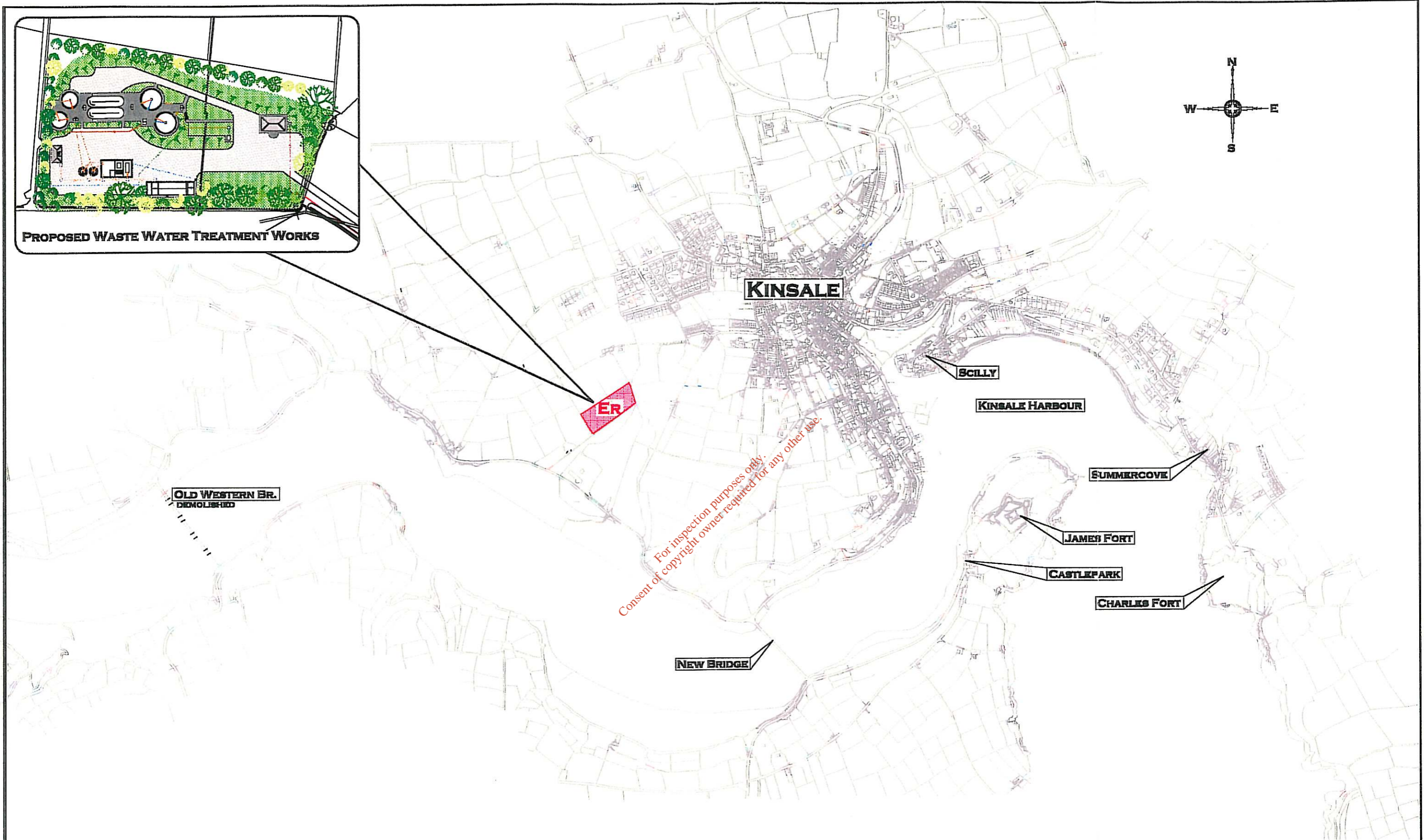
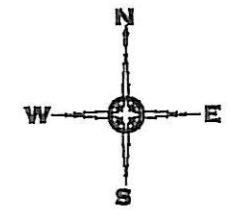
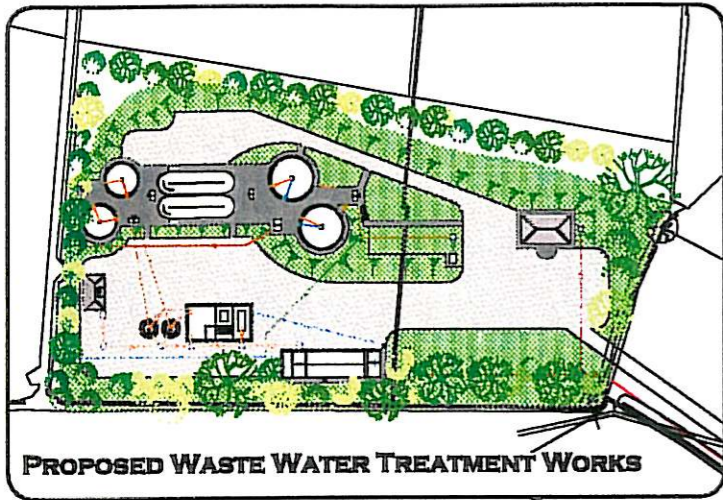


1.0 INTRODUCTION

- 1.1.1 Cork County Council propose to upgrade the sewerage scheme for the town of Kinsale, together with the construction of a modern waste water treatment plant, to serve the needs of Kinsale town and environs. The treatment facility will have a capacity of 9,800 PE to allow for future development and expansion.
- 1.1.2 Cork County Council have instructed Malachy Walsh & Partners, Consulting Engineers, to prepare an Environmental Impact Study on behalf Kinsale Urban District Council and themselves on the Scheme.
- 1.1.3 Information on the project and its potential effects on the Kinsale area has been collected over an extended period since 1993. This information is presented here in ten sections. Alternative sites and technologies are considered in Section 2, followed by a detailed description of the proposed scheme in Section 3. The subsequent Sections 4-10 present the effects of the development on key aspects such as human environment, water quality, landscape, ecology, air, noise and cultural heritage.
- 1.1.4 Previous documents prepared for the Scheme, and referred to in this document, comprise the following:
- ◆ Preliminary Report prepared by Malachy Walsh and Partners, dated November, 1993 incorporating:
 - ◆ Hydrographic Survey and Study by Hydrographic Survey Ltd, in conjunction with Marine Computation Services Ltd
 - ◆ Intertidal, Subtidal and Water Quality Surveys by Aquafact International Services Ltd
 - ◆ Addendum to Preliminary Report – Development in the Commoge Area, prepared by Malachy Walsh and Partners, dated July, 1997
- 1.1.5 A non-technical summary of the study is included at the beginning of this document.



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Project
Kinsale Sewerage Scheme. E.I.S.
Kinsale, County Cork

Title
**Layout Plan Inset
Proposed Waste Water
Treatment Plant**

Scales 1:15000
Drawn
Ch'd (D.O.)
Ch'd (Eng.)
Approved

Org. No. 2328/EIS1
Fig. 1.1
rev. | A |

2.0 ALTERNATIVES

This section details the alternatives originally reviewed in the Preliminary Report for the various elements of the proposed Scheme. Figure 2.1 shows the alternative locations considered for the waste water treatment plant and outfall pipe. The location for the revised waste water treatment site E_R at Commoge (see section 2.1.12) is also shown.

2.1 Waste Water Treatment Plant Site Selection

2.1.1 In all, five sites within the environs of Kinsale were reviewed as potential treatment plant locations (see Figure 2.1 and Plates 2 to 8). These were pre-selected on the basis of engineering, cost, and environmental criteria. Chief among the environmental considerations were the potential effects upon landscape (both terrestrial and marine), ecology (terrestrial and marine), and cultural heritage. The sites include one location at James Fort (A), two locations at Charles Fort (B and C), one location at Commoge (D) and one location at Cappagh (E). Outlined below is a summary of the criteria for selection and rejection of each site as appropriate.

Site A - James Fort

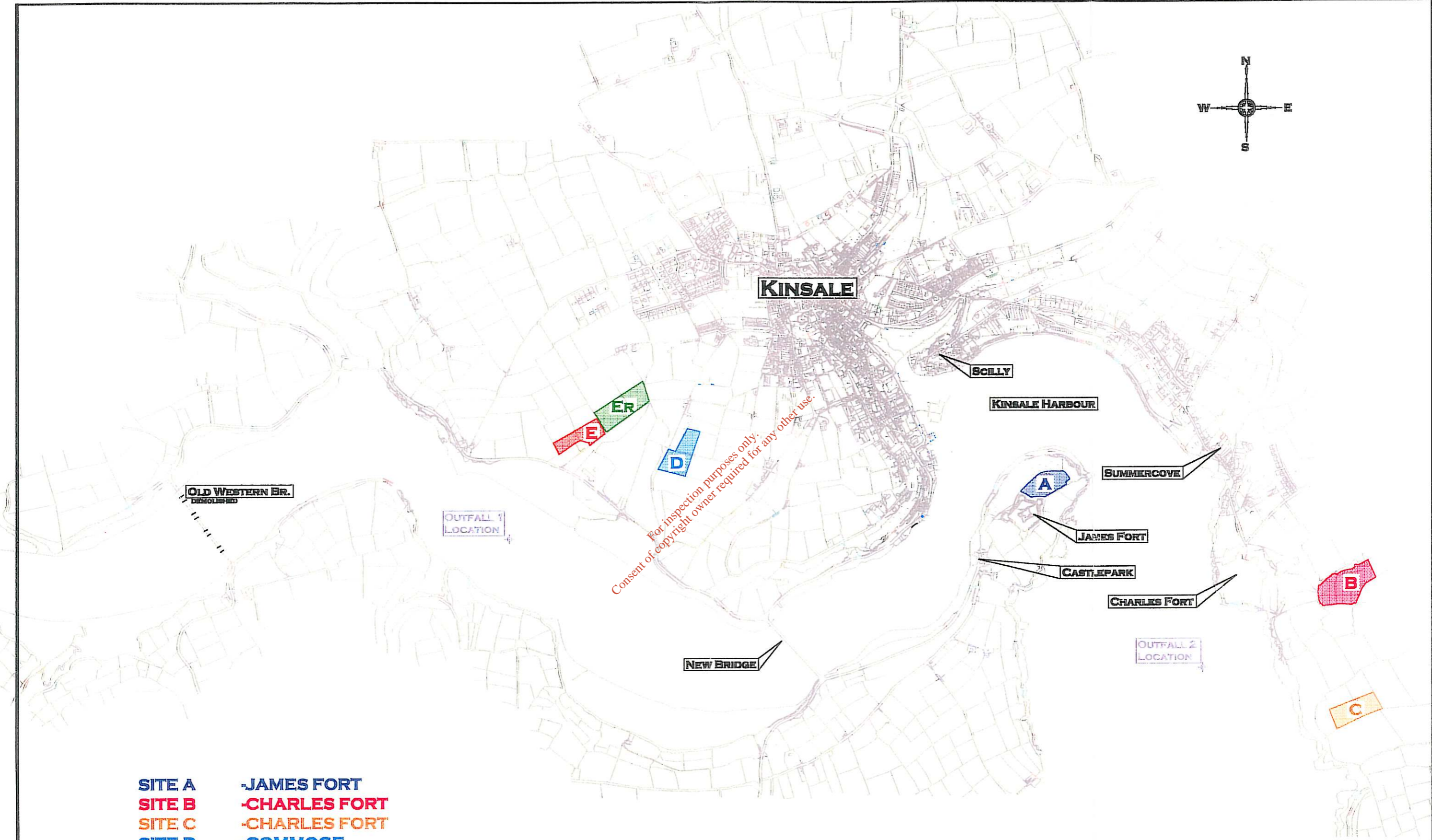
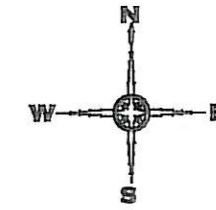
2.1.2 The fields on the promontory immediately to the east of James Fort present an option of considerable technical merit (Plate 3). A rising main laid under the river bed would convey sewage from close to the present outfall location across the channel and to a treatment works constructed on the saddle of the peninsula at point "A". The outfall could be laid south-eastwards into the estuary below the Fort and to the east of it. It was envisaged that the works would be set below ground level and partially roofed in such a manner that grass would be replaced over much of their area. This could be done in a manner that would effectively conceal their presence.

2.1.3 This option was rejected, however, on the following criteria:


- ◆ Cultural, historical and archaeological significance of the site
- ◆ Significant amenity disruption during construction.
- ◆ Additional costs of (1) access to plant, and (2) concealment of plant.
- ◆ The need for a relatively long outfall to discharge outside the inner harbour.

Sites B and C - Charles Fort


2.1.4 This area had the attraction, on engineering grounds, of laying a rising main along the eastern shore of the estuary conveying the town sewage to points below Charles Fort (Plates 4 and 5). Pumping the sewage to this general location would enable the treated effluent to be discharged into waters a considerable distance below the town, and well out into the estuarine channel.



- SITE A** - JAMES FORT
- SITE B** - CHARLES FORT
- SITE C** - CHARLES FORT
- SITE D** - COMMOGE
- SITE E** - CAPPAGH
- SITE ER** - CAPPAGH REVISED



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Project Kinsale Sewerage Scheme. E.I.S. Kinsale, County Cork	
Title Alternatives: Waste Water Treatment Plant Sites. Outfall Locations	
Scale 1:15000	Drwg. No. 2320/EIS2
Drawn	Fig. 2.1
Ch'd (D.O.)	
Ch'd (Eng.)	
Approved	rev. A

- 2.1.5 With this in mind, two treatment sites were reviewed. Location "B" is a shallow valley immediately southeast of Charles Fort and to the east of the road serving the eastern shore area. Careful siting and landscaping would conceal the works.
- 2.1.6 Pursuing the identical sewer line to a further site downstream of the Charles Fort at "C" was reviewed. A natural fold in the hillside forms a ledge that is concealed from the Fort and most other places in Kinsale excepting the opposite shore of the estuary. Enlargement of the ledge feature would create a site for the treatment works. Careful treatment of the external features of the works would create an interesting aspect seawards, which when combined with appropriate landscaping would minimise the intrusion of a treatment plant at this location.
- 2.1.7 These sites were rejected for the following criteria:
- ◆ These sites would require a lengthy rising main laid in difficult terrain.
 - ◆ The historical and archaeological significance of the area adjacent to Charles Fort.
 - ◆ The increasing distance between urban development to the west of Kinsale and these sites.
 - ◆ The increased running costs due to high lift pumping.

Site D – Commoge

- 2.1.8 Technically there is an attraction in pumping the untreated sewage north-westwards from the town to be treated at Site D (Plate 6). Space is available in the fields to the east of the waters which currently create an informal wildlife sanctuary.
- 2.1.9 However, this site was rejected for the following reasons:
- ◆ High visibility from local residential areas.
 - ◆ Need to elevate the site above flood tidal levels.
 - ◆ Proximity to future housing development and post primary school sites.
 - ◆ Ecological considerations.

Sites E and E_R – Cappagh

- 2.1.10 Site E: Immediately to the west of the Commoge waters and beyond the factory located at the western termination of the road causeway, the high ground slopes gently south-eastwards to the bank of the Bandon River (Plate 7). A small forestry planting and other peripheral trees conceal the foot of these sloping fields from the public road and from much of the heights of Compass Hill.
- 2.1.11 Site E_R: Following the presentation and adoption of the Preliminary Report, land adjoining the original proposed treatment plant site became available (Plate 8). The suitability of part of this land as a treatment plant was investigated and found to be compatible with the original proposed site. This alternative site was then recommended as the location for the treatment plant. The findings of this study are based on the revised site location. This site was chosen as being that which

caused minimal environmental impact allied with viable engineering solutions for the waste water treatment plant.

- 2.1.12 A survey of the housing areas north and northwest of the site reveals that the foot of the field at "E_R" remained largely unsighted from the viewpoints. Studying the site from locations on Compass Hill suggests that the tree cover can be readily amplified. With new landscaping, a waste water treatment plant can be easily concealed at this location.
- 2.1.13 On technical grounds the site at "E_R" is also attractive. It has ready access, in contrast to the downriver locations discussed. The ground is relatively flat but at a workable hydraulic level. Its present level of concealment can be readily enhanced. The available dilutions in the estuary and the other characteristics of the waterway are favourable to the discharge of the treated effluent.
- 2.1.14 A positive improvement of this area is the formalisation of the Kinsale Marsh as a nature reserve. The technical merits of the location are dealt with comprehensively elsewhere in the report.

2.2 Mathematical Model - Dispersive Predictions

- 2.2.1 Dispersion analyses were carried out, modelling faecal coliform (*E. coli*) concentrations for the existing system, for each of the proposed outfall locations, and for the proposed storm overflow location. The grid spacing employed in the transport-dispersion model was 25 x 25 metres. This provides good resolution which is sufficiently detailed to allow environmental impacts, as a result of an outfall, to be determined, since the spread and fate of water quality substances can be accurately followed along an uneven shoreline and narrow channel. Figure 2.1 shows the locations of the outfalls, and Appendix A contains the simulated results for the various conditions detailed below.
- 2.2.2 The results of dispersion analyses from Outfalls 1 and 2 for three environmental conditions have been presented (see Appendix A, figures A1 to A24). Concentrations of faecal coliform (maximum predicted) are shown at both outfalls and at four sites of interest (see Table 2.1). The three environmental conditions were:
- (1) Spring Tide with mean long term wind and 95 percentile freshwater inflow conditions.
 - (2) Neap Tide with mean prevailing wind and 95 percentile freshwater inflow conditions.
 - (3) Mean Tide with mean prevailing wind and mean freshwater inflow conditions.
- 2.2.3 These three environmental conditions were chosen to model a range of dispersion conditions in order to assess the most onerous situation. Spring tides allow greater dispersion of substances due to higher velocities and are therefore important when considering the bacterial impact on sites remote from an outfall. Due to lower current velocities, neap tides provide less dilution of polluting

substances and can therefore be used to predict maximum solute concentrations due to a proposed outfall.

2.2.4 The results of these analyses are summarised in Table 2.1:

TABLE 2.1. Maximum predicted faecal coliform concentrations (no./100 ml) at the outfalls and observation sites.

Analysis	Outfall 1	Outfall 2	Site 1	Site 2	Site 3	Site 4
1	3,204	—	neg.	27	29	45
2	3,097	—	neg.	59	1	36
3	3,103	—	neg.	80	58	52
4	—	3,607	neg.	81	293	8
5	—	3,543	1	25	218	2
6	—	3,513	1	68	265	11
7	Storm overflow			1,333	290	28

Outfall 1 - Upstream of The Creek

Outfall 2 - Downstream of Charles Fort

Site 1 - Jarley's Cove

Site 2 - Kinsale Marina Area

Site 3 - Summercove

Site 4 - Castlepark

Present Discharge

2.2.5 The present situation of untreated waste effluent entering the estuary waters was modelled which allows a direct comparison between the existing and proposed situations. The present situation was modelled for a total combined population equivalent of 6,800 persons between Summercove, Scilly and Kinsale Town. The dispersion analyses show that significant bacterial impact occurs in the Summercove, Kinsale Marina and Docks area, and shellfish beds with faecal coliform levels exceeding 1,000/100 ml (see Appendix A, figures A25 to A28).

Outfall Location 1

2.2.6 Outfall Location 1, situated midway in the estuary channel, exhibits high dispersive characteristics, with the plume being transported in a rectilinear manner along the central axis of the channel on both the ebb and flood tides (see Appendix A, figures A1 to A12). The characteristic of the pollutant plume resulting from outfall 1 is a long narrow plume which exhibits high longitudinal dispersion and poor transverse dispersion, particularly so during a spring tide as a result of the high current speeds. The plume extends a considerable distance both upstream and downstream of the outfall location during both flood and ebb tides respectively.

2.2.7 During spring tides the effluent plume extends out beyond Money Point with *E. coli* concentrations in the order of 10/100 ml at Money Point. In Kinsale Harbour the faecal coliform impact from Outfall 1 is not very significant as the higher concentrations remain further out towards the channel centreline, with lower concentrations along the channel banks.

2.2.8 Results clearly show that the impact from Outfall 1 is not significant, with levels exceeding 1000/100 ml confined to a midstream area of 100 m upstream and downstream of the outfall site.

Outfall Location 2

- 2.2.9 Outfall Location 2 is situated close to the north bank of the estuary channel, some 300 m south of Charles Fort. Similarly to Outfall Location 1, the pollutant plume is elongated in the longitudinal direction resulting in a long narrow band of high concentration (see Appendix A, figures A13 to A24). The pollutant plume is carried out into the open sea during the ebb tide and is carried up past Outfall 1 on the flood tide during spring tide conditions. The plume hugs the north/east channel bank both on the ebb and flood tides. On the flood tide the pollutant plume is carried up along the north bank into the Kinsale docks and quay area.

Conclusions on Location 1

- 2.2.10 The impact of waste effluent from Location 1 is very small in the Kinsale Town area, and further downstream with predicted values being in the order of 30/100 ml. The highest levels of 3,204 are predicted at the outfall site with a near field dilution of 104 between the receiving waters and effluent discharge (see Table 2.1). This represents the lowest dilution rate obtained during the tidal cycle with the highest being 660 at mid-flood and mid-ebb.

Conclusions on Location 2

- 2.2.11 Results show that the bacterial impact from Outfall 2 is confined close to the outfall site, with levels only exceeding 1000/100 ml for a distance of 75 m upstream and downstream of the outfall site. Location 2 will impact more significantly on the Kinsale Town area, including Marina and Scilly Dam. However, predicted values are still relatively small, being in the order of 90/100 ml.
- 2.2.12 Predicted maximum levels at Summercove, S3, (see Table 2.1) are in the order of 300/100 ml. Concentrations at Jarley's Cove are negligible and never exceed 11/100 ml at Castlepark, S4, indicating that little impact from Outfall 2 occurs upstream of Kinsale town. The highest predicted level of 3,607/100 ml occurs during a spring tide. The dispersion model predicts that the lowest near field dilution is 92 and the maximum is 670 at mid-ebb and mid-flood on a spring tide.

Overflow Outlet

- 2.2.13 The Pumping Station and Holding Tank proposed at Denis Quay will include an overflow from the holding tank. It is likely that this overflow will impact on the water quality at adjacent areas, particularly downstream in the Docks/Marina area (see Appendix A, figures A29 to A32). However, even for an extreme condition (discharge of 255 l/sec), levels in excess of 1000/100 ml are confined to within 200 m upstream and downstream of the overflow outlet. Away from the discharge site the numbers fall sharply to a predicted 290/100 ml at Summercove and 4/100 ml at Jarley's Cove (see Table 2.1). It should be noted that the predicted values are for a worst case scenario, under extreme conditions, and

would occur very infrequently. Changing any parameters will have a significant impact on predicted numbers.

- 2.2.14 As the impact from the overflow will be of an infrequent and temporary nature, mitigation is not deemed necessary.

2.3 Waste Water Treatment Plant Site Selection

- 2.3.1 Outfall Location 1 has better dispersive characteristics than Location 2 (see Table 2.1). This table also shows that for three of the four sensitive sites, namely S1, S2 and S3, the predicted maximum bacterial concentrations are higher from Outfall 2.

- 2.3.2 It can therefore be concluded that an outfall at Location 1 would have a lesser bacterial impact on the quality of the Kinsale harbour waters than an outfall at Location 2. Thus, it would appear, based on the study, that Location 1 is more suitable than Location 2 for an outfall discharge. Consequently, a waste water treatment plant located near outfall Location 1 is deemed more appropriate.

- 2.3.3 It is also necessary to examine the values quoted or predicted in the light of current legislative values (see section 5).

2.4 Pipeline Route Selection

- 2.4.1 The majority of the pipelines proposed for the scheme would be common to all proposed outfall pipe and treatment plant locations. However, as previously mentioned, additional rising mains would be necessary for the sites at Locations A, B, and C.

- 2.4.2 For the sites at Locations D and E, an alternative route for the rising main from Denis Quay pumping station was analysed. This alternative included the laying of the rising main along St John's Hill, Winter's Hill and Blind Gate, and discharging to the gravity sewer in the area of the new post-primary school.

- 2.4.3 This option was rejected for the following reasons:

- ◆ Higher pumping costs.
- ◆ Potentially greater archaeological disturbance.

2.5 Pumping Station Selection

- 2.5.1 The majority of the pumping stations proposed for the scheme would be common to all proposed outfall pipe and treatment plant locations. However, larger pumping stations would be necessary for the sites at Locations A and B. An additional pumping station would also be required for the site D and E in the Commoge/Cappagh areas, which are the larger developable areas in the catchment.

2.5.2 The selection of the site E_R in Cappagh gave the most viable alternative for the number, size and location of the pumping stations.

2.6 Treatment Type Selection

2.6.1 Two treatment options were analysed: traditional primary plus secondary treatment to a 20/30 effluent using extended aeration, and a long sea outfall at Sandycove discharging on an ebbing tide.

2.6.2 The long sea outfall alternative was dismissed on the following grounds:

- ◆ An additional pumping station would be required at the New Bridge.
- ◆ Additional holding plus odour removal facilities would be necessary.
- ◆ The waste waters would be untreated and would not be compatible with the *Environment Action Programme*.
- ◆ Increased capital costs.
- ◆ More complex maintenance requirement.

2.7 Aeration Methods

2.7.1 Two aeration methods were analysed: traditional surface mounted aerators, and diffused air.

2.7.2 Diffused air was recommended for the following reasons:

- ◆ Low noise level.
- ◆ No aerosol and mist effects.
- ◆ Less running costs.
- ◆ Increased oxygen transfer efficiency.
- ◆ Landscape



PLATE 2

AERIAL PHOTOGRAPH SHOWING ALTERNATIVE SITE LOCATIONS FOR WASTE WATER TREATMENT PLANT

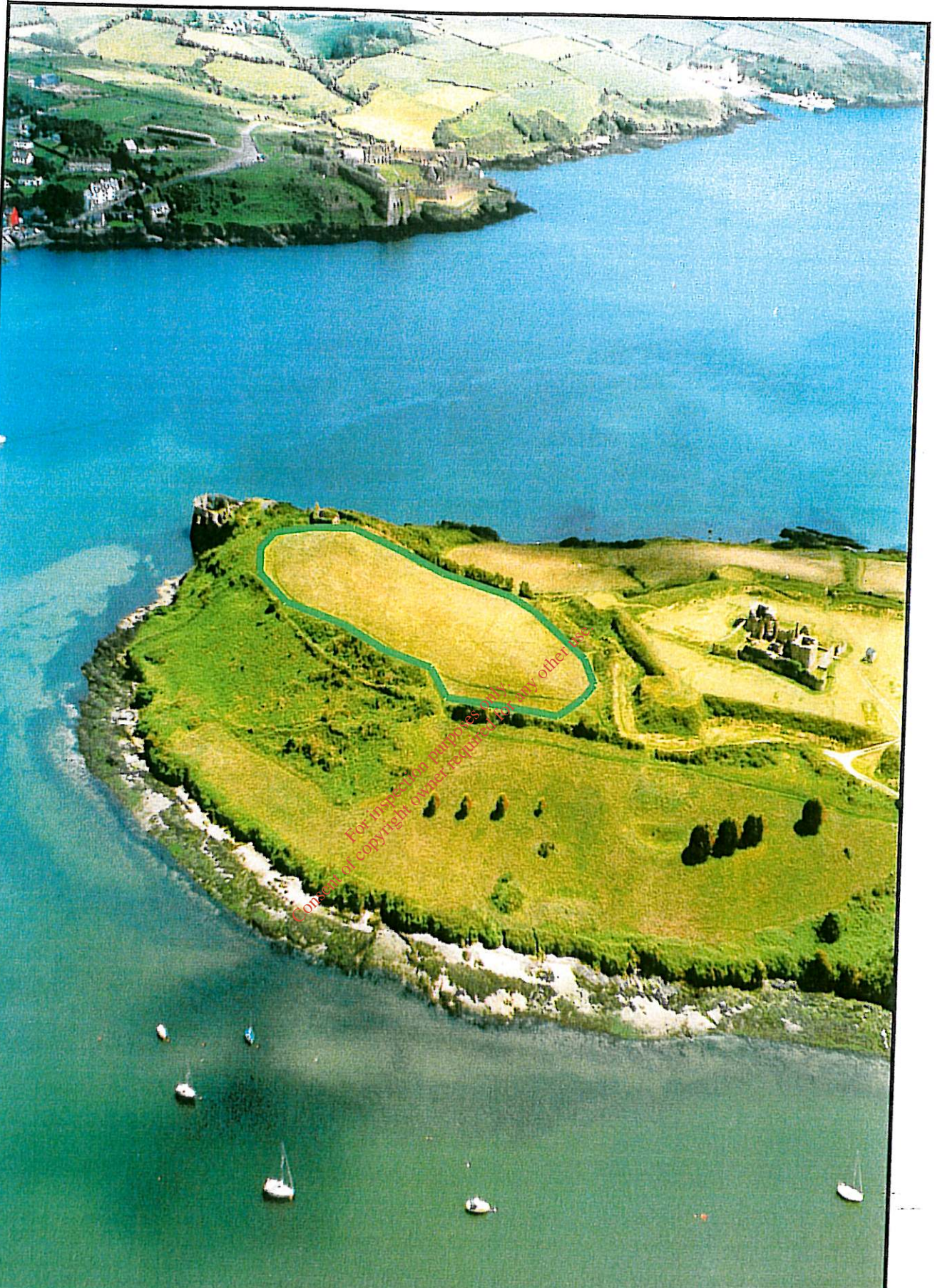


PLATE 3

**AERIAL PHOTOGRAPH SHOWING ALTERNATIVE
SITE LOCATIONS FOR WASTE WATER
(SITE A)**



PLATE 4

**AERIAL PHOTOGRAPH SHOWING ALTERNATIVE
SITE LOCATIONS FOR WASTE WATER
(SITE B)**



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PLATE 5

**AERIAL PHOTOGRAPH SHOWING ALTERNATIVE
SITE LOCATIONS FOR WASTE WATER
(SITE C)**



PLATE 6

**AERIAL PHOTOGRAPH SHOWING ALTERNATIVE
SITE LOCATIONS FOR WASTE WATER
(SITE D)**



PLATE 7

AERIAL PHOTOGRAPH SHOWING ALTERNATIVE SITE LOCATIONS FOR WASTE WATER (SITE E)

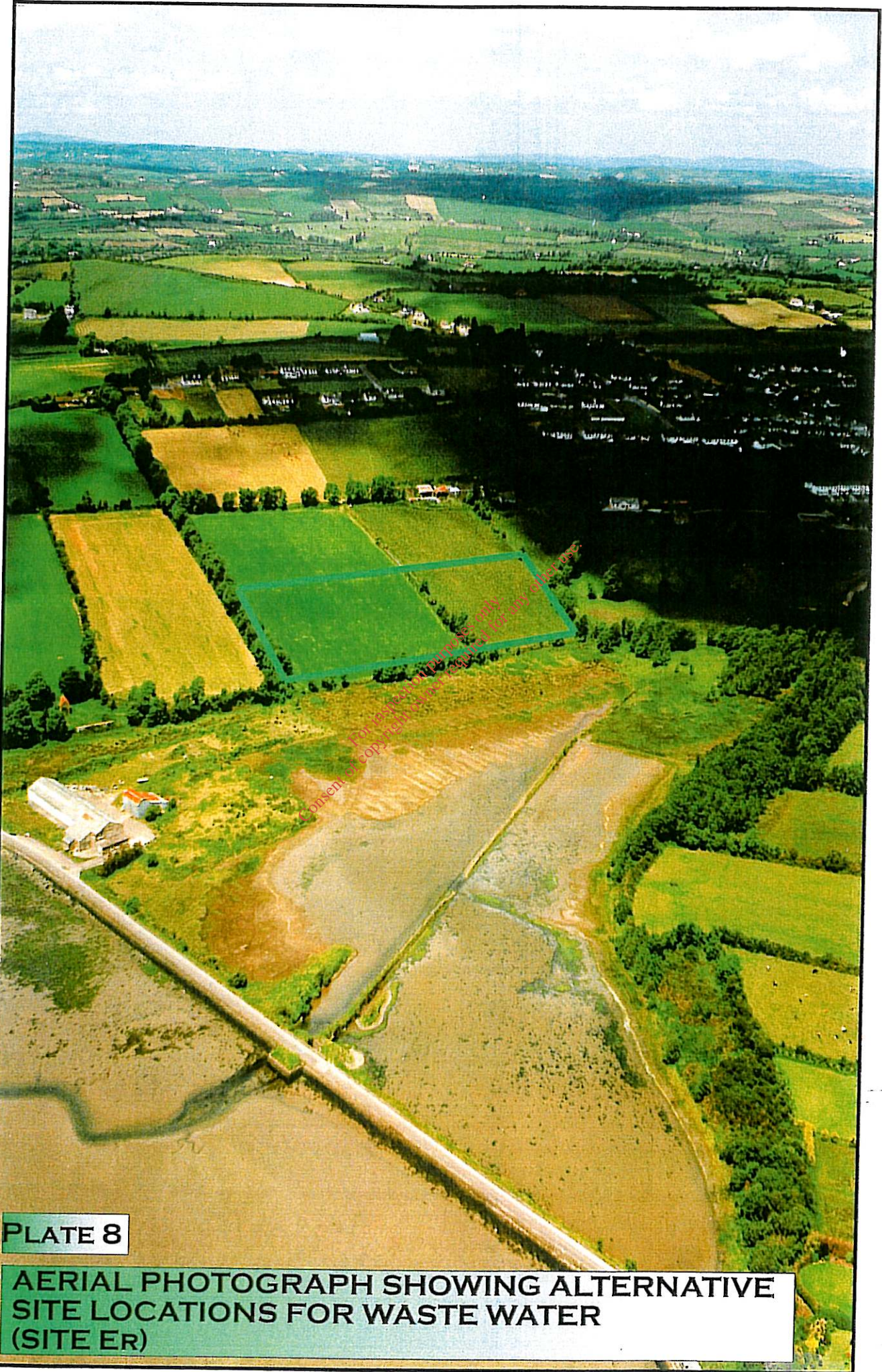


PLATE 8

**AERIAL PHOTOGRAPH SHOWING ALTERNATIVE
SITE LOCATIONS FOR WASTE WATER
(SITE ER)**