

5.0 OPTIONS FOR DISPOSAL OF THE DREDGED MATERIAL

5.1 The total volume of material to be dredged is 960,000 m³. Sediment analysis shows that the majority of dredged material is sand and gravel with the highest silt levels of approximately 15% found in the upstream reach of the river. Chemical analysis of this silt fraction determined that pollutant levels were generally low in comparison to other Irish Ports. It has been confirmed by *Forbairt* that "levels of contamination within the dredged material are well below those that would give cause for concern".

Option 1

5.2 Disposal sites at sea were considered and discussions held with the Department of the Marine to determine the closest licensed disposal site suitable for the volume of material to be removed. In this option the dredged material would be placed directly into barges which would be taken out of the estuary and discharged at an agreed disposal site. Following investigation and a lengthy review by the Department of Marine's Fishery section it was established that the nearshore area is important for fishing, particularly trawling, and that the volume of material is such that the nearest site considered to be suitable for sea disposal is some 55 km from Drogheda bar as illustrated in Figure 5.1.

- The extra over cost of transporting the dredged material to this location was in the order of £2.0 - 2.5M. This expenditure would result in the scheme being unviable as the additional funds required are unavailable.
- In addition, a cutter suction type dredger could not be used to undertake the capital dredging works. Instead a bucket or back hoe type dredger would have to be used which would increase the contract period from 5 months to around 12-18 months with consequential impact on the whole estuary.

- The works would therefore have a greater impact on the Boyne estuaries's salmonid and mussel fisheries as dredging would occur over two seasons and there would be a delay in reseeded mussel stocks. There is also the potential for prolonged turbidity to affect migrating salmon.
- Due to the works extending over two winter seasons there would be added risk of bad weather interrupting the programme and extending the works even further.
- There would also be a prolonged impact on the shipping currently using the port and the anticipated increase in vessel size projected to use the port would be jeopardised or at least delayed.

Option 2

5.3 An alternative option of extending the dunes on the foreshore to the north of the training walls was thoroughly investigated. The "cut back" to the north of the north training wall is an area which is accreting naturally and lies within the proposed NHA and SPA. The sands and gravels from the dredging could be pumped directly to the site and used to form a new dune system in front of the existing dunes. The bulk of the dunes would be formed from the sand/gravel while the sand from the entrance channel would be used to provide a sand cover. The dunes would be contoured and planted to match the existing grey dune system.

5.4 The location and general layout of this infill proposal is presented in Figure 5.2. The extended dune system would represent the equivalent of many decades of accretion with the gradual establishment of successional flora over time.

The location of the infill area was selected to avoid the nesting sites of Little Tern which are situated on a gravel/shingle bank immediately to the north of the training walls. This single ridge is shown in Plate 5.1 along with the concave

coastline which is accreting and developing seawards. A hydraulic study including sediment transport analysis along the coastline indicates that the ridge will be covered by dune advancement within 10 years thus removing the Terns nesting site by natural sedimentation. By way of compensation for infilling the area north of the Tern colony the Drogheda Port Company proposed to carry out annual maintenance dredging in the lee of the north training wall to minimise further dune growth over the shingle ridge and hence extend the life of this important feature.

- 5.6 Despite these beneficial measures and additional amelioration by moving the reclaimed dune formation a further 500 m northwards, this option was still considered by OPW and IWC to be unacceptable.
- 5.7 They cite the ecological impact on the bird populations in this Special Protection Area (SPA) and particularly the impact on "priority habitat" embryo dunes in this proposed Natural Heritage Area (NHA) to be environmentally unacceptable. In addition, the dune habitat has been classified as a proposed Special Area of Conservation (pSAC). An ecological assessment of the Baltray dune area is presented in Sections 7.0 and 15.0.

Option 3

- 5.8 An option to dispose of the dredged material to quarry sites outside Drogheda was considered.
- 5.9 There are old quarry workings on the Dundalk side of the town which could contain the dredged material. In this option the dredged material would be placed in barges and brought to the town quay where it would be unloaded into trucks for transportation to the quarry.

- 5.10 Some 1,520,000 tonnes of material would have to be transported and if a dredging programme of 5 months is to be achieved then this will involve 5 unloading excavators, and 1,000 lorry movements per day for 7 days a week. This equates to 1 heavy vehicle trip approximately every 48 seconds over an assumed 14 hour day (7 am - 9 pm). The additional cost is in the order of £3 million and the traffic implications for Drogheda would be particularly severe. This volume of heavy traffic, in combination with the disruptions to traffic flow associated with other ongoing major capital works schemes within Drogheda would have significant implications for the residents of Drogheda Town and through traffic on the N1 in terms of noise, traffic delays and airborne pollution. Even if the dredging programme was extended to 12 months (approximately 1 heavy vehicle trip every 2 minutes) the additional cost would remain similar and be such that the Harbour Development Scheme would be uneconomic.

Option 4

- 5.11 An alternative disposal site was considered behind the south training wall on the area of the accreting beach at Mornington.
- 5.12 In this option it was proposed to excavate the sand which has built up behind the south wall and transport it southwards to form beach re-nourishment in the Bettystown/Laytown area which is suffering erosion. The dredged material would then be pumped directly to replace the excavated sand and the area covered with sand to replace the beach to the current levels.
- 5.13 The scheme would have the benefit of improved beaches at Bettystown/Laytown but would increase the cost of the scheme by approximately £0.6 million.
- 5.14 This proposal would require a sufficient volume of beach sand removal to permit dredged material infilling. However, the lowered beach levels after excavation would make the dunes in this proposed NHA more vulnerable to erosion before infilling was completed. The stretch of dunes closest to the training wall exhibit

embryo dunes and evidence of seawards accretion. The habitat is recognised by the proposed NHA status for environmental protection. The 5-6 month construction period during the winter raised the probability of storms occurring which could erode the dunes. In addition, beach surveys indicated that only 65% of the dredged material could be accommodated by excavating down to low tide level in a 1.8 km length of beach south from the training wall. As this would leave the dunes very exposed to erosion the option was considered both environmentally and technically unacceptable.

Option 5

- 5.15 An alternative option incorporating beach renourishment and material disposal was considered. The dredged material could be spread on the beaches to the north and south of the Boyne entrance.
- 5.16 The material would be dredged, placed in barges and then delivered to the beaches by pumping through several pipelines from nearshore pumpheads to the beaches.
- 5.17 While the dredged materials consist mainly of sand and gravel which would be technically suitable for coast protection, the south beach and sections of the north beach near Termonfeckin are used extensively for recreation. Indeed, the Bettystown beach held the European Blue Flag status in 1996 indicating consistently good water quality, beach management principles and safety guidelines in compliance with EU criteria. The proportion of gravel in the dredged material is such that the beaches would become stoney and not acceptable for recreational use. This change in the nature of the beaches would also affect the fauna and particularly bird populations which use the beach and hinterland for feeding and roosting. This option was rejected on the grounds of suitability as well as the additional cost of double handling the dredged material.

Option 6

- 5.18 An alternative viable option is, however, available. This would involve;
- recovery of the main quantity of dredged material; sands and gravels located between Tom Roe's Point and the Bar Mouth; for temporary storage and beneficial re-use - approximately 700,000 m³;
 - disposal of the dredged material with highest silt content, from between the Steam Packet Quay and Tom Roe's Point, to the Port's present maintenance dredging disposal site - approximately 160,000 m³;
 - disposal of the fine sand from the bar mouth to the present maintenance dredging disposal site with an option to use it as beach renourishment at Laytown if the appropriate Authorities so desire and approve - approximately 100,000 m³.
- 5.19 The principle of recovering dredged sands and gravels for beneficial re-use is in line with EC Council Directives and a suitable temporary storage area has been identified as the western polder at Stagrennan.
- 5.20 This polder formerly extended from Stameen's Pier in the east to the Railway Viaduct at the west. The western end was utilised as the Town tip with progressive infilling and development. Current development includes the construction of a municipal pumping station adjacent to the Maxol and Flogas oil and gas terminals, and temporary storage of pipes and construction equipment for the Main Drainage scheme.
- 5.21 The western polder at Stagrennan has been excluded from the designation of proposed Natural Heritage Area and Special Protection Area which cover the remainder of the estuary. Indeed, this western polder which has been leased by the Department of Marine to Drogheda Port Company has been designated for

land use zoning objectives to provide development for port related industry and other uses. The location of the polder is shown in Figure 5.3 with a typical section through the temporary storage site.

5.22 Figure 5.4 shows the land use in the vicinity of the polder highlighting the industrial and commercial nature of the area. The polder lies to the south of the Premier Periclase Plant, to the west of Stameen's Pier and the paper storage warehouse, to the east of the waste water treatment works and Maxol/Flogas depots and is bounded to the south by a grassed verge to the Mornington Road. The extent of the temporary storage material in the polder will be approximately 2 m higher than road level and will have graded slopes on each side.

5.23 The infill process will comprise the following procedures:

- (i) Raise the level of the riverside weir to above high water level to impound the polder and prevent tidal water entering.
- (ii) Dredged sands and gravels will be pumped in suspension through disposal pipelines to the polder. The sands and gravels will quickly settle out of suspension and a settlement lagoon will be provided to allow settlement of the limited silt fraction.
- (iii) Bulldozers will operate within the polder area to relocate settled material to the required levels above the bank walls.
- (iv) Pumping sands and gravels in suspension and relocating to level will commence at the eastern end of the polder progressing westwards towards the weir.
- (v) Higher settlement rates will be achieved in the early stages of the infilling as the settlement lagoon will be large. As infilling progresses westwards the volume of suspension entering the lagoon will be monitored to maintain

at least 12 hours settlement prior to the water escaping over the weir and returning to the river. Intermediate bunds will be created if necessary.

(vi) Towards the end of the dredging and infilling process the settlement lagoon will be maintained and the infilled material temporarily stockpiled by bulldozer higher than the average finished level.

(vii) When the pumping of sands and gravels is completed, the lagoon will be infilled by dozer producing an average finished level of approximately +7.9 m O.D.

5.24 Temporary storage of the dredged material in the polder will be required for 3-5 years for beneficial re-use as fill in the construction industry in line with EU directives on recycling. The material is suitable for road embankments or general fill at construction sites and interest has already been expressed in the material.

5.25 Disposal of dredged material to the Ports current licensed disposal site will also be required. The highest silt contents at approximately 15% have been indicated in the zones between the Port and Tom Roes Point in the upstream stretch of dredging. This element of the dredged material is considered to be most suitable for disposal to the site used for routine maintenance dredging disposal, located approximately 4 km from the mouth of the river.

5.26 The site as shown in Figure 5.5 covers the licensed disposal sites for disposal of maintenance dredged silts, sands and gravels as permitted by Department of the Marine annual permits from 1993 to 1997. The quantity of disposal permitted has been 60,000 m³ per annum in the last 3 years.

5.27 The area of the disposal site is 400 hectares and typical water depths are in the range of 11-16 m depth at chart datum.

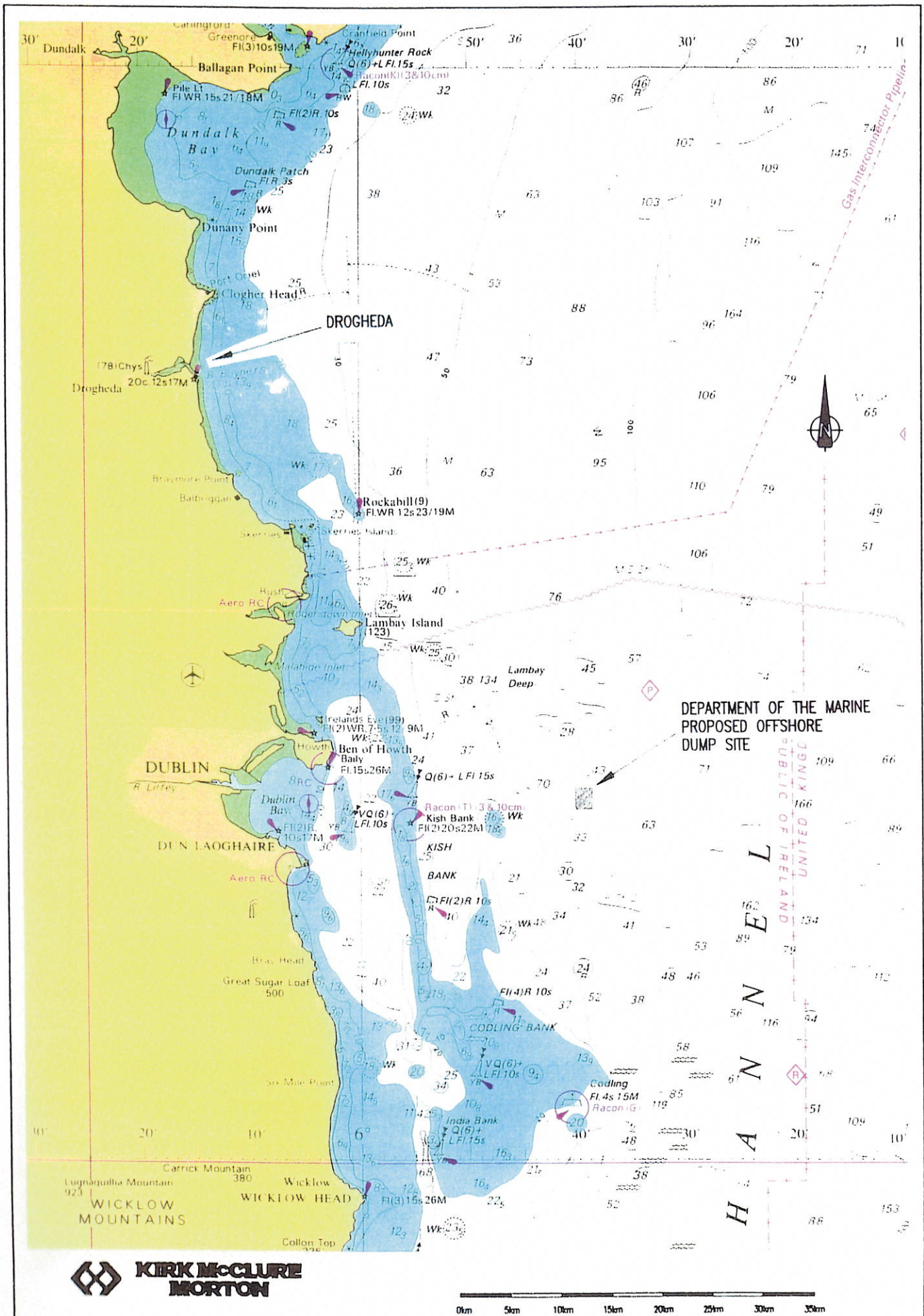
5.28 The dredged fine sand from the bar mouth is also proposed for sea disposal to the current maintenance site. The material consists of 96-97% fine sand, 1% silt and 2-3% medium/coarse sand. The area of dredging lies to seaward of the training walls as shown by figure 5.6 and results mainly from longshore sediment transport bypassing the river mouth. However, a further option to use this sand for renourishment at Laytown beach has been proposed and the relevant authorities are assessing their requirements. If the Authorities gain the relevant approvals and appropriate arrangements are carried out this sand will be made available and transported to the beach at Laytown.

5.29 Maintenance dredging of the new channel will be required on an ongoing basis at a rate similar to that prevailing at present. Continued disposal of silts, sands and gravels will therefore be required to a specialised site under licence by the Department of Marine. Maintenance dredging of the seaward channel through the fine sands will also be required particularly after storm conditions have redistributed the nearshore sediment. Some sediment can also be expected to get trapped in the channel by longshore movement. The hydraulic study of the Boyne Coastline has shown that the sand removed from the Bar Mouth during maintenance dredging should be disposed of to the nearshore at the north of the training walls so as to maintain the natural sediment transport regime. The rate of dredging and deposition will be low due to the nature and operation of the Port's maintenance grab dredger. In this way, any sand bypassing the river mouth, which becomes trapped in the seaward channel will be cleared and redeposited in the mobile area to the north.



**DUNE SYSTEMS
AT THE
ENTRANCE TO
THE BOYNE
ESTUARY**

Plate 5.1



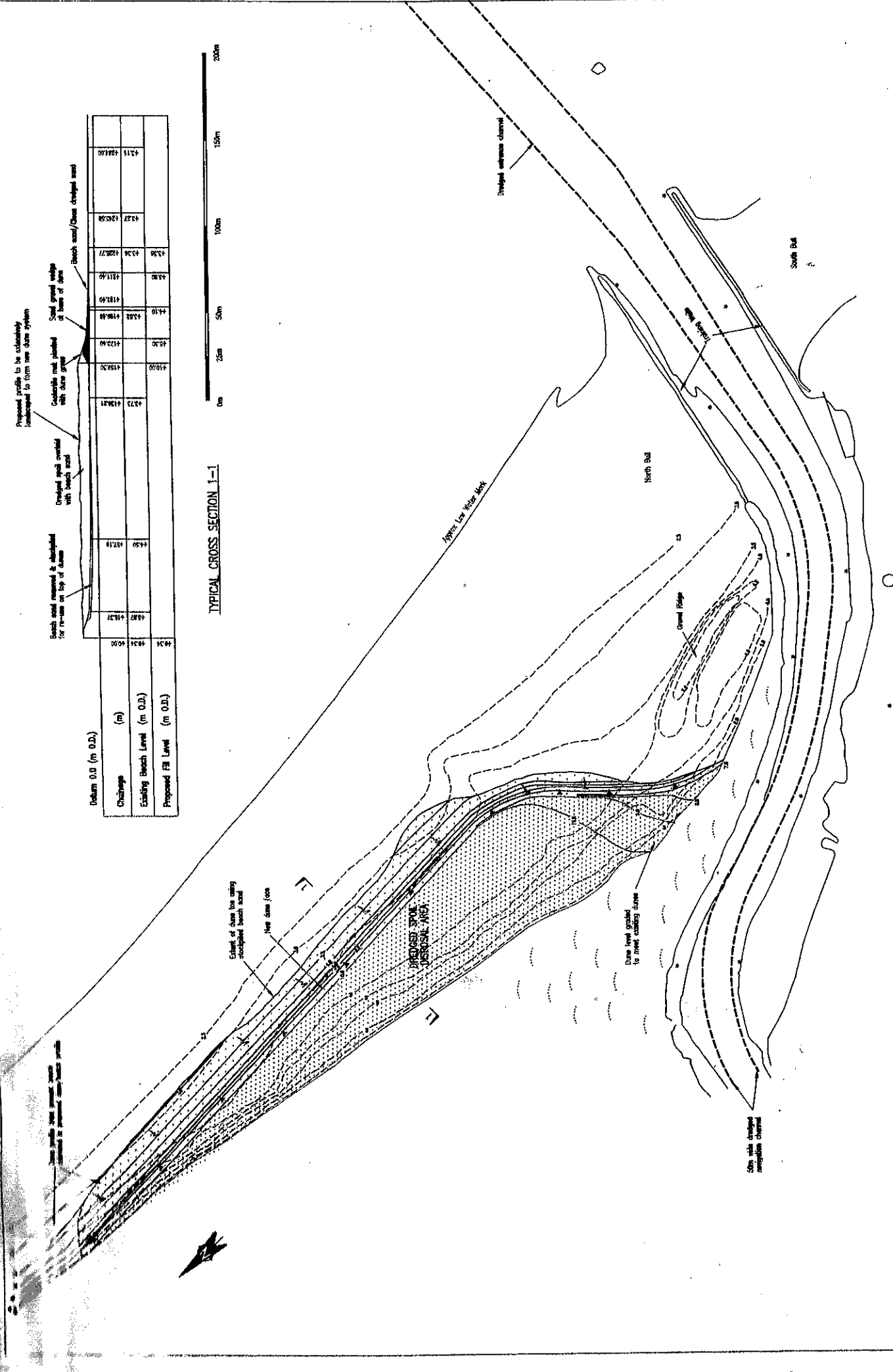
**KIRK McCLURE
MORTON**

LOCATION OF PROPOSED OFFSHORE DISPOSAL SITE

FIGURE 5.1

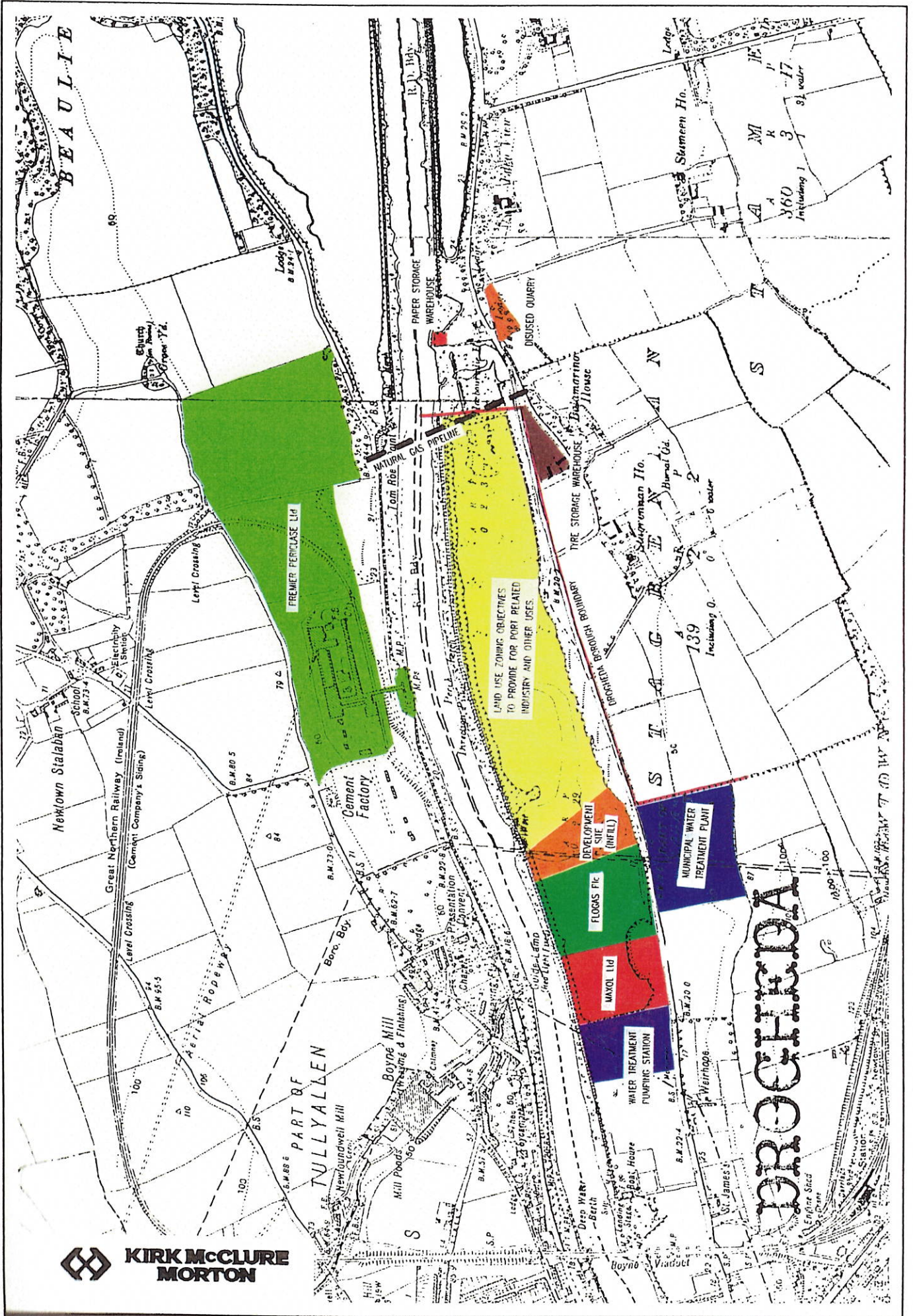
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49.24	49.24	49.00	49.24	49.00
49.25	49.25	49.00	49.25	49.00
49.26	49.26	49.00	49.26	49.00
49.27	49.27	49.00	49.27	49.00
49.28	49.28	49.00	49.28	49.00
49.29	49.29	49.00	49.29	49.00
49.30	49.30	49.00	49.30	49.00
49.31	49.31	49.00	49.31	49.00
49.32	49.32	49.00	49.32	49.00
49.33	49.33	49.00	49.33	49.00
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49.38	49.38	49.00	49.38	49.00
49.39	49.39	49.00	49.39	49.00
49.40	49.40	49.00	49.40	49.00
49.41	49.41	49.00	49.41	49.00
49.42	49.42	49.00	49.42	49.00
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49.97	49.97	49.00	49.97	49.00
49.98	49.98	49.00	49.98	49.00
49.99	49.99	49.00	49.99	49.00
50.00	50.00	49.00	50.00	49.00

TYPICAL CROSS SECTION 1-1



TITLE BEACH RECLAMATION SITE AND TYPICAL CROSS SECTION

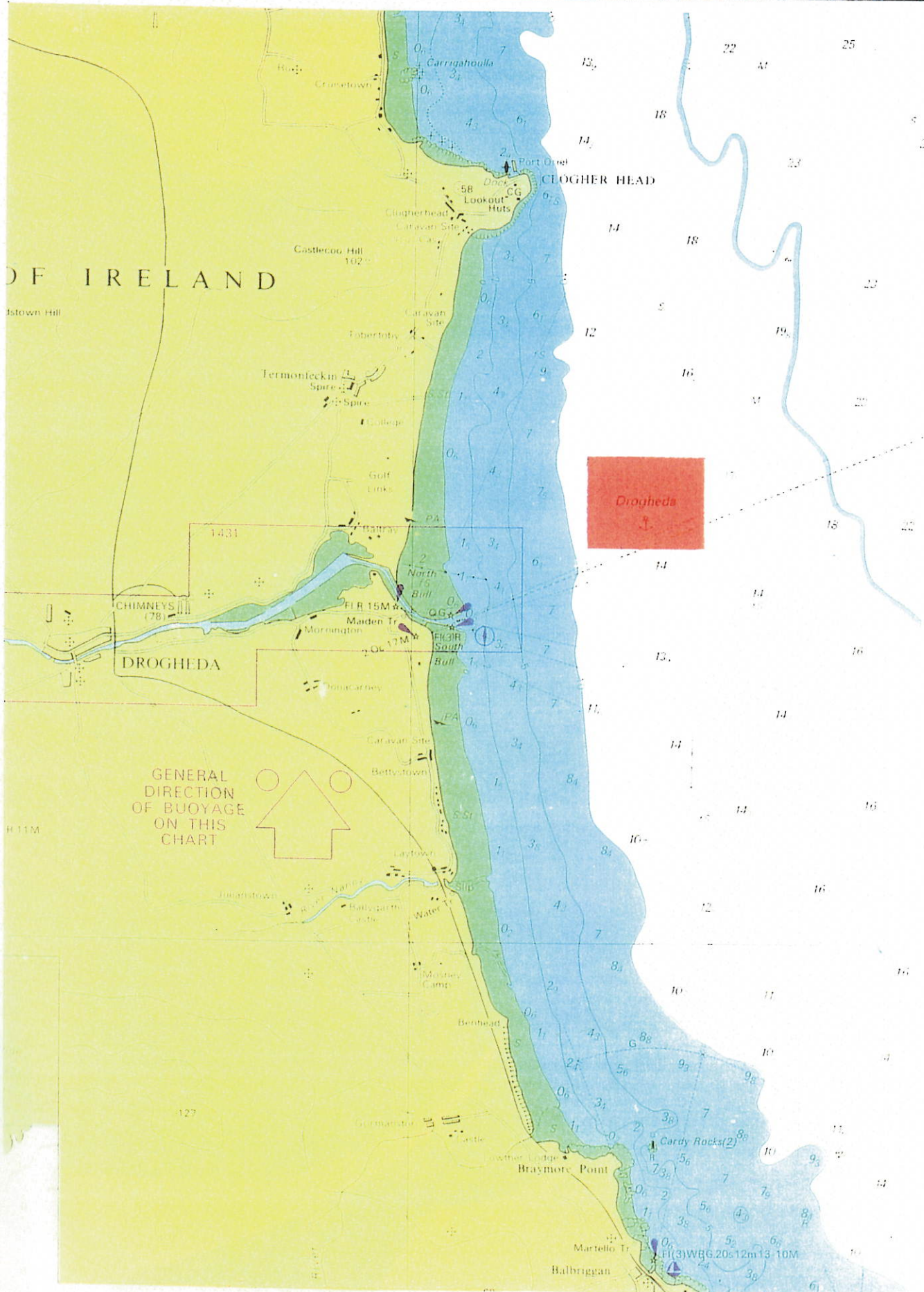
FIGURE 5.2



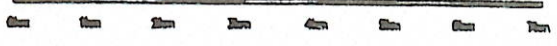
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LAND USE ADJACENT TO STAGRENNAN POLDER

FIGURE 5.4



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LOCATION OF SEA DISPOSAL SITE

FIGURE 5.5

