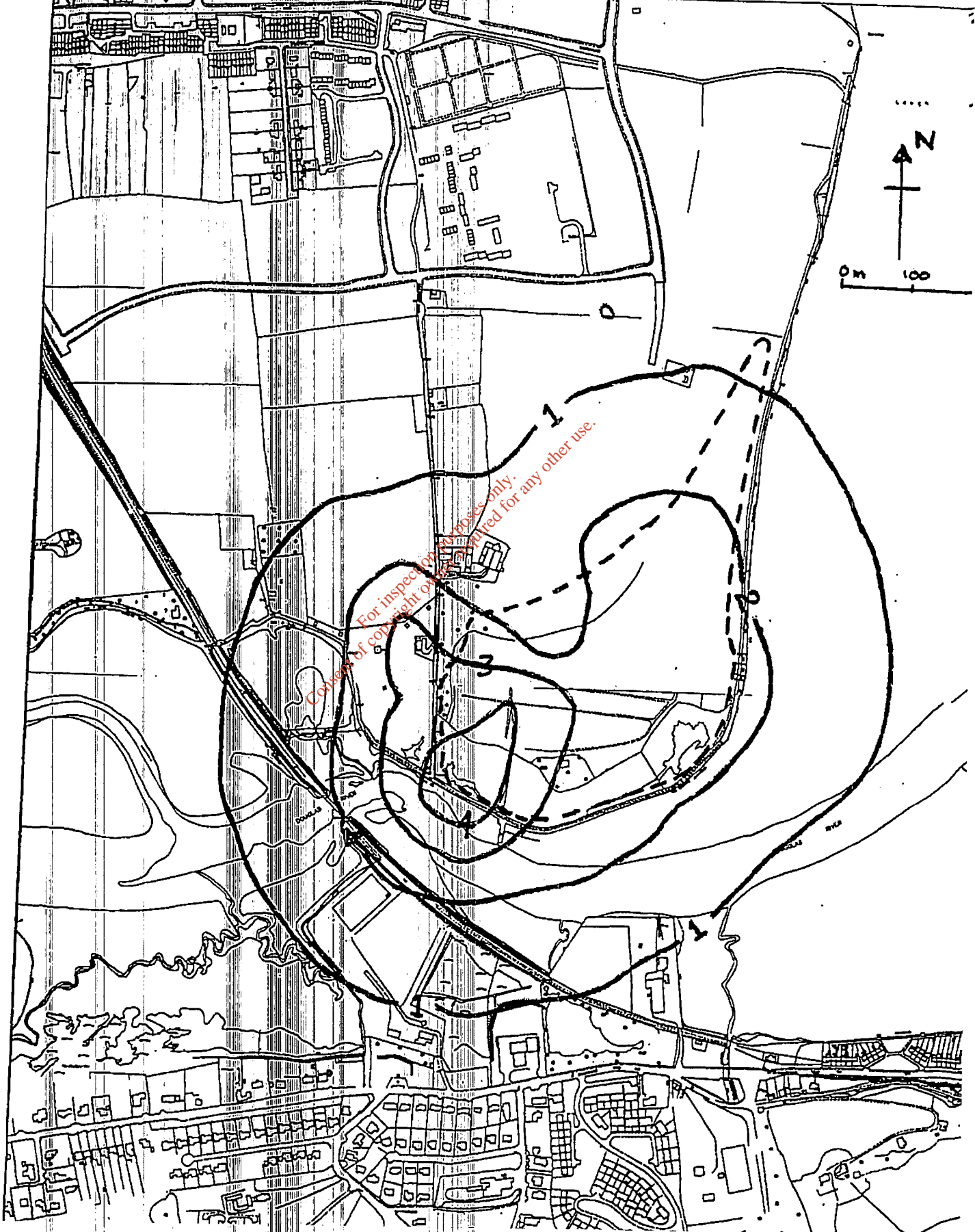


Figure B.4.5. 1: Peak short-term odour concentrations from proposed Mahon st Primary Tanks uncovered - Unstable atmospheric stability (o.u./m<sup>3</sup>)



Douglas river and the Rochestown residential area. Indeed the maps indicate that levels in excess of  $5 \text{ o.u./m}^3$  may occur along much of the main road immediately to the south of the river. To the north of the proposed site it is evident, based on the modelling study that during worst case weather conditions and high odour emission rates that an odour potential also exists at the southern part of Mahon.

These values relate to  $1 \text{ m/s}$  wind speeds, i.e. worst case conditions. However, for wind speeds of  $3 \text{ m/s}$  during stable weather conditions the odour potential is significantly reduced at Rochestown and Mahon with concentrations of  $2 \text{ o.u./m}^3$  or less for the two areas. As mentioned above the incidence of winds of less than  $3 \text{ m/s}$  is very low in the direction of Rochestown and Mahon with Roches Point data indicating an annual frequency of only about 700 and 525 hr./year respectively (for all atmospheric stability conditions). Therefore based on wind direction alone for about 92% of the year any odorous plumes originating from the treatment plant will not disperse in the direction of residential areas.

Calculations of odour potential were not carried out for the house immediately to the north of the NW corner of the site as the planned construction of the Southern Ring Road (recently approved) will result in its demolition. However the contour maps indicate that given the close proximity of this major road to the site that a significant odour potential would exist along this stretch of the carriageway.

Contours for odour potential concentrations during neutral and unstable weather conditions shown in Figs. B.4.3 and B.4.5 indicate that due to increased dilution factors that the areal extent of high odour concentrations is much reduced. Based on these results the potential for an odour nuisance in nearby residential areas is low. For unstable weather conditions with enhanced dilution, predicted concentrations are less than  $1 \text{ o.u./m}^3$  at Rochestown and Mahon and so would not be a source of odour nuisance.

#### **Option No. 2 - Covering the primary sedimentation overflow weirs.**

Results of emissions measurements from primary sedimentation tanks published recently (2) indicate that the emissions from the flow of effluent over the perimeter weirs on circular primary sedimentation tanks is about 10% of the total emissions for a tank of similar size to the one considered in this plant design. A reduction in odour emissions of this magnitude would not significantly lower the overall odour potential of the plant on the surrounding area.

### **Option No. 3 - Covering of Primary Sedimentation Tanks**

Complete enclosure of the 6 primary sedimentation tanks would effectively eliminate emissions directly into the air from these large area sources. The reduction in potential odour concentrations as a consequence of this modification in plant design for stable and neutral weather conditions is shown in Figs. B.4.6 and B.4.7. The computed concentrations relate only to emissions from the secondary treatment part of the works and also fugitive emissions from the inlet and sludge handling areas of the plant. It is evident that during periods of very low wind speeds that the area where a potential odour may occur extends beyond the boundary of the plant although the predicted levels at Mahon and Rochestown are substantially reduced.

### **Conclusions**

The results of the modelling study of potential odours from the proposed wastewater treatment plant at Mahon indicate that there is a potential for an odour nuisance to occasionally occur at residential property in Rochestown and Mahon if the primary sedimentation tanks are not covered. They are located at the southern end of the site and so if certain weather conditions occur (low wind speeds and a northerly wind direction) then odours may be detected to the south of the Douglas river. In the case of the houses in Mahon, due to the greater distance involved an odour nuisance is less likely. However the proposed Southern Ring road will pass close to the northern boundary of the plant so a potential odour is more likely along this stretch of road than further downwind. It is therefore recommended, given the relatively close proximity of property in Rochestown and this road, that the primary sedimentation tanks should be covered.

The considerable extent of the aeration tanks, which when all 12 are in operation will cover an area of 24,300 m<sup>2</sup>, also suggests that a reduction in emissions from this part of the plant is recommended. The modelling study indicates that during calm stable weather conditions, although odours are unlikely to be sufficiently strong to present a potential nuisance, it is possible that on occasions they may be detected close to the boundary of the plant. As in a similar study for an alternative site at Carrigrenan, it is recommended that installation of sub-surface aeration diffusers would result in lower emission rates from the aeration tanks than would be the case with a vertical shaft surface aeration system.

Overall, the plant design is one that ensures that odorous emissions are controlled and hence the potential for nuisance complaints in the neighbourhood is kept to a minimum. The sludge handling facilities and

Figure B.4.6.1 : Peak short-term odour concentrations from proposed Mahon site:  
Primary Tanks covered - Stable atmospheric stability (o.u./m<sup>3</sup>)



Figure B.4.7. : Peak short-term odour concentrations from proposed Mahon site:  
Primary Tanks covered - Neutral atmospheric stability (o.u./m<sup>3</sup>)



inlet works are designed with air filtration systems to ensure that emissions from these parts of the plant are negligible. In addition the high flow of wastewater through the works, coupled with efficient plant design will ensure that the material does not become stale resulting in anaerobic reactions causing strong odours. It must be stressed that efficient plant management and good house-keeping procedures are vital elements in the successful operation of the plant and that the sludge and grit must be handled and stored correctly.

Insofar as recommending the Mahon location or the other proposed site at Carrigrenan as the preferred site for the wastewater treatment plant with regard to odour potential it is evident from the modelling studies that covering the primary sedimentation tanks should be addressed at both sites. There are a smaller number of residential properties in the vicinity of the Carrigrenan site compared to the Mahon location from which nuisance complaints could arise. On the basis of the results of the modelling studies both sites are similar from an Odour Dispersion viewpoint and therefore it is not possible to make a recommendation on which site shall be adopted based on odour dispersion alone. However, whichever site is selected it is important that odours are kept to a minimum at all times so that the potential for an odour nuisance is very low.

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## APPENDIX 5

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# COMMON FLORA OF FAUNA IN VIINITY OF PROPOSED CORK MAIN DRAINAGE SCHEME

**Table 5.1**  
**Common Flora & Fauna In Vicinity Of Proposed Cork Main Drainage Scheme**

Taxon	Common Name	Scientific Name
<b>TERRESTIAL</b>		
Flora	Common Nettle	<i>Urtica Dioica</i>
	Thistle	<i>Cirsium spp.</i>
	Gorse	<i>Ulex Europaeus</i>
	Knapweed	<i>Centaurea Nigra</i>
	Dog Rose	<i>Rosa Canina</i>
	Bramble	<i>Rubus Fruticosus</i>
	Ivy	<i>Hedera Helix</i>
	Hawthorn	<i>Crataegus Monogyna</i>
	Quaking Aspen	<i>Populus Tremula</i>
	Norway Maple	<i>Acer Platanoides</i>
	Sessile Oak	<i>Quercus Petraea</i>
	Common Oak	<i>Quercus Robur</i>
	Common Ash	<i>Fraxinus Excelsior</i>
	Cherry Laurel	<i>Prunus Lauricerasus</i>
	Holly	<i>Ilex Aquifolium</i>
	Walnut	<i>Juglans Regia</i>
	Beech	<i>Fagus Sylvatica</i>
	Holm Oak	<i>Quercus Ilex</i>
	Apple	<i>Malus spp.</i>
	Monkey Puzzle	<i>Araucaria Araucana</i>
Norway Spruce	<i>Picea Abies</i>	
Amphibians	Common Newt	<i>Triturus Vulgaris</i>
	Common Frog	<i>Rana Temporaria</i>
Reptiles	Common Lizard	<i>Lacerta Vivipara</i>
Mammals	Hedgehog	<i>Erinaceus Europaeus</i>
	Pygmy Shrew	<i>Sorex Minutus</i>
	Bank Vole	<i>Clethrionomys Glareolus</i>
	Long-Eared Bat	<i>Plectus Auritus</i>
	Pipistrelle	<i>Pipistrellus Pipistrellus</i>
	Leisler's Bat	<i>Nyctalus Leisleri</i>
	Fox	<i>Vulpes Vulpes</i>
	Stoat	<i>Mustela Erminea</i>
	Otter	<i>Lutra Lutra</i>
	Badger	<i>Meles Meles</i>
	Mountain Hare	<i>Lepus Timidus</i>
	Rabbit	<i>Oryctolagus Cuniculus</i>
	Red Squirrel	<i>Sciurus Vulgaris</i>
	Grey Squirrel	<i>Sciurus Carolinensis</i>
	Wood Mouse	<i>Apogemus Sylvaticus</i>
Brown Rat	<i>Rattus Norvegicus</i>	
House Mouse	<i>Mus Musculus</i>	
Birds	House Sparrow	<i>Passer Domesticus</i>
	Redpoll	<i>Carduelis Flammea</i>
	Reed Bunting	<i>Emberiza Schoeniculus</i>
	Greenfinch	<i>Carduelis Chloris</i>
	Raven	<i>Corvus Corax</i>
	Magpie	<i>Pica Pica</i>
	Jackdaw	<i>Corvus Monedula</i>
	Rook	<i>Corus Frugilegus</i>
	Hooded Crow	<i>Corvus Corone</i>
	Great Tit	<i>Parus Major</i>
	Long-Tailed Tit	<i>Aegithalos Caudatus</i>



**Table 5.1 (Contd.)  
Common Flora & Fauna In Vicinity Of Proposed Cork Main Drainage Scheme**

Taxon	Common Name	Scientific Name
	Chiffchaff	<i>Phylloscopus Collybita</i>
	Whitethroat	<i>Sylvia Communis</i>
	Robin	<i>Erithacus Rubecula</i>
	Blackbird	<i>Turdus Merula</i>
	Starling	<i>Stumus Vulgaris</i>
	Song Thrush	<i>Turdus Philomelos</i>
	Redwing	<i>Turdus Iliacus</i>
	Fieldfare	<i>Turdus Pilaris</i>
	Wren	<i>Troglodytes Troglodytes</i>
	Dunnock	<i>Prunella Modularis</i>
	Spotted Flycatcher	<i>Muscicapa Striata</i>
	Treecreeper	<i>Certhia Familiaris</i>
	Swallow	<i>Hirundo Rustica</i>
	Skylark	<i>Alauda Arvenis</i>
	Meadow Pipit	<i>Anthus Pratensis</i>
	Woodpigeon	<i>Columba Palumbus</i>
	Stock Dove	<i>Columba Oenas</i>
	Pheasant	<i>Phasianus Colchicus</i>
	Kestrel	<i>Falco Tinnunculus</i>
	Peregrine Falcon	<i>Falco Peregrinus</i>
	Short-Eared Owl	<i>Asio Flammeus</i>
	Sparrow Hawk	<i>Accipiter Nisus</i>
<b>MARINE</b>		
<b>Flora</b>		
<b>Red Seaweeds</b>		<i>Gelidium sp.</i>
		<i>Ceramium Rubrum</i>
		<i>Hildenbrandia Rubra</i>
		<i>Mastocarpus sp.</i>
	Red Laver	<i>Porphyra Umbilicalis</i>
<b>Green Seaweeds</b>	Sea Lettuce	<i>Ulva Lactuca</i>
		<i>Cladophora sp.</i>
<b>Brown Seaweeds</b>	Notted Wrack	<i>Ascophyllum Nodosum</i>
	Bladder Wrack	<i>Fucus Vesiculosus</i>
	Serrated Wrack	<i>Fucus Serratus</i>
	Spiral Wrack	<i>Fucus Spiralis</i>
	Channelled Wrack	<i>Pelvetia Canaliculata</i>
<b>Coelenterates</b>	Beadlet Anemone	<i>Actinia Equina</i>
<b>Annelids</b>	Ragworm	<i>Nephtys Hombergi</i>
		<i>Cirratulus Cirratus</i>
		<i>Polydora sp.</i>
		<i>Pomatoceros sp.</i>
		<i>Nereis Diversicolor</i>
		<i>Sabella sp.</i>
	Lugworm	<i>Arenicola Marina</i>
	Roundworm	<i>Capitella Capitata</i>
<b>Molluscs</b>	Common Periwinkle	<i>Littorina Littorea</i>
	Flat Periwinkle	<i>Littorina Littoralis</i>
	Common Dog Welk	<i>Nucella Lapillus</i>
	Common Mussel	<i>Mytilus Edulis</i>
	Common Limpet	<i>Patella Vulgaris</i>
	Limpet	<i>Patella Aspera</i>

**Table 5.1 (Contd.)  
Common Flora & Fauna In Vicinity Of Proposed Cork Main Drainage Scheme**

Taxon	Common Name	Scientific Name
Echinoderms	Common Brittlestar	<i>Ophiothrix Fragilis</i>
Crustacens	Acorn Barnacle	<i>Balanus Balanoides</i>
	Acorn Barnacle	<i>Balanus Crenatus</i>
	Star Barnacle	<i>Chthamalus Stellatus</i>
	Darwin Barnacle	<i>Eliminius Modestus</i>
	Shore Crab	<i>Carcinus Maenas</i>
	Amphipod	<i>Grammarus sp.</i>
	Springtail	<i>Anurida sp.</i>
	Bristle-Tails	<i>Petrobilus Maritimus</i>
Fish	Plaice	<i>Pleuronectes Platessa</i>
	Flounder	<i>Platichthys Flesus</i>
	Dab	<i>Limanda Limanda</i>
	Cod	<i>Gadus Morhua</i>
	Spotted Dogfish	<i>Scyliorhinus Canicula</i>
	Mullet	<i>Crenimugil Labrosus</i>
	Blonde Ray	<i>Raja Brachyura</i>
	Thornback Ray	<i>Raja Clavata</i>
	Atlantic Salmon	<i>Salmo Salar</i>
	Sea Trout	<i>Salmo Trutta</i>
Birds	Cormorant	<i>Phalacrocorax Carbo</i>
	Little Grebe	<i>Tachybaptus Ruficollis</i>
	Great Crested Grebe	<i>Podiceps Cristatus</i>
	Mute Swan	<i>Cygnus Olor</i>
	Shelduck	<i>Tadorna Tadorna</i>
	Wigeon	<i>Anas Penelope</i>
	Teal	<i>Anas Crecca</i>
	Mallard	<i>Anas Platyrhynchos</i>
	Shoveler	<i>Anas Clypeata</i>
	Pochard	<i>Aythya Ferina</i>
	Tufted Duck	<i>Aythya Fuligula</i>
	Scaup	<i>Aythya Marila</i>
	Goldeneye	<i>Bucephala Clangula</i>
	Red-Breasted Merganser	<i>Mergus Merganser</i>
	Ringed Plover	<i>Charadius Hiaticula</i>
	Golden Plover	<i>Pluvialis Apricaria</i>
	Grey Plover	<i>Pluvialis Squatarola</i>
	Lapwing	<i>Vanellus Vanellus</i>
	Dunlin	<i>Calidris Alpina</i>
	Black-Tailed Godwit	<i>Limosa Limosa</i>
	Bar-Tailed Godwit	<i>Limosa Lapponica</i>
	Curlew	<i>Numenius Arquata</i>
	Redshank	<i>Tringa Totanus</i>
	Greenshank	<i>Tringa Nebularia</i>
	Common Gull	<i>Larus Canus</i>
	Herring Gull	<i>Larus Argentatus</i>
	Black-Headed Gull	<i>Larus Ridibundus</i>
Oystercatcher	<i>Haematopus Ostralegus</i>	
Grey Heron	<i>Ardea Cinerea</i>	
Turnstone	<i>Arenaria Interpres</i>	
Hooded Crow	<i>Corvus Corone</i>	

Sources : Chinery 1987] ; REMU 1991a , 1991b ; Hutchinson and O'Halloran 1984 ; AFIS 1991 ; Maye 1986 ; D'Arcv 1986 .

**CORK MAIN DRAINAGE SCHEME**

**ADDENDUM TO**

**ENVIRONMENTAL IMPACT STATEMENT**

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**Cork Corporation  
City Hall  
Cork**

**E. G. Pettit & Company  
Consulting Engineers & Architects  
Springville House  
Blackrock Road  
Cork**

**June 1994**

A3357CRA1

**Cork Main Drainage Scheme**  
**Addendum to**  
**Environmental Impact Statement**

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**Cork Main Drainage Scheme**  
**Addendum to**  
**Environmental Impact Statement**

**1.0      Introduction**

The Preliminary Report for the Cork Main Drainage -Wastewater Collection Treatment and Disposal, was submitted to Cork Corporation in December 1992 and was accompanied by an Environmental Impact Statement (EIS). The Preliminary Report recommended the siting of a Wastewater Treatment Plant for the scheme at Carrigrenan Townland in Little Island, Co. Cork.

This statement is an addendum to, and should be read in conjunction with, the original Environmental Impact Statement dated December 1992 and addresses the matters outlined hereunder.

At a Council meeting of Cork Corporation in March 1994, a decision to site the wastewater treatment plant at Carrigrenan was proposed and carried, with an amendment to include tertiary treatment (nutrient removal). The Scheme Design as outlined includes provision for nutrient removal facilities.

Subsequent to the original submission and following discussions between Cork Corporation Officials and the Little Island Community Association (LICA) it was decided to implement the following additional amelioration measures;-

- Reduce area of site occupied by the plant.
- Provide an amenity walk.
- Enhance the landscaping of the buffer zone.

It was also deemed appropriate to include the following items in this addendum:

- Elaboration of Site Lighting Proposals.
- Corrections to Original EIS
- Statement of the Overall Beneficial Environmental Impacts

## Resulting from the Scheme.

Drawings, Figures etc. which have been up-dated from the original EIS have been included in this addendum with the original EIS number followed by the Suffix "(A)" i.e. Fig. 4.5.1 becomes Fig 4.5.1 (A).

Plate 4.5.1(A) shows an aerial photograph of the site at Carrigrenan with the site boundary highlighted in red.

Figs. 2.2.1(A), 4.5.1(A), 4.5.2(A), 4.5.3(A), 4.5.4(A) and Plate 4.5.2(A) show the schematic profile, layouts, sectional elevations and photomontage of the wastewater treatment plant at Carrigrenan.

### 2.0 Additional Ameliorative Measures

As noted previously a number of discussions took place between Local Authority Officials and Representatives of LICA with regard to the siting of the wastewater treatment plant at Carrigrenan. While no agreement was reached between the parties at these meetings, Cork Corporation decided to incorporate, in the proposed scheme, many of the additional ameliorative measures discussed. These additional ameliorative measures are outlined hereunder.

### 2.1 Reduced Area of Site Occupied by the Plant

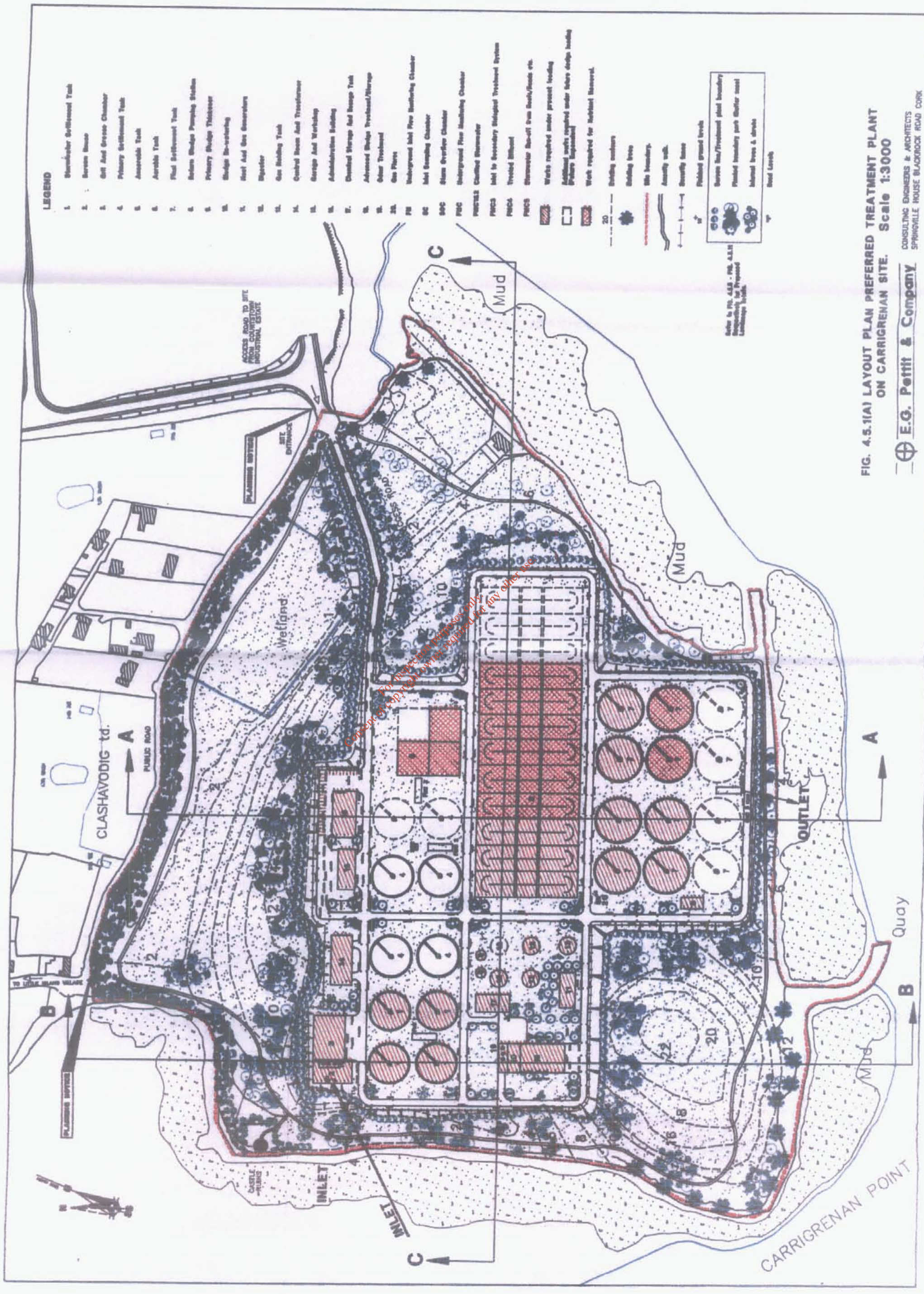
While it is still intended to purchase the entire land bank of 32 hectares in Carrigrenan, it is proposed to reduce the area occupied by the wastewater treatment plant from 20 hectares to 15 hectares. To achieve this the individual plant units have been moved as close as is physically possible to the existing 22 metre high hillock on the southern side of the site (See Fig. 4.5.1(A)). This hillock is the primary topographic feature of the site, providing a natural screen for the proposed wastewater treatment plant when viewed from the southern side of Lough Mahon, and should be retained. The northern screen boundary has also been moved southwards thereby increasing the buffer zone area to the north of the plant. The area of open space reserved on site for amenity purposes represents 53% of the total site area.

### 2.2 Amenity Walk

An amenity walk, affording public access to the foreshore, will be provided along the shoreline, between the overall (32 ha) site boundary and the secured wastewater treatment plant boundary (See Fig 4.5.1(A)). The walk will be controlled and accessible only during daylight hours and will be tastefully laid out and landscaped (See 2.3 below). It should be noted that currently the public has no formal access to this area.

The Walk will be constructed in tarmac or bark mulch. Since the amenity walk traverses a wet area subject to tidal flooding (Wetland) in



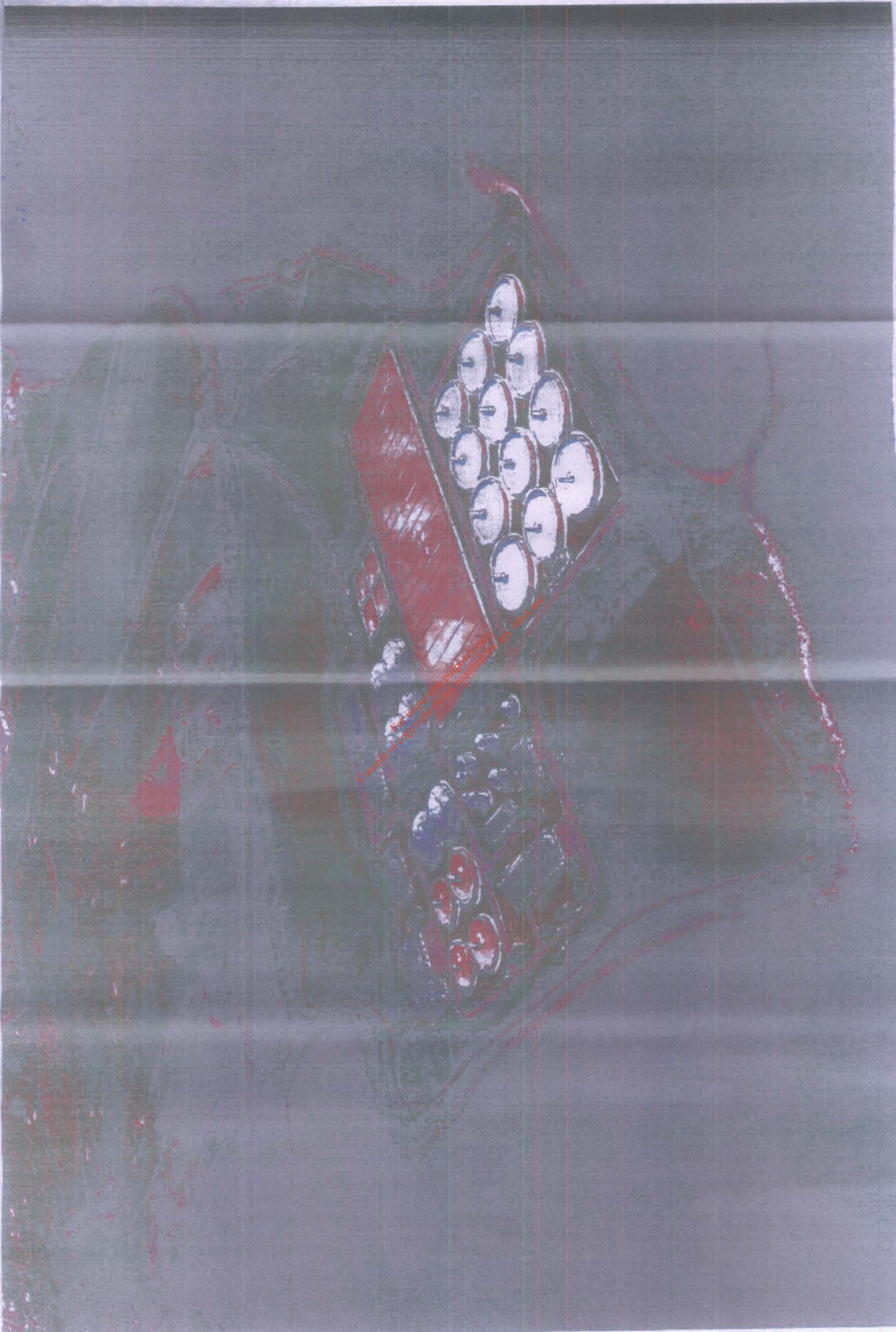


**LEGEND**

1. Secondary Settlement Tank
  2. Screen House
  3. Grit And Grease Chamber
  4. Primary Settlement Tank
  5. Aeration Tank
  6. Aerobic Tank
  7. Final Settlement Tank
  8. Return Sludge Pumping Station
  9. Primary Sludge Thickener
  10. Sludge Storage
  11. Heat And Air Generators
  12. Digester
  13. Gas Holding Tank
  14. Control Room And Transformer
  15. Garage And Workshop
  16. Administration Building
  17. Chemical Storage And Storage Tank
  18. Advanced Sludge Treatment/Storage
  19. Odour Treatment
  20. Gas Flare
  21. Underground Inlet Flow Monitoring Chamber
  22. Inlet Sampling Chamber
  23. Sludge Overflow Chamber
  24. Underground Flow Monitoring Chamber
  25. Clarified Stormwater
  26. Inlet to Secondary Biological Treatment System
  27. Treated Effluent
  28. Stormwater Run-off from Roofs/roads etc.
  29. Works required under present loading
  30. Additional works required under future design loading
  31. Future Expansion
  32. Work required for Inland Drainage
- Existing structures  
 Building lines  
 Site boundary  
 Assembly with  
 Security fence  
 Fenced ground levels  
 Screen Box/Treatment plant boundary  
 Fenced boundary with electric fence  
 Inland drains & ditches  
 Road Levels

**FIG. 4.5.1(A) LAYOUT PLAN PREFERRED TREATMENT PLANT ON CARRIGRENAN SITE. Scale 1:3000**

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Photo Montage Wastewater Treatment Plant located at Carrigrenan.

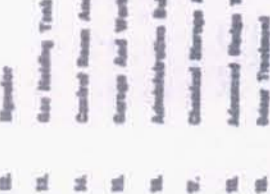
Plate No: 4.5.2 (A)



**LEGEND**

1. Slammeter Sediment Tank
2. Screen House
3. Grit And Grease Chamber
4. Primary Sediment Tank
5. Aeration Tank
6. Aerobic Tank
7. Final Sediment Tank
8. Return Sludge Pumping Station
9. Primary Sludge Thickener
10. Sludge Storage
11. Hot Air Gas Generators
12. Separator
13. Gas Holding Tank
14. Control Room And Transformer
15. Storage And Workshop
16. Administration Building
17. Chemical Storage And Storage Tank
18. Advanced Sludge Treatment/Storage
19. Sludge Treatment
20. Gas Flares
21. Integrated Inlet Flow Stabilizing Chamber
22. Inlet Storage Chamber
23. Sludge Storage Chamber
24. Integrated Fine Sanding Chamber
25. Clarified Slammeter
26. Inlet to Secondary Biological Treatment System

27. Treated Effluent
28. Slammeter Run-off from Tanks/Buildings etc.
29. Works required under present heading
30. Additional works required under future design heading
31. Works required for Redundant Removal.



Refer to PLS 4.1.1 - PLS 4.1.10  
Responsibility for Proposed  
Landscaping Works

**FIG. 4.5-2(A) LAYOUT PLAN OF WASTEWATER TREATMENT PLANT  
ON CARRIGRENAN SITE - SHOWING PROXIMITY OF  
RESIDENTIAL DWELLINGS AND BUFFER ZONE/FREE SPACE. Scale 1:4000**

**E.O. Pettit & Company**

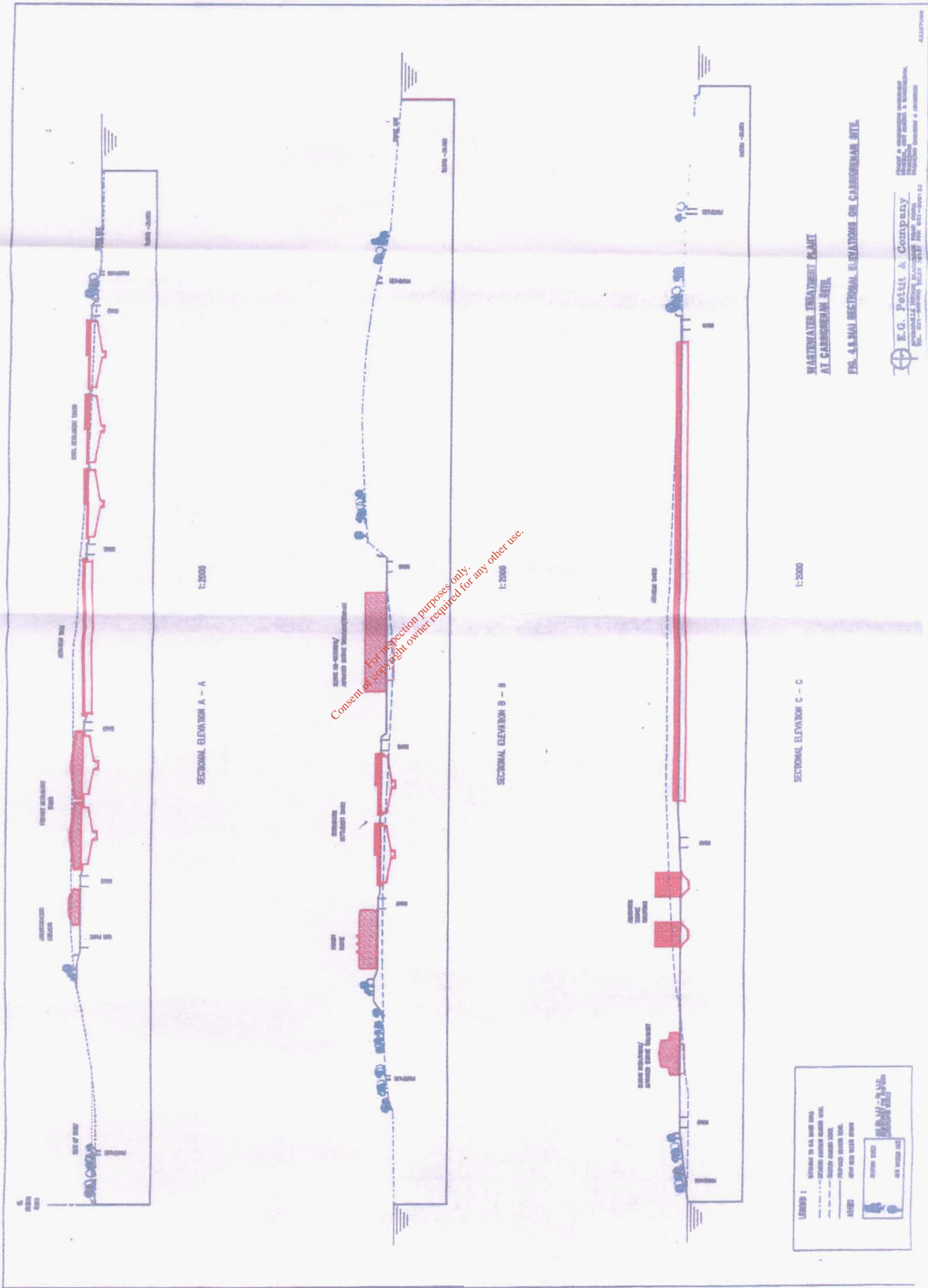
CONSULTING ENGINEERS & ARCHITECTS  
SPRINGLEE HOUSE, BLAUGROVE ROAD, CO. DUBLIN

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5 of 5.1

A.235706.4

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SECTIONAL ELEVATION A - A  
1:2000

SECTIONAL ELEVATION B - B  
1:2000

SECTIONAL ELEVATION C - C  
1:2000

**LEGEND :**

- ORIGINAL TO AS BUILT DATA
- - - - - EXISTING PROPOSED WORKING DATA
- - - - - EXISTING PROPOSED DATA
- PROPOSED WORKING DATA
- EXISTING PROPOSED DATA

 AERATION TANK  
 CLARIFIER  
 BUILDING  
 WALL  
 GATE

WASTEWATER TREATMENT PLANT  
AT CARBONEMAN SITE  
FIG. 4.6.2(A) SECTIONAL ELEVATIONS ON CARBONEMAN SITE.

**E. G. Pettit & Company**  
 CONSULTING ENGINEERS  
 1000 WEST 10TH AVENUE  
 DENVER, COLORADO 80202  
 TEL. 303-733-1111 FAX 303-733-1112

- GREEN LINE
- TREES / TREES
- EXISTING TREES

- LEGEND**
1. STORMWATER SETTLEMENT TANK
  2. SCREEN HOUSE
  3. GRY AND GREASE CHAMBER
  4. PRIMARY SETTLEMENT TANK
  5. AERATION TANK
  6. AERATION TANK
  7. FINAL SETTLEMENT TANK
  8. RETURN SLUDGE PUMPING STATION
  9. PRIMARY SLUDGE THICKENER
  10. SLUDGE DE-WATERS
  11. HEAT AND GAS GENERATORS
  12. OXIDIZER
  13. GAS HOLDING TANK
  14. CONTROL ROOM AND TRANSFORMER
  15. GARAGE AND WORKSHOP
  16. ADMINISTRATION BUILDING
  17. CHEMICAL STORAGE AND STORAGE TANK
  18. ADVANCED SLUDGE TREATMENT/STORAGE
  19. ODOUR TREATMENT
  20. GAS FLAMES
  21. UNDERGROUND INLET FLOW SORTING CHAMBER
  22. INLET SAMPLING CHAMBER
  23. UNDERGROUND FLOW MOUNTING CHAMBER
  24. PMS 1/2 CLASSIFIED STORMWATER
  25. PMS 3 INLET TO SECONDARY BIOLOGICAL TREATMENT SYSTEM
  26. PMS 4 TREATMENT EFFLUENT
  27. PMS 5 STORMWATER RUN-OFF FROM ROOFS/ROADS etc.



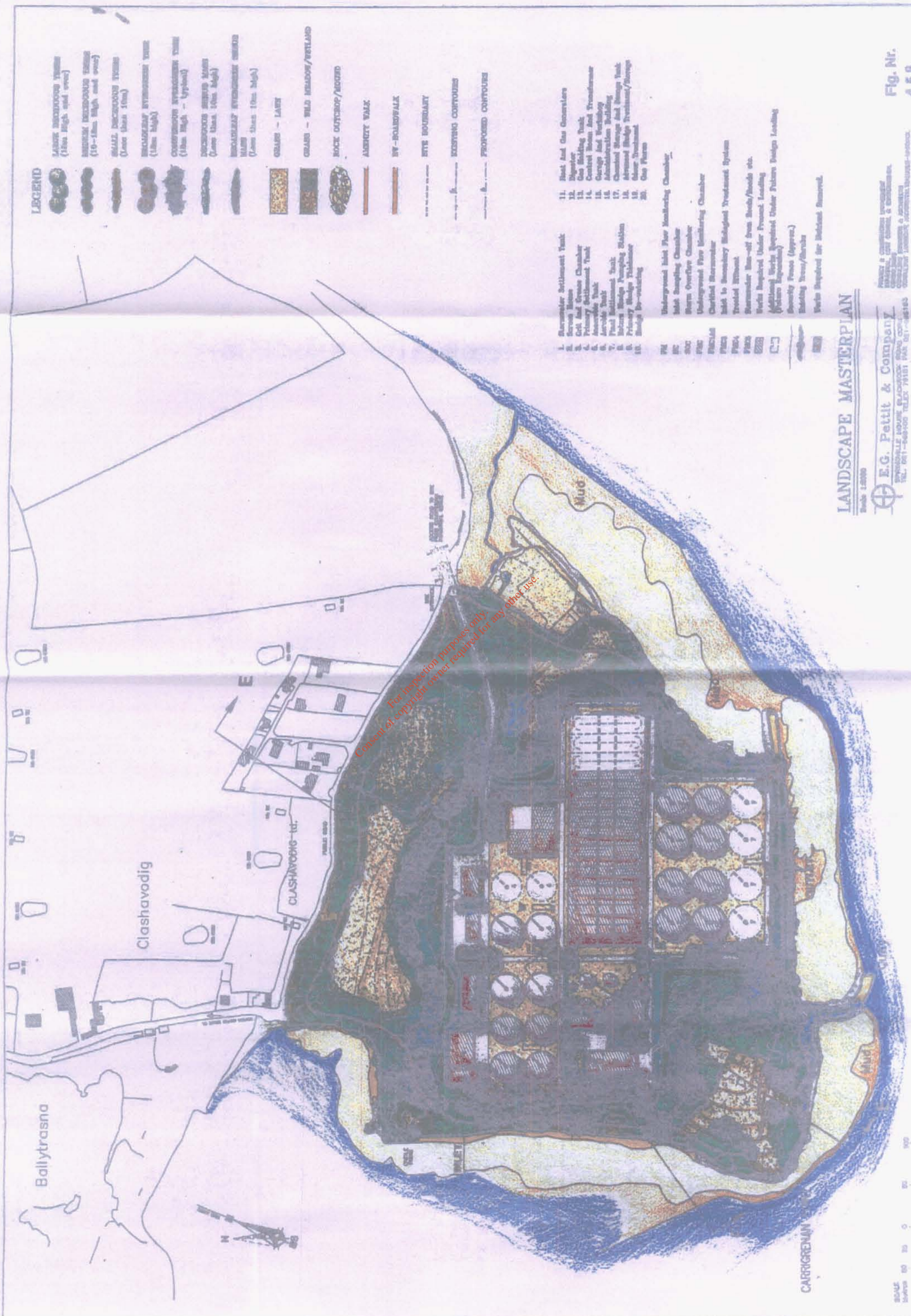
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AERIAL PERSPECTIVE

**CORK MAIN DRAINAGE SCHEME  
 WASTEWATER TREATMENT PLANT  
 LOCATED AT CARRIGRENAN**

E.G. Feltit & Company  
 SPECIALIST HOUSE TO CONCEPT DESIGN  
 TEL: 021-454000 FAX: 021-454133





**LEGEND**

- 1. LARGE DECIDUOUS TREES (15m High and over)
- 2. MEDIUM DECIDUOUS TREES (10-15m High and over)
- 3. SMALL DECIDUOUS TREES (Less than 10m)
- 4. SEMI-DECIDUOUS TREES (15m High)
- 5. CONIFEROUS EVERGREEN TREES (15m High - typical)
- 6. DECIDUOUS SHRUB MARS (Less than 10m High)
- 7. SEMI-DECIDUOUS SHRUBS (Less than 10m High)
- 8. GRASS - LAWN
- 9. GRASS - WILD MEADOW/WETLAND
- 10. ROCK OUTCROP/MOUND
- 11. AMBIENT WALK
- 12. BY-ROAD/WALK
- 13. SITE BOUNDARY
- 14. EXISTING CONTOURS
- 15. PROPOSED CONTOURS

- 11. Heat And Gas Generators
- 12. Digester
- 13. Gas Holding Tank
- 14. Control Room And Transformer
- 15. Storage And Ventilation
- 16. Administration Building
- 17. Chemical Storage And Storage Tank
- 18. Advanced Sludge Treatment/Storage
- 19. Sludge Treatment
- 20. Gas Flare

- Underground Inlet Flow Monitoring Chamber
- Inlet Sampling Chamber
- Storm Overflow Chamber
- Underground Flow Monitoring Chamber
- Clarified Stormwater
- Inlet to Secondary Biological Treatment System
- Treated Effluent
- Stormwater Run-off from Roads/Buildings etc.
- Works Required Under Present Loading
- (Additional Works Specified Under Future Design Loading)
- Security Fence (Approved)
- Building Trees/Barriers
- Works Required for District Reserved.

**LANDSCAPE MASTERPLAN**

Scale 1:2000

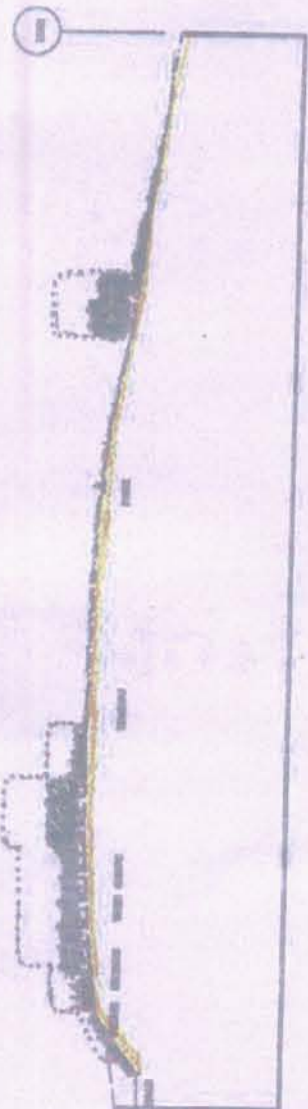
**E.G. Pettit & Company**  
 ARCHITECTS, LANDSCAPE ARCHITECTS, CIVIL ENGINEERS  
 100, SOUTH STREET, DUBLIN 1, IRELAND  
 TEL: 001-668-1000 TELEFAX: 001-668-1010

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CARRIGEMAN



SECTIONAL ELEVATION E - E SCALE 1:1000

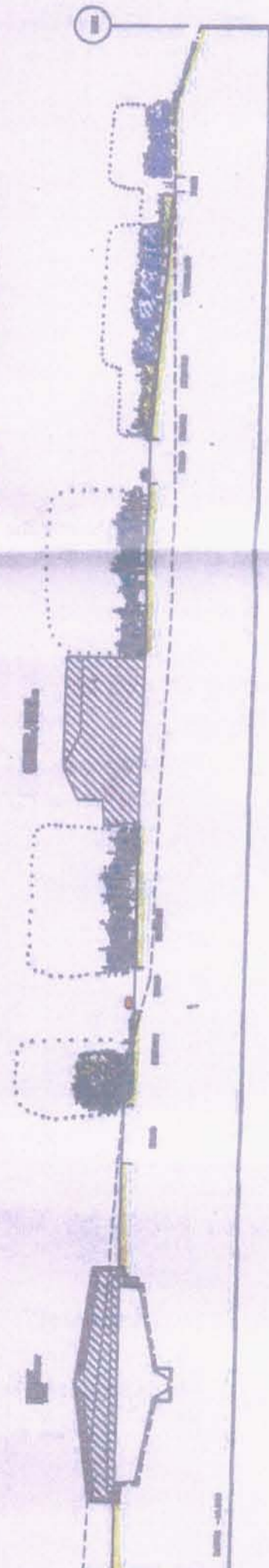


SECTIONAL ELEVATION E - E (Contd.)

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SECTIONAL ELEVATION (E) - (E) SCALE 1:500



SECTIONAL ELEVATION F - F SCALE 1:500

**LEGEND :**

- EXISTING STRUCTURE
- PROPOSED STRUCTURE
- EXISTING LANDSCAPE
- PROPOSED LANDSCAPE
- EXISTING UTILITY POLE
- PROPOSED UTILITY POLE
- EXISTING TREE
- PROPOSED TREE

**LANDSCAPED TYPICAL SECTION**

**E.G. Pettit & Company**  
 LANDSCAPE ARCHITECTS  
 1100 West 12th Street  
 Anchorage, Alaska 99501

Fig. Nr.

its north-eastern section, a boardwalk (i.e. 'an elevated walkway constructed of timber) with railings will be provided for that portion of the site. The boardwalk will also protect the wetland plant species from pedestrian impact, while allowing the public to enjoy viewing at close quarters this particular landscape scene.

### **2.3 Landscaped Buffer Zone/Amenity Park**














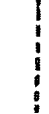

The area between the northern boundary of the net (15ha) treatment plant site and the Well Road will be preserved as a buffer zone between the plant and the nearby residences. The visual appearance of this area will be enhanced by the effective use of landscaping (See Figs. 4.5.8 to 4.5.11 incl. and Appendix 7.) which will ensure that the overall development will be aesthetically pleasing. It will be seen that special attention has been paid to preserving and enhancing the wetland ambience of the low-lying area to the east of this zone.

The general objective of providing a buffer zone is to reduce the visual impact of the proposed wastewater treatment plant on Carrigrenan, Little Island by regrading the existing topography and by adequate screening with plants.

The specific objectives are:

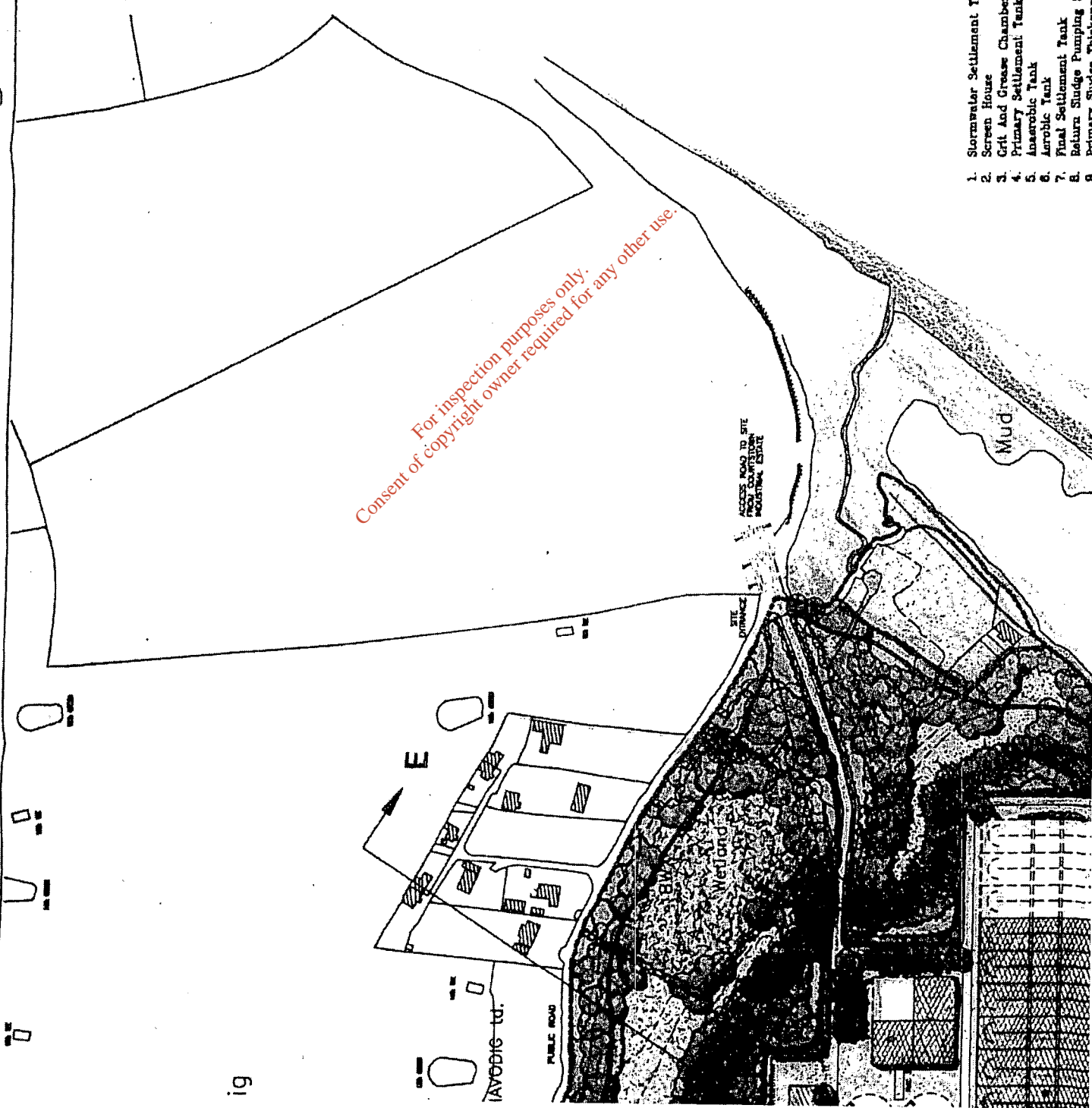
- To create a large landscaped buffer zone between the northern boundary of the site adjacent to Well Road and the proposed embankment defining the northern perimeter of the treatment plant area. To extend a narrower version of this buffer zone along the entire site's boundary for primarily screening purposes.
- To provide a suitable design scheme with the intent to reduce the impact on the area due to the proposed wastewater treatment plant.
- To provide a planting concept that reflects the indigenous and naturalised vegetation of the area.
- To provide an access corridor or amenity walk along the site's boundary, near the shore line and Well Road.
- To preserve the existing wetland and incorporate the wetland in the proposed design scheme.
- To retain and preserve the existing Castle Ruins as an attractive feature within the design scheme, and provide limited access to this particular area of the site.

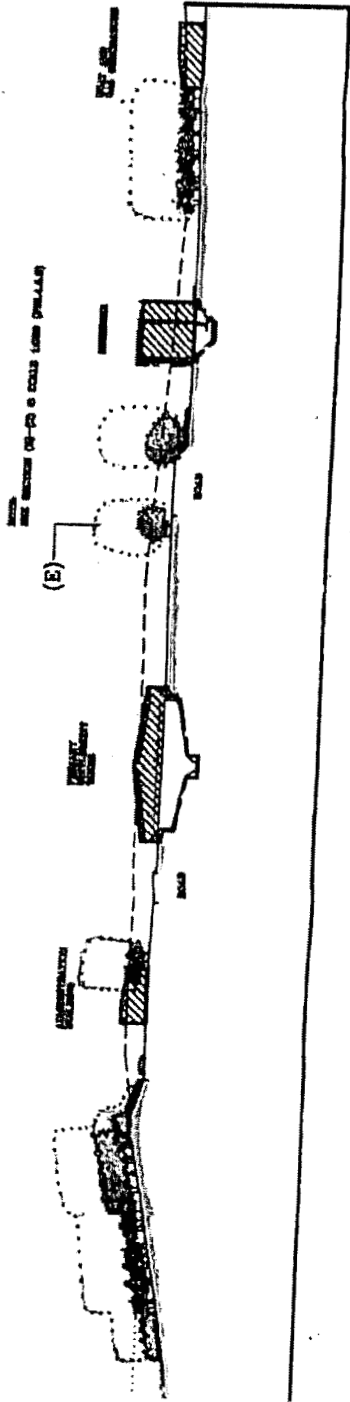
**LEGEND**

-  **LARGE DECIDUOUS TREES**  
(18m High and over)
-  **MEDIUM DECIDUOUS TREES**  
(10-18m High and over)
-  **SMALL DECIDUOUS TREES**  
(Less than 10m)
-  **BROADLEAF EVERGREEN TREE**  
(18m high)
-  **CONIFEROUS EVERGREEN TREE**  
(18m High - typical)
-  **DECIDUOUS SHRUB MASS**  
(Less than 10m high)
-  **BROADLEAF EVERGREEN SHRUB MASS**  
(Less than 10m high)
-  **GRASS - LAWN**
-  **GRASS - WILD MEADOW/WETLAND**
-  **ROCK OUTCROP/MOUND**
-  **AMENITY WALK**
-  **BW-BOARDWALK**
-  **SITE BOUNDARY**
-  **EXISTING CONTOURS**
-  **PROPOSED CONTOURS**

- 1. Stormwater Settlement Tank
- 2. Screen House
- 3. Grit And Grease Chamber
- 4. Primary Settlement Tank
- 5. Anaerobic Tank
- 6. Aerobic Tank
- 7. Final Settlement Tank
- 8. Return Sludge Pumping Station
- 9. Primary Sludge Thickener
- 11. Heat And Gas Generators
- 12. Digester
- 13. Gas Holding Tank
- 14. Control Room And Transformer
- 15. Garage And Workshop
- 16. Administration Building
- 17. Chemical Storage And Deaerage Tank
- 18. Advanced Treatment/Storage

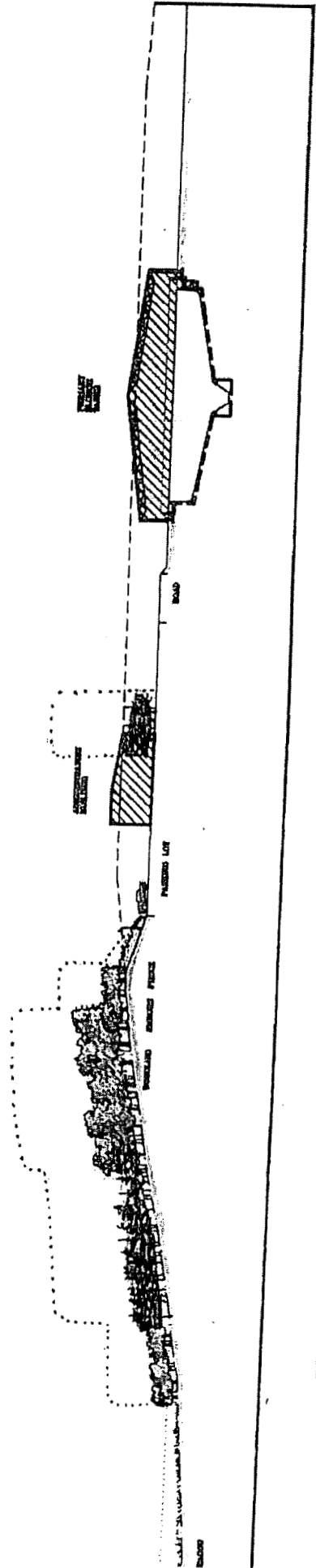
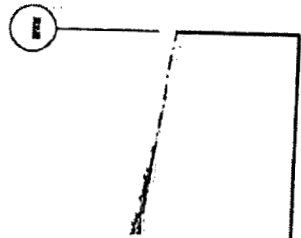
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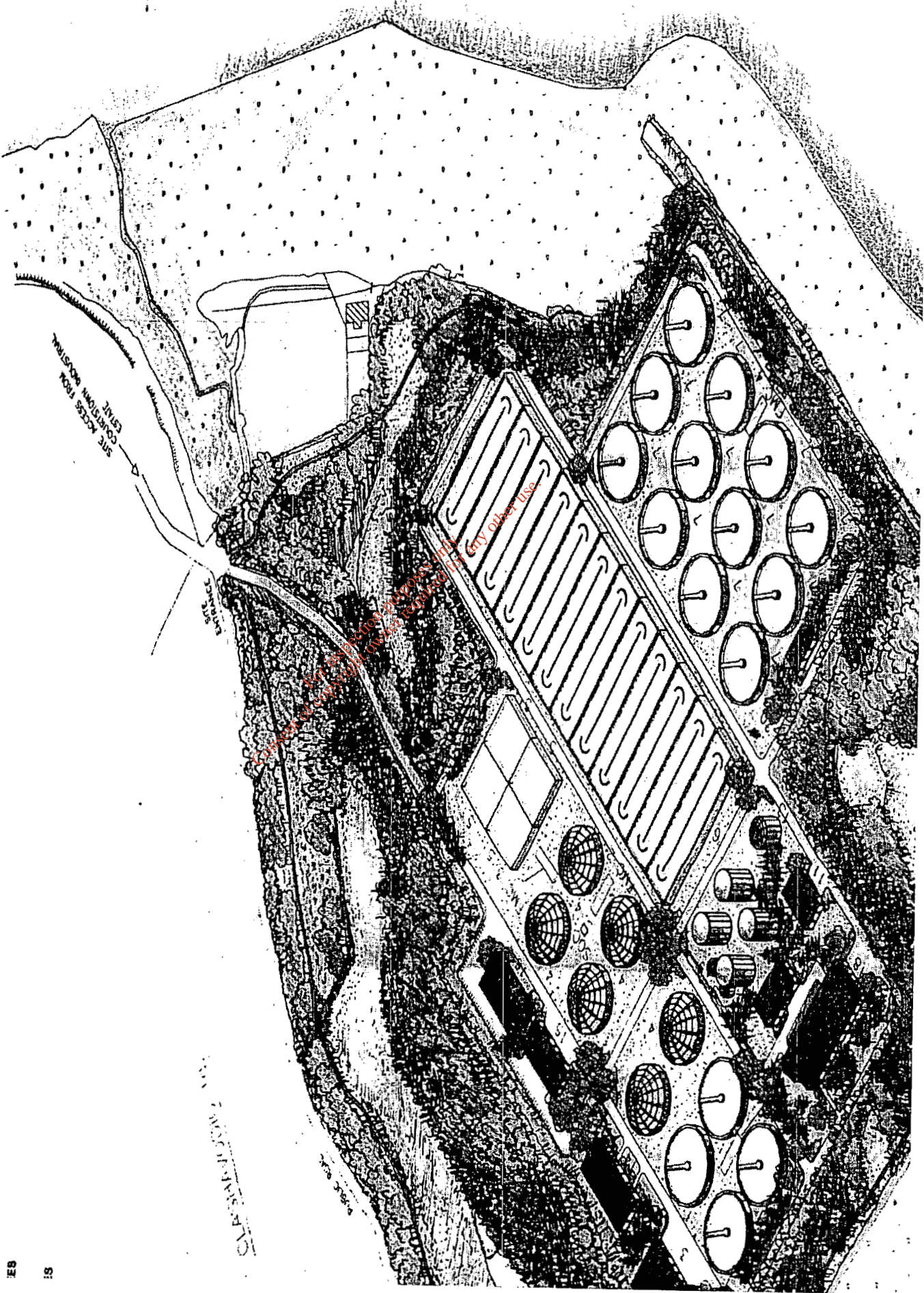
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SECTIONAL ELEVATION (E) - (E) SCALE 1:500

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EB  
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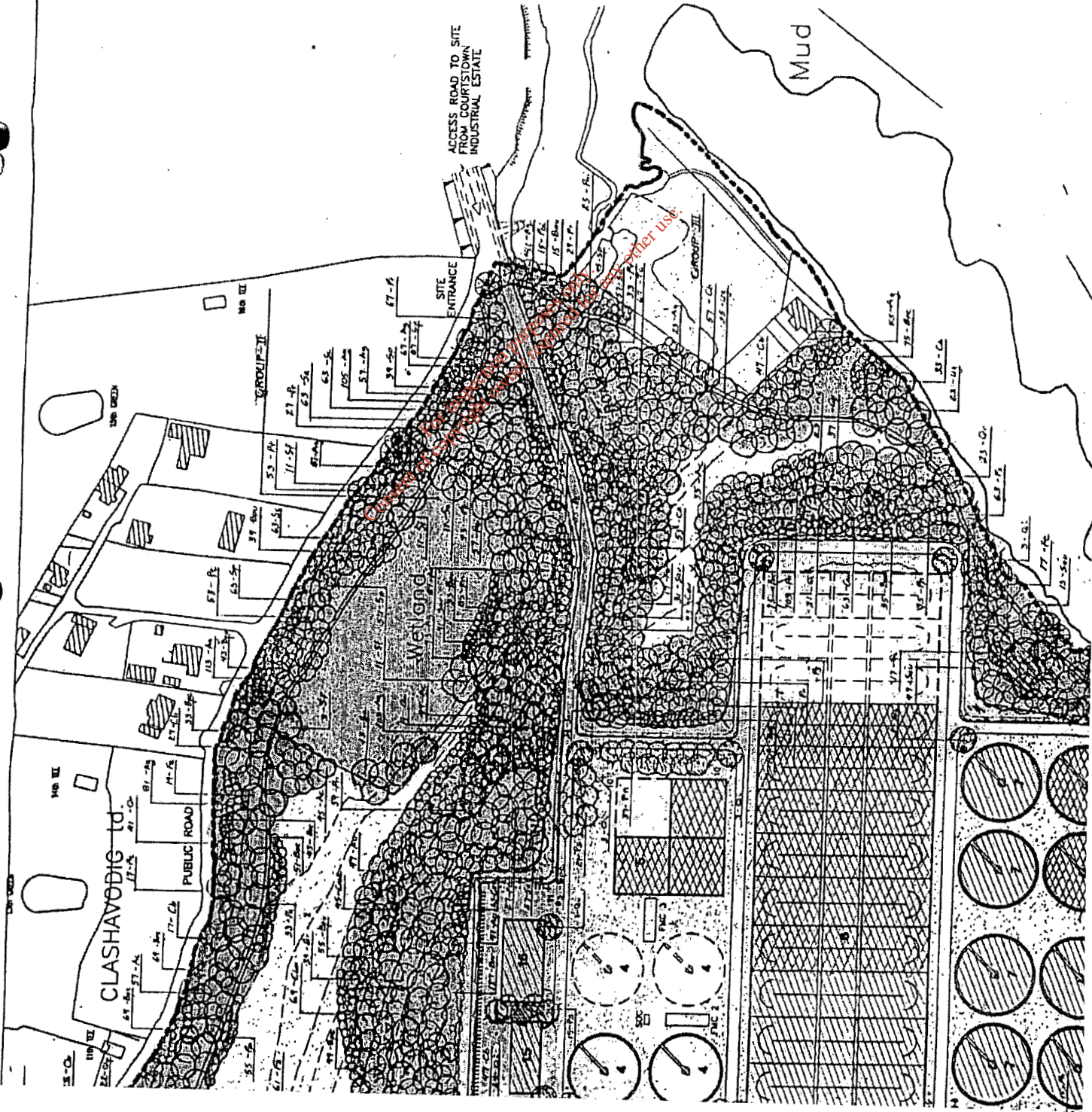
**LEGEND**

- LARGE DECIDUOUS TREES
- MEDIUM DECIDUOUS TREES
- SMALL DECIDUOUS TREES
- BROADLEAF EVERGREEN TREE
- CONIFEROUS EVERGREEN TREE
- DECIDUOUS SHRUB MASS
- BROADLEAF EVERGREEN SHRUB MASS
- GRASS - LAWN
- GRASS - WILD MEADOW
- ROCK OUTCROP/MOUND
- AMENITY WALK
- SITE BOUNDARY
- EXISTING CONTOUR
- PROPOSED CONTOUR

**PLANT LIST FOR TREES**

- LARGE TREES (18 IN HIGH AND OVER):**
- AC\* American Elm
  - CE\* European Larch
  - CO\* Canadian Red Pine
  - FR\* Norway Spruce
  - LA\* Loblolly Shortleaf Pine
  - LS\* Live Oak
  - PE\* Pinus strobus
  - PI\* Pinus resinosa
  - PO\* Pinus taeda
  - PR\* Red Pine
  - SC\* Scotch Pine
  - SP\* Spruce Pine
  - ST\* Shortleaf Pine
  - TA\* Tamarac
  - TR\* True Spruce
  - WA\* White Pine
  - WE\* White Pine
  - WI\* White Pine
  - WY\* Wyoming Pine
- MEDIUM TREES (10 TO 18 IN HIGH):**
- AL\* Norway Spruce
  - CA\* Carolina Redwood
  - CO\* Carolina Redwood
  - FR\* Norway Spruce
  - LA\* Loblolly Shortleaf Pine
  - LS\* Live Oak
  - PE\* Pinus strobus
  - PI\* Pinus resinosa
  - PO\* Pinus taeda
  - PR\* Red Pine
  - SC\* Scotch Pine
  - SP\* Spruce Pine
  - ST\* Shortleaf Pine
  - TA\* Tamarac
  - TR\* True Spruce
  - WA\* White Pine
  - WE\* White Pine
  - WI\* White Pine
  - WY\* Wyoming Pine
- SMALL TREES (LESS THAN 10 IN HIGH):**
- AL\* Norway Spruce
  - CA\* Carolina Redwood
  - CO\* Carolina Redwood
  - FR\* Norway Spruce
  - LA\* Loblolly Shortleaf Pine
  - LS\* Live Oak
  - PE\* Pinus strobus
  - PI\* Pinus resinosa
  - PO\* Pinus taeda
  - PR\* Red Pine
  - SC\* Scotch Pine
  - SP\* Spruce Pine
  - ST\* Shortleaf Pine
  - TA\* Tamarac
  - TR\* True Spruce
  - WA\* White Pine
  - WE\* White Pine
  - WI\* White Pine
  - WY\* Wyoming Pine

NOTE: All quantities are approximate. For further information on trees and shrubs see written description and planting schedule.



The planting concept in general for this particular site is to select native and naturalised plant species (in particular trees), with a wide range of tolerance to various soil conditions; suitable to coastal or maritime exposure; and of low maintenance. The function of the proposed planting is to screen, buffer, direct traffic, reinforce visual orientation, create spaces, reduce erosion, frame views, and reduce high maintenance associated with cutting grass. The intent throughout this landscape scheme (except for the shrub planting within the Treatment Plant area such as on the embankments or levelled areas), is to echo the natural plant associations found typically in the area, thus creating interest through contrasting plant scales (sizes), and emphasising the horizontal and vertical layering of a woodland.

Fig. 4.5.12 shows the location of existing trees on the site, and should be read in conjunction with Appendix 6 which also schedules these trees.

The wastewater treatment plant is defined by a high security palisade type perimeter fence. The function of the security fence is to prevent public access into the wastewater treatment plant area. The fence is shown bordered by shrub masses on both sides to soften its harsh appearance, and to create a zone of plant materials that separate the woodland from the treatment plant area reducing the potential for tree branches to hang over the fence. Furthermore, the shrub mass will hamper ease of access to the fence. In the following text the fenced area shall be referred to as the "Treatment Plant Area", (which also includes any shrub beds beyond the fence along embankments), in order to differentiate it from the remaining portions of the entire "Site".

The plant species selected are listed in Appendix 7. The proposed planting concept shows (see Landscape Masterplan Fig 4.5.8) an informal planting layout which acts to buffer and screen the wastewater treatment plant from the surrounding context, and also to ameliorate the loss of mature trees, particularly in the vicinity of Carrigrenan House and at the proposed access to the site, which will be lost due to the construction of the wastewater treatment plant.

Wetlands are important habitats for wildlife, particularly for birds and a suitable place, however small, for bird watching. The presence of an information panel regarding the ecology of the wetland would be beneficial for public appreciation of this amenity. The access road to the Treatment Plant will divide the existing wetland, however proper drainage facilities will be provided to maintain the existing wetland. Prior to introducing any new wetland plant species or plants tolerant to wet conditions, it is advisable that an environmental consultant such as a



wetland ecologist be involved to determine:-

- The ecological character of the wetland;
- Its relative degree of tolerance to site disturbance (caused by construction);
- Its boundaries;
- Any wildlife associated with the wetland.

The Castle Ruin area is included in the scheme, and a proposed enclosure such as a high stone wall or security fence will create limited access. The Castle Ruin at present although an attractive feature worth preserving is not safe for general public use. Another strategy is to block all entry points to the Castle, so that it can only be viewed, and to reinforce any weak structure that could fail and cause injury.

The proposed planting concept incorporates a large buffer zone of open space, framed by tree planting along Well Road, and along the embankment adjacent to the Wastewater Treatment Plant northern perimeter. The typical layout for trees is combinations of deciduous and evergreen trees of different species. The intent is to create a layering and terracing effect of various tree sizes, echoing the topography. The smallest species will be used at the edges of the woodland so as to simulate a natural 'ecotone' (zone of vegetation that acts as a habitat and buffer for wildlife). The understorey will typically include shade tolerant evergreen shrubs like Holly and Common Laurel, particularly in areas where screening is a priority and where invasive plants can occur, with Myrtle, Hawthorn, Bird and Wild Cherry used for hedge effect. These shrubs species can propagate themselves naturally as well which is an added advantage. This open space of grass shall be cut infrequently so that it may resemble a wild meadow.

Another option is to actually create a wild flower meadow to break the monotony of green. The wild flower meadow is an attractive habitat for animals, and is an aesthetic feature in the landscape. The initial high cost of establishing such a landscape is compensated by the low maintenance associated with the wild flower meadows in the long run. Cutting occurs typically only twice a year, spring and autumn, after the second year of its establishment. The success of the wild flower meadow depends on the soil's fertility (lower the better), and that the correct procedure for establishment is adhered to by the landscape contractor. This planting concept can be incorporated into the existing features of the site and the proposed wastewater treatment plant.

## 2.4 Views of the Proposed Wastewater Treatment Plant Site

As stated in Section 7.6 of the EIS (December 1992) the overall setting of the treatment plant incorporates an aesthetic layout which will blend in with the natural environment of the area and not be a visual intrusion. To this end tanks will, where possible, be constructed substantially below ground level and their outside surfaces treated in appropriate colours to blend in with the local landscape as noted in Section 3.0..

This can be seen from the perspective views of the proposed treatment plant from various locations around the area as shown on Figs. 4.5.13 - 4.5.18.

Screening trees are shown an average of 8 m in height being 5 years old when planted and having three years growth. The eventual canopy level of the mature trees of 20 m is also outlined.

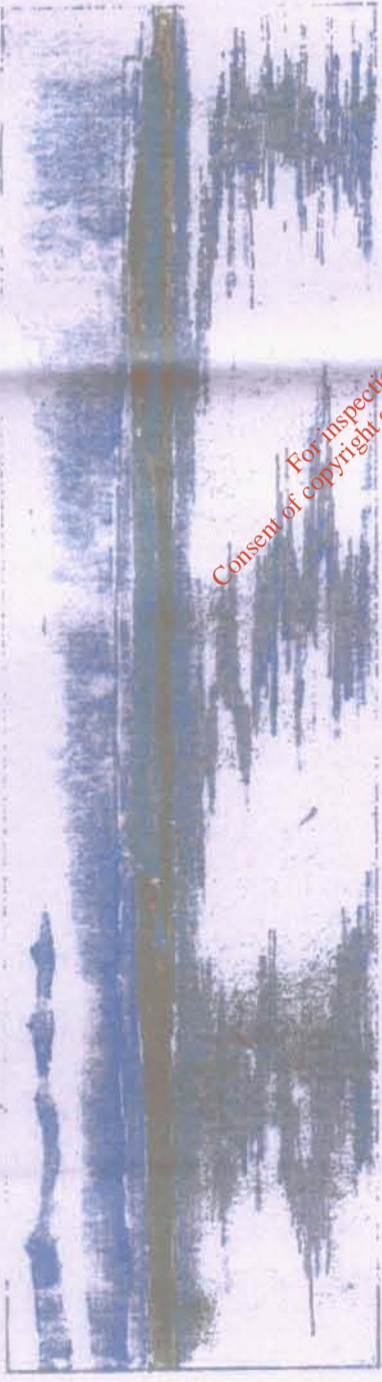
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7. IMPROVED VIEW FROM ROCHESTOWN-PASSAGE WEST AMENITY WALK ADJACENT TO ROCHESTOWN.



7. SCREENED VIEW FROM ROCHESTOWN-PASSAGE WEST AMENITY WALK ADJACENT TO ROCHESTOWN.

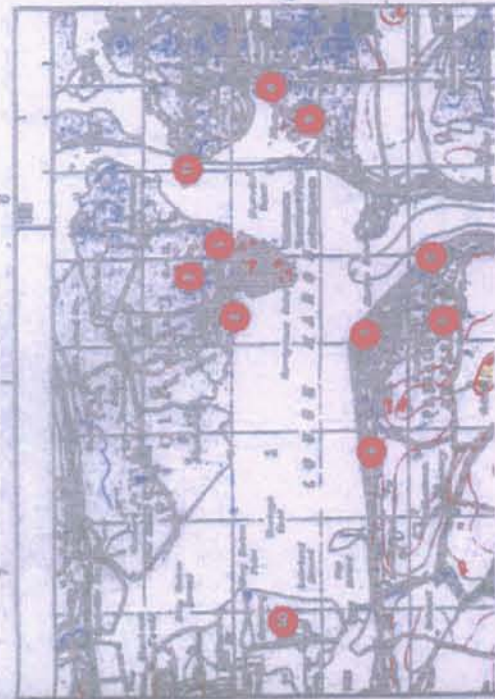


8. UNSCREENED VIEW FROM QUAY SIDE ADJACENT TO FIRE STATION AT PASSAGE WEST.



8. SCREENED VIEW FROM QUAY SIDE ADJACENT TO FIRE STATION AT PASSAGE WEST.

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**KEY PLAN**

**Legend**

1. View from Eastern boundary of most elevated dwelling on Wall Road.
2. View from South-Eastern corner of Clubhouse, Harbour View golf course.
3. View from 6th tee, Cork golf club.
4. View from West of Belvelly Bridge.
5. View from Cobh Road.
6. View from Rochestown-Passage West amenity walk.
7. View from Rochestown-Passage West amenity walk adjacent to Rochestown.
8. View from Quay side adjacent to fire station at Passage West.
9. View from high level at Pembroke, Passage West.
10. View from road at Ballymore.
11. View from Captaie at Fota.

**Notes:**

1. Observer eye level at all locations taken at 1.5m above ground level.
2. Tree line shown at average height of 6m after 3 yrs. growth (height at planting 3m).
3. ——— Top Canopy Level of Mature Trees.

REV	DATE	DESCRIPTION	BY	CHECKED

**E.G. Pettit & Company**  
 PLANNING & CONSTRUCTION CONSULTANTS  
 100-100 SOUTH ROAD, COBLENCE  
 TEL: 021 909-0000 FAX: 021 909-1155

**CLIENT & PROJECT**  
 Cork Corporation  
 Cork Irish Drainage Scheme

**DRAWING TITLE**  
 Perspective views of proposed amenity walk (treatment plant) at Carriyano.









### 3.0 Building Design Philosophy

In order to ameliorate the visual impact of the proposed wastewater treatment plant, it is proposed to house a variety of the treatment processes. To achieve visual continuity throughout the site the building blocks have been designed utilising Dense Concrete Masonry (DCM), modular blockwork, profiled, insulated roofing and cladding, coloured grey. In addition, each block has been given a horizontal emphasis as opposed to a vertical emphasis. The facade of each block expresses the structural frame using contrasting DCM block piers which lend rhythm and interest to each elevation. Visual continuity has been achieved throughout the entire development with colour co-ordination of the various elements, the colours selected being those which are sympathetic to the existing environs.

### 4.0 Site Lighting

The wastewater treatment plant will operate on a continuous basis. Site lighting will be provided as a safety and security measure and will be used as required during nighttime hours.

It is proposed to provide floodlighting to illuminate each individual treatment plant unit as required. The floodlights will consist of high pressure sodium lamps provided with cut-off hoods to reduce glare. Additional fluorescent lighting will be provided on access ladders and platforms to ensure operator safety. The site floodlighting will be manually controlled from the central control room under normal operations and will only be used during essential night-time maintenance operations.

Continuous lighting of access roads within the site will be provided during nighttime hours. This lighting will consist of low density high pressure sodium lamps incorporating anti-glare cut-off hoods. The access road lighting will be controlled by photocell which can be manually overridden if required. All lighting fixtures will be directed inwards so as to minimise any overspill of light at the treatment plant site boundaries.

The nearest residences to the treatment plant are located more than 200 metres to the north. The presence of boundary screening and landscaping together with the features incorporated into the design of the site lighting to minimise glare etc. and the intensity of access road lighting which will be used on a continuous basis during nighttime hours, will ensure that the impact due to site lighting will not be significant.

## 5.0

**Air Quality and Noise**

As discussed in Section 6.5 of the EIS (December 1992), emissions of odours and noise by the wastewater treatment facility are not expected to be significant. Areas susceptible to possible odour emissions will be covered/housed and the extracted gases conveyed to odour removal facilities prior to discharge to the atmosphere. This measure includes the housing of the screening plant, screenings treatment, grit treatment and sludge dewatering/thermal drying processes, and covering the sludge thickening/holding tanks including primary sedimentation tanks. The positively extracted air/gases will be treated by biological scrubbers prior to discharge to the atmosphere. Biological odour treatment involves the use of naturally occurring microbes to oxidise odorous compounds in the air stream. In practice this involves sulphur oxidising bacteria, for the removal of hydrogen sulphide, and other species for the removal of the organic odour components. A microbiological film is immobilised on the gas/liquid transfer media. The extracted air/gases to be treated are blown up through the packing in a single pass and the micro organisms absorb and oxidise the impurities within the system and also through microbes in the recycled water. It is recommended that three bioscrubber units 4.8m diameter x 7.5m high be provided for treatment of the extracted air from the preliminary treatment facilities and 3 nr. units of 3.5 m diameter x 7.5 m high be provided for the treatment of the extracted air from the sludge thickening and de-watering areas. Furthermore, a regular maintenance schedule will be adhered to so that the wastewater treatment plant is continually operated in an effective manner.

Monitoring and recording facilities for hydrogen sulphide will be provided on all inlets and vents from the proposed odour removal system as hydrogen sulphide is the principle odour indicator. This will enable the efficiency of the systems to be ascertained while providing a continuous record of all emissions. The vent stack from the thermal dryer will also be monitored. Biogas and/or natural gas will be utilised as the energy source for the dryer, this, together with the adoption of an indirect or a closed loop system will ensure that emissions from same to the atmosphere will not have a significant impact.

Facilities for diverting flows from the various modular type treatment units will be provided to effect ease of maintenance and to facilitate isolation of any integral unit should breakdown occur without impairing the overall treatment plant efficiency. Two independent power supplies will be provided at the site and in addition on-site emergency power generation plant utilising natural gas will be provided. These will eliminate the effects of a power outage.

To minimise possible impacts to the nearby residences, noise-control measures will be implemented. These measures include selection of low-noise equipment (i.e., low-noise-level ventilation fans and sound-absorbing roll-up doors), and utilisation of silencers and attenuators (i.e., inlet filter silencers on blowers). Noise emissions will further be diminished by enclosing the screening facilities and all motors, and covering the grit chamber.

Noise impacts will also be ameliorated by scheduling sludge removal by trucks during periods of relatively high background noise such as midday. The presence of the northern embankment and additional vegetation planting, especially around the northern border, will help to absorb noise emissions. These measures, combined with the normal attenuation of sound with distance, will ensure that noise levels will be minimised.

Further to Section 6.5.2 of the EIS which relates to dust emissions, the operation of the wastewater treatment plant will not result in any significant impacts due to dust or smoke emissions. Dried sludge will be in a dust free granulate form and will be bagged for ultimate disposal off site. Screenings will be washed/compacted and bagged for disposal at Kinsale Road Municipal landfill or its subsequent replacement. Grit will be washed and disposed of in covered skips at the above landfill site. Biogas or natural gas are the only combustible fuels which are used on site and they do not give rise to significant smoke emissions.

## 6.0

### Utility Services

Water for use during construction and during operation of the wastewater treatment plant will be piped from the Cork County Council public water supply system. The existing 250 mm dia. watermain will be tapped into where the new access road crosses it and a 150 mm dia. supply line will be laid to this treatment plant site along the route of the proposed access road.

Natural gas supply to the site will be taken from the existing Bord Gais high pressure supply at Courtstown Industrial Estate to the south of the 'Simon Eurolift' premises and used for emergency power generation and/or an energy source for the sludge dryer. A 63 mm pressure supply line will be connected to the existing 125 mm gas main and routed along the proposed access road route to the entrance to the treatment plant site. A pressure reducer and meter will be installed at this location and a 125 mm gas main laid to the treatment plant.

Power supply to the treatment plant will be tapped off the existing 38 kv

main power line at the existing ESB transformer station at Courtstown. The Electricity Supply Board has confirmed that sufficient capacity is available from the existing 38 kv network to service the proposed treatment plant which requires approximately 3 Mw. 2 nr. 10 kv cables will be laid along the route of the access road, one at either side of the road for security reasons. All cables from the supply point to the site and within the site will be distributed underground and therefore will not have a significant impact on the surroundings.

The biogas produced in the anaerobic sludge digestion process will be used as the energy source for the sludge dryer and/or also for power generation, with resultant energy savings. 2 nr. gas flares (duty/standby) will be provided for emergency flaring (burning) of biogas, if required, should it be necessary to take the sludge drying plant and the power generation plant out of commission at the same time. This will eliminate the possible emission of the biogas to the atmosphere. Standby generation plant will be provided to operate the main elements of the wastewater treatment plant in the event of power failure and also possibly to reduce peak demand loads from the National Grid thereby reducing the running costs of the wastewater treatment plant.

## 7.0 Monitoring

Flow monitoring, sampling and recording facilities will be provided on:

- The inlet wastewater stream
- The clarified stormwater stream
- The inlet to the biological treatment system
- The treated effluent outfall
- The stormwater run-off from site roads.

This will enable effective control of the processes to be achieved together with provision of comprehensive records of all discharges from the site to the harbour. These monitoring facilities will be tied back into the central control and monitoring system for the plant.

## 8.0 Fishing in Cork Harbour

Whereas the EIS states that no commercial shellfishing operations occur in Cork Harbour except in the eastern part of the North Channel, several other fishing activities do occur in Cork Harbour including salmon draft

netting, shore angling and boat angling.

Commercial salmon draftnetting is carried out on a seasonal basis (February to July) in areas of the harbour from the Ferry Boat at Tivoli to Cobh and Monkstown Creek, traditionally known for their salmon movement, and the draft nets exploit the migrations of the salmon through the harbour area. There are over 25 nr. draft net licensed fishermen operating in the inner and outer harbour areas.

Shore angling is a very popular recreational past-time along the coastline of Cork Harbour. Spinning, float fishing and bottom fishing for bass, ray, dogfish, flounder, plaice, dabs, conger eel, pollack, wrasse, codling, whiting, coalfish, rockling, sea trout, mullet and mackerel are widely practised. Fishing for slob trout and brown trout is carried out on a regular basis on the South Channel of the River Lee.

The sheltered nature of the inner harbour makes it ideal for boat angling all year round. Charter boats are available from many operators around the harbour while anglers with their own small boats make great use of the harbour. The species most frequently taken in the sheltered waters of the harbour are turbot, ray (especially blonde ray), conger eel, plaice, dabs, codling and dogfish. Traditionally, Cork Harbour was renowned for the quality of turbot and blonde ray available but fishing for these species has declined in recent years.

The implementation of the proposed scheme will result in a significant improvement in water quality throughout the harbour and particularly in Lough Mahon. Significant reduction in existing BOD levels even at the outfall location and at nearby areas (Monkstown) will be achieved. The improvement in water quality will significantly benefit the above fishing activities and will be of aesthetic and amenity value to Cork Harbour in general.

From a bacteriological viewpoint the implementation of the proposed scheme will result in a major improvement in the zone extending from mid Lough Mahon to the Custom House. A slight localised disimprovement may occur in the vicinity of the outfall location. However, the water quality allowing for background levels, even at this location, will comply with the requirement of the Irish Bathing Water Regulations. This will enhance the recreational and amenity value of the Harbour.

## 9.0 Safety & Security

Safety measures at the wastewater treatment plant site will provide for

the requirements of all plant personnel and will limit access to the site by unauthorised persons.

Safety features will include the following:-

- First Aid/Rest Room and safety equipment (located in Administration Building).
- Handrails to uncovered tanks where appropriate.
- Handrails and toe-board to access platforms walkways etc.
- Controlled access to all stairs and platforms.
- Safety chains/cages to units/ladders where appropriate.
- Safety grid flooring to all ducts and channels
- Local emergency stop buttons to be provided on all machinery.
- Life buoys will be provided at strategic locations around all tanks.
- Hadrian rails and harnesses for maintenance personnel.
- All personnel clothing and equipment as required by the "Safety and Health at Work Act" /Local Authority Requirements.
- Perimeter security fence.

These measures are incorporated in the plant design to minimise risk to all plant personnel/visitors/intruders.

All lubricating oil drums, laboratory chemicals and ferric sulphate will be stored in a housed bunded area - Block Nr. 17 on the Layout Plan.

## 10.0 Corrigenda to Original Environmental Impact Statement

### 10.1 Non-Technical Summary

Page X Last paragraph, first sentence should read,

"From a land-use perspective, the construction and operation ..... the future use of Harbour Point, Little Island and Fota Golf Courses or development of Foaty island".

Fota ?

Page XI 4th. paragraph, first sentence should read,

"The construction and operation .....growth patterns for Cork City, Little Island, Fota or other areas of Cork County".

5th. paragraph, 2nd. sentence, should read,

"These impacts would be likely to include ..... treatment plant".

5th. paragraph, last sentence should read,

"In addition, it should be noted that new residential construction on Little Island is limited by the current County Development Plan to certain areas, largely remote from the proposed treatment plant site. The recent LUTS Review and the County Development Plan give primary emphasis to Little Island's development role as a major industrial and employment location"

6th. paragraph, add new sentence

"It should be noted that Planning Permission has been granted on appeal for the construction of a dwelling house at the north-western corner of the site".

Page XIII 1st paragraph, add new sentence

"Screenings and Grit will be disposed of off site at the Kinsale Road Municipal Landfill or its subsequent replacement. The dried sludge granulate will be disposed of off site, at golf courses, municipal parks and/or landfill."

Page XVII 3rd paragraph, 2nd sentence should read,

"A key objective ..... developments to the scheme and the avoidance of adverse impacts on planned developments in the more heavily developed areas (i.e. Cork, Mahon, Douglas, Blackrock)".

3rd paragraph, add new sentence,

"The loss of a potential port related industrial site at Carrigrenan is compensated for by the potential enhancement of other industrial sites on Little Island.

Page XX 4th. paragraph should read,

"To promote sustainable development throughout the Cork City, Environs and harbour area, the Local Authority .....and development".

5th. paragraph should read,

"To avoid severance of the shoreline around Carrigrenan a public amenity walk will be created in the area between the shoreline and the treatment plant perimeter fence. Access will not be permitted through the treatment plant site itself for obvious operational and security reasons".

## 10.2 Environmental Impact Statement

Page 18, 3rd paragraph should read,

"The corresponding 1991 BOD and Suspended Solids loadings are 4743 kg/day and 2842 kg/day respectively. The industrial hydraulic load for the City has increased slightly from 6994 m<sup>3</sup>/day in 1975 to 7109 m<sup>3</sup>/day in 1991."

Page 132, 3rd paragraph

The ultimate population as outlined in this paragraph at 205,600 includes population equivalent (PE) figures for the industrial/commercial contributions from Tramore Valley/Glanmire Little Island catchments. The ultimate design population for the plant is 166,166 (448,350 PE when commercial and industrial contributions are included.).

It should be noted that Tramore Valley caters for 9600 of the city population.

Page 164 First paragraph, first sentence should read,

"From a land-use perspective, the construction and operation ..... the future use of Harbour Point, Little Island and Fota Golf Courses or development of Foaty island".

Page 165 First paragraph, first sentence should read,

"The construction and operation .....growth patterns for Cork City, Little Island, Fota or other areas of Cork County".

2nd. paragraph, 2nd. sentence, should read,



"These impacts would be likely to include ..... treatment plant".

2nd. paragraph, last sentence should read,

"In addition, it should be noted that new residential construction on Little Island is limited by the current County Development Plan to certain areas, largely remote from the proposed treatment plant site. The recent LUTS Review and the County Development Plan give primary emphasis to Little Island's development role as a major industrial and employment location"

3rd. paragraph, add new sentence

"It should be noted that Planning Permission has been granted on appeal for the construction of a dwelling house at the north-western corner of the site".

Page 165, 2nd paragraph, last sentence should read,

"In addition it should be noted that new residential construction on Little Island is limited by the current County Development Plan to certain areas, largely remote from the proposed treatment plant site. The recent LUTS Review and the County Development Plan give primary emphasis to Little Island's development role as a major industrial and employment location".

Page 166, 5th. paragraph, should read

"Actual traffic ..... transportation off site, which amounts to approximately 20 - 30 traffic movements per day. Sufficient parking area to accommodate these vehicles on the Carrigrenan Site will be provided."

Page 167, 3rd. paragraph, add new sentence.

"Screenings and grit will be disposed of off site at the Kinsale Road Municipal Landfill or its subsequent replacement. The dried sludge granules will be disposed of off site, at golf courses, municipal parks and/or landfill."

Page 186, 6th paragraph, last sentence should read,

"The maximum height of any specific structure at the treatment plant will not exceed a height of 14.5m above ground (sludge digesters)".

Page 188 Last paragraph, 2nd sentence should read,

"A key objective ..... developments to the scheme and the avoidance of adverse impacts on planned developments in the more heavily developed areas (i.e. Cork, Mahon, Douglas, Blackrock)".

Page 189 First paragraph, add new sentence,

"The loss of a potential port related industrial site at Carrigrenan is compensated for by the potential enhancement of other industrial sites on Little Island.

Page 196 1st. paragraph should read,

"To promote sustainable development throughout the Cork City, Environs and harbour area, the Local Authority .....and development".

2nd. paragraph should read,

"To avoid severance of the shoreline around Carrigrenan a public amenity walk will be created in the area between the shoreline and the treatment plant perimeter fence. Access will not be permitted through the treatment plant site itself for obvious operational and security reasons".

## 11.0

### Overall Environmental Benefits

Significant benefits accruing to the environment, associated with the siting of the wastewater treatment plant at Carrigrenan include the following:-

- Overall positive environmental impact in the area of Cork City and Cork Harbour..
- Considerable improvement in water quality in Cork Harbour and in particular in the Cork City portion of the River Lee and in Lough Mahon. This will promote the development of the following:-
  - Tourism Potential
  - Water Related Leisure Activities.
- Provision of a common high quality treated effluent to replace the multiple untreated wastewater discharges at present outfalling to

the River Lee and Lough Mahon.

- Enhancement of sustainable development.
- Promotes achievement of Development Plan Objectives in the City and County.
- Provides access to a local amenity at Carrigrenan Point.
- Creation of employment during construction of the scheme.
- Enhancement of long term employment prospects for the catchment area in industry, commerce and tourism.

## 12.0

### Glossary of Terms

BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
SO	Storm Overflow
m <sup>3</sup> /day	Cubic Metres per day
t/d	Tonnes per day
TS	Total Solids
PE	Population Equivalent
Thermal Drying	Reduction of the water content of sludge by vaporisation of water to air.
Pyrolysis	A process whereby dried sludge is heated to derive a fuel.
DWF	Dry Weather Flow

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## Appendices

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### APPENDIX 6 EXISTING TREE SURVEY

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**Appendix 6**

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**EXISTING TREE SURVEY**

**APPENDIX 6**

**EXISTING TREE SURVEY**

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**Introduction**

**General Comments**

**Protective Measures**

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## Appendix 6

### Existing Tree Survey

#### Introduction

The trees and associated understory shrubbery of the proposed Wastewater Treatment plant site at Carrigrenan, are concentrated into four broad areas as follows:

- Copse in North Western corner of site close to 'castle structure'.
- Mature trees around Carrigrenan House and the field to the South East of same.
- Trees and scrub surrounding headland at the southern tip of the site
- Hedgerow along Northern Boundary of site and surrounding field by swampy area.

Fig. 4.5.12 shows the locations of existing trees within the site.

#### General Comments

The mature trees on site which consist principally of Beech with some Spanish Chestnut and Pine are all estimated to be in the region of 150 years plus and the Beech in particular have lost many branches over the years and show evidence of heart rot arising from same. It is likely that these mature trees will become increasingly vulnerable in coming years to wind damage and indeed a number of Beech have fallen in recent years.

All existing trees, shrubs and vegetation outside the treatment plant site perimeter (17 of the 32 ha) will be retained and enhanced with further landscaping as outlined in Section 2.3. Existing trees within the treatment plant site (15 ha) will be removed to allow for construction of the various tanks, etc. This loss of trees will be ameliorated by the proposed extensive landscaping of the entire site.

The value of the various small woodlands around the margins of the site should not be underestimated as these can be supplemented with additional planting and even though there is a significant level of Elm Suckers on the site these will continue to regrow even though there will be ongoing loss due to Dutch Elm Tree disease until natural resistance

develops.

The following Table 6.1 is a detailed schedule of the trees on the site and it should be noted that the assessment regarding the health of the trees is based on a visual inspection from ground level and trees to be retained should receive a more detailed examination before construction work commences.

The following observations should also be noted:

- There is a copse consisting of Elm Suckers, Elder, Hawthorn, and Wild Plum located around tree Nrs. 1 - 7. In addition there is a Grisilinia Littoralis hedge along the side of the road.
- The hedgerow along the Northern Boundary consists principally of Elm Suckers with occasional small Ash Trees. There is a group of somewhat larger Ash number 6 in all located at the Eastern end of the Northern Boundary. These trees are 8 - 10 m high.
- The inner hedgerow around the swampy area consists of a mixture of Elm Suckers, Alder, and Ash.

### Protective Measures

The following protective measures should be undertaken to protect retained trees, woodlands and hedgerows:

- Prior to the commencement of construction operations on site a protective fence 1.2 m high consisting of timber posts and three runs of wire shall be erected around all trees, woodlands and parallel to hedgerows. The fence generally should be located at the limit of the branch spread of the said trees and not withstanding same shall be located not closer than 3 m from any tree.
- This fence shall be maintained intact throughout the period of the construction operations on site.
- At all times care must be taken to avoid any equipment striking the trunk, branches or foliage and particular care would be needed with overhead cranes, mechanical excavators and piling rigs which may reach over the fence.
- Temporary site offices, materials, fuel tanks, etc. may not be placed or fires lit within 10 m of any retained trees, hedgerows or



**Table 6.1**  
**Cork Main Drainage - Wastewater Treatment Plant**  
**Existing Tree Schedule**

Ref. No.	Species	Height (m)	Diameter (cm)	Comments
1	* Beech	8 / 9	30	
2	* Oak	10	40	
3	* Oak	10	40	
4	* Ash	10	45	M / S
5	* Oak	8	30	
6	* Ash	6	30	
7	* Oak Small	6	30	
8	* 3 No. Evergreen Oak	8	30	Some branch loss, otherwise healthy
8 a	* 20 No. Gold Lawsons Cypress 16 No. Blue Lawsons Cypress	1.5 - 2		
9	* Ash	10	60	Some heart rot, wire embedded in trunk
10	* Ash	10	45	Wire embedded in trunk
11	Beech	35 / 40	100	Ivy - appears relatively healthy
11 a	Bay Laurel	5		Very large shrub
12	Beech	35 / 40	100	Ivy appears healthy
12 a	C. Macrocarpa	15	> 30	Poor specimen / shaded
12 b	Sitka Spruce	12	< 30	Poor specimen / shaded
13	Spanish Chestnut	35	150	Appears healthy, some ivy
13 a	Holly	10	> 30	
13 b	C. Macrocarpa	15	30	Poor / shade
13 c	C. Macrocarpa	15	30	Poor / shade
14	Beech	35 / 40	100	Ivy, appears healthy
15	Spanish Chestnut	30	>100	Dying due to water logging
16	Spanish Chestnut	35	150	Ivy, appears healthy
17	Sycamore Double Span	35 / 40	100	Some heart rot
17 a	Sycamore	10	30	Poor specimen
18	Oak	40	120	Ivy
19	Beech	40	120	Ivy, heart rot
20 - 23	C. Macrocarpa	30	30 - 60	Some dieback & lower branch loss - poor specimen
24	Bay Laurel	5		M / S
25	2 No. Small Ash	6	< 30	Poor specimen
26	Beech	25	> 30	
27	E. Oak	35	200	M / S, branch loss, ivy, misshapen
28	E. Oak	40	200	M / S, heart rot
29	E. Oak	40	100	M / S, ivy, heart rot
30	Spanish Chestnut	30	200	Major branch loss & heart rot

**Table 6.1 (Cont'd)**  
**Cork Main Drainage - Wastewater Treatment Plant**  
**Existing Tree Schedule**

Ref. No.	Species	Height (m)	Diameter (cm)	Comments
31	Beech	35	150	Poor leaf cover, major branch loss, heart rot
32	Copper Beech	30 / 35	150	Major branch loss, heart rot
33	Spanish Chestnut	35 - 40	200	Stagham, branch loss, heart rot
34	Beech	40	150	Dead
35	Oak	40 +	200	Major branch loss, heart rot
36	8 No. C. Macrocarpa	38	30 - 60	Healthy
37	Spanish Chestnut	35 - 40	150	Major branch loss, heart rot
38	Scots Pine	30		Mop head
39	Yew - small by building	5	< 30	
40	Yew - small	4	< 30	Under span of chestnut
41	Clump Rhododendron, Bay Laurel, Small Sycamore, Chamaecyparis Lawsoniana			
42	Evergreen Magnolia	10	< 30	M / S, in flower
43	Sycamore	10	< 30	Young sapling
44	Evergreen Oak	50	200	Some branch loss
45	Spanish Chestnut	45	150	Some branch loss
46	Evergreen Oak	50	100	Some branch loss
47	Beech	50	200	Heart rot
48	Beech	50	200	Heart rot
49	Scots Pine	35	150	Mop head
50	Oak	40	100	
51	Spanish Chestnut	30	100	Bark badly eaten, major branch loss
52	Sycamore	40	150	Bark badly eaten, major branch loss
53	Beech	45 +	150	Some branch loss, heart rot - but good tree
54	Beech	45 +	100	Some branch loss, heart rot - but good tree
55	Beech	45 +	150	Significant branch loss, heart rot
56	Beech	35	100	OK
57	Sycamore	40	100	OK
58	Beech	40	150	Dieback
59	Beech	45 +	150	Ivy, some heart rot
60	Sycamore	35 +	100	Ivy, some heart rot
61	Beech	45 +	150	Some branch loss
62	Beech	45 +	100	Some branch loss, heart rot
63	Beech	50 +	100	OK

**Table 6.1 (Cont'd)**  
**Cork Main Drainage - Wastewater Treatment Plant**  
**Existing Tree Schedule**

Ref. No.	Species	Height (m)	Diameter (cm)	Comments
64	Sycamore	45 +	100	OK
65	Beech	50	150	Mop head
66	Beech	50	150	Mop head
67	Beech	50	150	Branch loss
68	Evergreen Oak	50	200	Branch loss / heart rot
69	Ash - by house	30	< 60	OK
70	Beech	50	150	OK
71	Horse Chestnut	40	100	OK
72	* Beech	40	100 - 150	OK
73	• Beech	40	100	Ivy
74	• Sycamore	35	100	OK
75	* Sycamore	25	60	Ivy
76	* 2 No. Scots Pine	30	100 & 60	Very bad ivy, mop head
77	Beech	35	200	Branch loss, close head, dieback
78	2 No. Cherry	9	< 30	Branch rot
79	Lime	40 +	100	Lower suckers eaten
80	Crinodendron	6/7		M / S, OK
81	Cherry	5	< 30	M / S, poor
82	Sycamore	25	60 +	OK
83	Evergreen Oak	20 +	200	Large spreading, serious branch loss, very unhealthy
84	Sycamore	30	100	OK
85	* Sycamore	20	60	OK
86	* Beech	17	60	Leaning
87	• Monterey Pine	50	100	Branch loss
88	* Monterey Pine	40	60	Branch loss, leaning
89	* Evergreen Oak	40 +	200	
90	* Monterey Pine	50	100	Branch loss
91	• Monterey Pine	80	200	Branch loss
92	* Monterey Pine	80	200	Branch loss
93	• 2 No. Scots Pine (small)	8	30	Ivy
94	• By shore : Elm, Ash, Crab Apple, Hawthorn, Furze			Linear copse
95 - 103	* Monterey Pine	40	30 - 100	
104	• Wood Land Copse Ash, Thin Tall Spruce			
105 - 108	* Monterey Pine	40	30 - 60	OK

**Table 6.1 (Cont'd)**  
**Cork Main Drainage - Wastewater Treatment Plant**  
**Existing Tree Schedule**

Ref. No.	Species	Height (m)	Diameter (cm)	Comments
109	* Beech	25	60	OK
110	* Scots Pine	15	60	OK
111	* Oak (small)	10	30	OK
112	* Spanish Chestnut	12	60	Fair
113	* Ash (small)	8	< 30	OK
114	* Ash (small)	8	< 30	OK
115	* Ash	8 / 9	30	OK
116	* Ash	5	15	OK
117	* 2 No. Spanish Chestnut	15	60 +	Largely debarked
118	* Ash	12	60	OK
119	* Clump Gorse / Hawthorn 2 No. very small Oak 1 No. small Oak nearly 5 m 1 No. small Oak almost dead			
120	* Scots Pine	3		Mop head
121	* Scots Pine	3		Mop head
122	* Small clump Hawthorn			
123	* Scots Pine	10	45	OK
124	* Scots Pine	20	45	OK
125	* Clump of Ash, Sycamore, Evergreen Oak	5		
126	* Evergreen Oak	6	< 30	OK

Note : \* - Denotes trees to be retained.

### **Botanical Names**

Beech	Fagus Sylvatica
Ash	Fraxinus Excelsior
Oak	Quercus Petraea
Evergreen Oak	Quercus Ilex
Spanish Chestnut	Castanea Sativa
C. Macrocarpa	Cupressus Macrocarpa
Sitka Spruce	Picea Sitchensis
Sycamore	Acer Pseudoplatanus
Bay Laurel	Laurus Nobilis
Scots Pine	Pinus Sylvestris
Monterey Pine	Pinus Radiata
Lime	Tilia X Europaea
Copper Beech	Fagus Sylvatica
Yew	Taxus Baccata
Elm	Ulmus Procera
Horse Chestnut	Aesculus Hippocastanum

woodlands.

- Care must be taken during construction operations to avoid the possibility of surface run-off to run into the area enclosed by the protective fence and the dangers of the trees posed by continuous waterlogged conditions must be recognised.

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## Appendix 7

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# PROPOSED TREES AND SHRUBS

**APPENDIX 7**

**PROPOSED TREES AND SHRUBS**

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**Planting Concept for Trees**

**Planting Concept for Shrubs**

**Plant List for Trees**

**Plant List for Shrubs**

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**Appendix 7**

**Proposed Trees and Shrubs**

**Planting Concept for Trees**

- Notes:**
1. \* - Coniferous Evergreen  
\*\* - Broadleaf Evergreen
  2. Refer to Fig. Nrs. 4.5.8 - 4.5.11 Inclusive

**Group I:**

**Planting adjacent to Well Road.**

**LARGE TREES:**

Quercus petraea (Sessile Oak)  
Quercus robur (Common Oak)  
Fraxinus excelsior (Common Ash)  
Castanea sativa (Sweet Chestnut)

**MEDIUM TREES:**

Acer campestre (Field Maple)  
Betula pubescens (Downy Birch)  
Carpinus betulus (Hornbeam)  
Prunus Avium (Wild Cherry)

**SMALL TREES:**

Alnus glutinosa (Common Alder)  
Corylus avellana (Hazel)  
Crataegus monogyna (Common Hawthorn)  
Betula pendula (Silver Birch)  
Prunus padus (Bird Cherry)

**GROUP II:**

**Planting in wetland area.**

**LARGE TREES:**

Salix alba (White Willow)  
Salix fragilis (Crack Willow)  
Populus nigra (Black Poplar)

**MEDIUM TREES:**

Populus tremula (Aspen)

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Betula pubescens (Downy Birch)

**SMALL TREES:**

Alnus glutinosa (Common Alder)

Salix caprea (Goat Willow)

Salix pentandra (Bay Willow)

**GROUP III**

**Planting adjacent to wetland. Lowland plant species.**

**LARGE TREES:**

Tilia cordata (Small-leaved Lime)

Ulmus glabra (Wych Elm) or equivalent; Ulmus hollandica.

**MEDIUM TREES:**

Carpinus betulus (Hornbeam)

Acer campestre (Field Maple)

**SMALL TREES:**

Alnus glutinosa (Common Alder)

Betula pendula (Silver Birch)

**GROUP IV:**

**Planting within the Treatment Plant area defined by the security fence.**

**LARGE TREES:**

Quercus ilex (Holm Oak)\*\*

Pinus nigra (Austrian Pine)\*

Pinus sylvestris (Scots Pine)\*

Chamaecyparis lawsoniana (Lawson Cypress)\*

Cupressus lustrinica x macrocarpa (Mexican Cypress)\*

Cupressus macrocarpa (Monterey Cypress)\*

**MEDIUM TREES:**

Taxus baccata (Common Yew)\*

**SMALL TREES:**

Arbutus unedo (Strawberry Tree)\*\*

Buxus sempervirens (Boxwood Tree)\*\*

Ilex aquifolium (Holly)\*\*

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**GROUP V:**

**Planting (Screen Line) at high northern embankment; eastern and southern perimeter of Treatment Plant area.**

**LARGE TREES:**

Quercus ilex (Holm Oak) substitute Eucalyptus species.\*\*  
Chamaecyparis lawsoniana (Lawson Cypress)\*  
Cupressus macrocarpa (Monterey Cypress)\*  
Cupressus lusitanica x macrocarpa (Mexican Cypress)\*  
Fagus Sylvatica (Beech)  
Fraxinas Excelsior (Ash)  
Pinus nigra (Austrian Pine)\*  
Pinus sylvatris (Scots Pine)\*  
Quercus Robur (Sessile Oak)  
Quercus Petraea (Common Oak)  
Larix decidua (European Larch)

**MEDIUM TREES:**

Acer campestre (Field Maple)  
Betula pubescens (Downy Birch)  
Carpinus betulus (Hornbeam)  
Sorbus aria (Whitebeam)  
Sorbus aucuparia (Rowan)

**SMALL TREES:**

Alnus glutinosa (Common Alder)  
Betula pendula (Silver Birch)  
Corylus Avellena (Hazel)  
Crataegus monogyna (Common Hawthorn)

**GROUP VI**

**Planting (Screen Line) at existing mound.**

**LARGE TREES:**

Pinus nigra (Austrian Pine)\*  
Pinus sylvatris (Scots Pine)\*  
Quercus robur (Common Oak)  
Quercus petraea (Sessile Oak)  
Fraxinus excelsior (Common Ash)

**MEDIUM TREES:**

Acer campestre (Field Maple)  
Betula pubescens (Downy Birch)  
Sorbus aria (Whitebeam)

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Sorbus aucuparia (Rowan)  
Sorbus torminalis (Wild Service)

**SMALL TREES:**

Betula pendula (Silver Birch)  
Corylus avellana (Hazel)

**GROUP VII:**

**Planting (Screen Line) at western perimeter of Treatment Plant.**

**LARGE TREES:**

Pinus nigra (Austrian Pine)\*  
Pinus sylvestris (Scots Pine)\*

**MEDIUM TREES:**

Betula pubescens (Downy Birch)  
Populus tremula (Aspen)

**SMALL TREES:**

Betula pendula (Silver Birch)  
Corylus avellana (Hazel)

**GROUP VIII:**

**Planting at existing Castle Ruin to be enclosed with limited access.**

**LARGE TREES:**

Quercus ilex (Holm Oak)\*\*  
Quercus robur (Common Oak)

**MEDIUM TREES:**

Taxus baccata (Common Yew)\*  
Prunus avium (Wild Cherry)  
Sorbus aucuparia (Rowan)

**SMALL TREES:**

Arbutus unedo (Strawberry Tree)\*\*  
Crataegus monogyna (Common Hawthorn)  
Ilex aquifolium (Holly)\*\*  
Prunus padus (Bird Cherry)

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**GROUP IX:**

**Planting at north-eastern corner of site boundary.**

**LARGE TREES:**

- Fagus sylvatica (European Beech)
- Tilia cordata (Small-Leaved Lime)

**MEDIUM TREES:**

- Carpinus betulus (Hornbeam)
- Prunus avium (Wild Cherry)
- Taxus baccata (Common Yew)\*

**SMALL TREES:**

- Alnus glutinosa (Common Alder)
- Arbutus unedo (Strawberry Tree)\*\*
- Betula pendula (Silver Birch)
- Buxus sempervirens (Boxwood Tree)\*\*
- Corylus avellana (Hazel)
- Crataegus monogyna (Common Hawthorn)
- Ilex aquifolium (Holly)\*\*
- Prunus padus (Bird Cherry)

**PLANTING CONCEPT FOR SHRUBS:**

**Group A, B, & C are within the "Treatment Plant Site" only.**

**Group D are species for the site used as understory.**

**GROUP A:**

**(Woodland plant theme with medium foliage. Primarily white blooms).**

- |                |  |  |
|----------------|--|--|
| Large Shrubs:  | Cornus alba<br>Cormas mas<br>Cotinus coggyria<br>Euonymus europaeus<br>Viburnum opulus                                 | (Red-Barked Dogwood)<br>(Cornelian Cherry)<br>(Smoke Tree)<br>(European Spindle)<br>(Guelder Rose) |
| Medium Shrubs: | Cornus stolonifera<br>Cornus stolonifera<br>"flaviramea"<br>Ribes sanguineum<br>Spiraea arugata<br>Spiraea salicifolia | (Dogwood)<br><br>(Flowering Currant)<br>(Bridal Wreath)<br>(Bridalwort)                            |

Spiraea x vanhouttei  
 Viburnum burkwoodii

Small Shrubs: Rosa avrensis (Field Rose)  
 Spiraea x bumalda  
 "Anthony Waterer"

**GROUP B:**

**Coastal plant theme with coarse texture foliage. Primarily white and pink bloom, some yellow. Emphasis on evergreen species \*\*).**

Large Shrubs: Choisya ternata (Mexican Orange blossom)  
 Elaeagnus x ebbingei  
 Escallonia "Apple Blossom"  
 Escallonia "rubra"  
 Myrtus luma "Glanleam Gold"  
 Olearia macrodonta (New Zealand Holly)  
 Pittosporum tenuifolium (Pittosporum)

Medium Shrubs: Senecio elaeagnifolius

Small Shrubs: Santolina incana (Lavender Cotton)  
 Senecio monroi

**GROUP C:**

**(Coastal plant theme with fine to medium foliage texture. Primarily red, purple, lavender, pink blooms, and some yellow)**

Large Shrubs: Fuschia "Carolline"  
 Fuschia magellanica "Tricolor"  
 Rosmarinus officinalis (Common Rosemary)  
 Tamarix tetrandra (Tamarisk)

Medium Shrubs: Cytisus scoparius (Common Broom)  
 Erica terminalis (Cosican Heather)

**GROUP D:**

**(Shrubs to be used as understory for the woodland areas of the site (not shown on plan), primarily on northern perimeter of treatment plant embankment for screening purposes).**

Large Shrubs:	Laurus nobilis	(Common Laurel)
	Myrtus luma	(Myrtle)
	Ilex agrifolium	(Holly)

**Plant List for Trees:**

- Notes:**
1. \* - Coniferous Evergreen  
     \*\* - Broadleaf Evergreen
  2. Refer to Fig. Nrs. 4.5.8 - 4.5.11 inclusive

<u>Key</u>	<u>Botanical Name</u>	<u>Common Name</u>
<b>LARGE TREES: (18M HIGH AND OVER)</b>		
Cla*	Chamaecyparis lawsoniana	Lawson Cypress
CIm*	Cupressus lusitanica x macrocarpa	Mexican Cypress
Cma*	Cupresus macrocarpa	Monterey Cypress
Cs	Castanea sativa	Sweet Chestnut
Fs	Fagus sylvatica	European Beech
Fe	Fraxinus excelsior	Common Ash
Ld	Larix decidua	European Larch
Pn*	Pinus nigra	Austrian Pine
Ps*	Pinus sylvestris	Scots Pine
Pni	Populus nigra	Black Poplar
Poi	Populus nigra 'italica'	Lombardy Poplar
Qi**	Quercus ilex	Holm Oak
QP	Quercus petraea	Sessile oak
QR	Quercus robur	Common Oak
Sa	Salix alba	White Willow
Sf	Salix fragilis	Crack Willow
Tc	Tilia cordata	Small-Leaved Lime
Ug	Ulmus glabra	Wych Elm

<u>Key</u>	<u>Botanical Name</u>	<u>Common Name</u>
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**MEDIUM TREES; (10 TO 18M HIGH)**

Ac	Acer campestre	Field maple
Bpu	Betula pubescens	Downy Birch
Cb	Carpinus betulus	Hornbeam
Pt	Populus tremula	Aspen
Pa	Prunus avium	Wild Cherry
Sar	Sorbus aria	Whitebeam
Sau	Sorbus aucuparia	Rowan
St	Sorbus torminalis	Wild Service
Tb*	Taxus baccata	Common yew

**SMALL TREES; (LESS THAN 10M HIGH)**

Ag	Alnus Glutinosa	Common Alder
Au**	Arbutus unedo	Strawberry Tree
Bpe	Betula pendula	Silver Birch
Bs**	Buxus sempervirens	Boxwood Tree
Cav	Corylus avellana	Hazel

Cm	Crataegus monogyna	Common Hawthorn
la**	Ilex aquifolium	Holly
Pp	Prunus padus	Bird Cherry
Sc	Salix caprea	Goat Willow
Sp	Salix Pentandra	Bay Willow

**LARGE SHRUBS; (OVER 3m HIGH)**

ct**	Choisya ternata	Mexican Orange Blossom
ca	Cornus alba	Red-Barked Dogwood
cm	Cornus mas	Cornelian Cherry
cc	Cotinus coggyria	Smoke Tree
ele**	Elaeagnus x ebbingei	
esr**	Escallonia "Apple Blossom"	Escallonia
esd**	Escallonia "Donard Brilliance"	Escallonia
esr**	Escallonia "rubra"	Escallonia
ee	Euonymus europaeus	Spindle
fc	Fuschia "Corallina"	Fuschia
fm	Fuschia magellanica "Tricolor"	Fuschia
ln	Laurus nobilis	Common Laurel
ml**	Myrtus luma "Glanleam Gold"	Myrtle
om**	Olearia macrodonta	New Zealand Holly

<u>Key</u>	<u>Botanical Name</u>	<u>Common Name</u>
pt**	Pittosporum tenuifolium	Pittosporum
ro**	Rosmarinus officinalis	Common Rosemary
tt	Tamarix tetrandra	Tamarisk
vo	Viburnum opulus	Guelder Rose
vt**	Viburnum tinus	Laurustinus

**MEDIUM SHRUBS; (1.5 TO 3M HIGH)**

cs	Cornus stolonifera	Dogwood
csf	Cornus stolonifera "flaviramea"	
cys*	Cytisus scoparius	Common Broom
et*	Erica terminalis	Corsican Heather
gc	Genista cinerea	Broom
rs	Ribes sanguineum	Flowering Currant
se**	Senecio elaeagnifolius	
sj	Spartium junceum	Spanish Broom
sa	Spiraea arguta	Bridal Wreath
ss	Spiraea salicifolia	Bridalwort
sv	Spiraea x vanhouttei	Spiraea
vb**	Vicurnum x burkwoodii	Viburnum

**SMALL SHRUBS; (1 TO 1.5M HIGH OR LESS DWARF/PROSTRATE)**

cd**	Cotoneaster dammeri	Cotoneaster
ch	Cotoneaster horizontalis	
cs**	Cotoneaster salicifolius	
gh	Genista hispanica	Spanish Broom
ra	Rosa avrensis	Field Rose (Trailing/climber)
si**	Santolina incana	Lavender Cotton
sm**	Senecio monroi	
sb	Spiraea x bumalda "A.W"	Anthony Waterer
ue	Ulex europaeus	European Gorse