
<td>20</td>
</tr>
<tr>
<td>MU 20/04</td>
<td>7.0</td>
<td>13</td>
</tr>
<tr>
<td>MU 20/05</td>
<td>7.0</td>
<td>7</td>
</tr>
<tr>
<td>MU 20/06</td>
<td>7.0</td>
<td>13</td>
</tr>
<tr>
<td>MU 20/07</td>
<td>7.0</td>
<td>17</td>
</tr>
<tr>
<td>MU 20/08</td>
<td>7.0</td>
<td>15</td>
</tr>
<tr>
<td>MU 20/09</td>
<td>7.0</td>
<td>4</td>
</tr>
<tr>
<td>MU 20/10</td>
<td>7.0</td>
<td>22</td>
</tr>
<tr>
<td>MU 20/11</td>
<td>7.0</td>
<td>20</td>
</tr>
<tr>
<td>MU 20/12</td>
<td>4.0</td>
<td>8</td>
</tr>
<tr>
<td>MU 20/13</td>
<td>4.0</td>
<td>0</td>
</tr>
<tr>
<td>MU 20/14</td>
<td>4.0</td>
<td>28</td>
</tr>
</tbody>
</table>

Table 6.1 – Critical design beach crest widths compared with recorded values

From the above values it can be seen that in general the critical beach width has been achieved or exceeded. The principle behind the open beach management approach that has been adopted for this frontage is that there is sufficient material within each management unit to accommodate the erosion that occurs between beach recycling operations. Depending on the timing of the survey, the state of the beach will vary the most at the extreme ends of the unit. For example, at the updrift end there will be a period immediately following the recycling.
operation where the crest width exceeds the critical value. Throughout the year this width will reduce and material will accumulate at the downdrift groyne. The narrowest and widest recorded widths shown in Table 6.1 above are therefore generally the extremes at either end of the management unit.

7. Recycling Operations

The majority of the Hythe and Folkestone frontage (MU20/02 to 012) relies upon the ongoing recycling operations to counter the natural transport of sediment along the frontage. Generally, the majority of recycling takes place in September, although a small amount is also undertaken in March following the winter storms. The principle behind the open managed beach approach is simply to maintain sufficient beach volume in front of the seawall to protect it from failure and to reduce wave overtopping. The volumes that are recycled each year greatly depend on the net volume of material that has been transported naturally along the frontage during the year.

Table 7.1 below summarises the volumes recycled in each period. The reason that the recycling period was delayed in 2004 from September to December was because of the coast protection scheme. The significant reduction in recycling undertaken that year is also a reflection of the amount of capital renourishment carried out during that year.

<table>
<thead>
<tr>
<th>Volume of material recycled in period (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30,070</td>
</tr>
</tbody>
</table>

Table 7.1 – Beach recycling volumes

8. Conclusions

The data that has been recorded over this reporting period and summarised in this beach management report exhibits many trends. Many of these fit well with anecdotal evidence and support the historic beach management decisions that been taken in the past.

The effect of the beach recycling operations is clearly evident from the profile CSAs and from the difference model analysis. From the results of the analysis of this data it is possible to conclude that the current level and approach to beach management carried out on this frontage is appropriate. However, the continual monitoring of the performance of the beaches and the feedback provided each year from the analysis of the monitoring data will allow this process to be refined.

In general the beach frontage remains relatively stable with a loss of only 5376 m³ between 2005 and 2006. However, the data collected has illustrated that there has been a large degree of sediment redistribution across the frontage which demonstrates the natural evolution of the beach frontage. This natural movement of material is currently limited or reversed by the effective interaction between the terminal groynes and the beach management recycling operations. Overall the frontage has shown an increase of approximately 227,005m³ and this is the net result of the capital recharge that took place during the summer of 2004.
The volume increase that has occurred is only 87% of the overall volume that was placed on the beach during the renourishment campaign which suggests very high volume losses. However, the previous beach management report had suggested that there is a significant volume of finer material, which has been washed out of the as-dredged material and is now sitting at the toe of the beaches below the -1mOD contour. Consequently this is outside of the survey envelope and is therefore not included in the volume calculations.

In summary, the beaches along the Hythe and Folkestone frontage have exhibited sediment transport trends that fit well with those experienced in the past and also those predicted by the mathematical models used in the design of the 2004 coast protection scheme.

Scheduled future monitoring includes profile surveys in Spring 2007 and Storm surveys may be carried out if any event is deemed to have significantly affected the frontage.