CHAPTER 3 – RECEIVING ENVIRONMENT

3.0 GENERAL

This chapter defines the existing receiving environment at Springfield House Gorteens, Co. Kilkenny. Where appropriate the receiving environment which will be traversed / affected by the associated collection system, rising mains and pumping stations is also defined.

Where specialist surveys have been conducted specifically for the purposes of this Environmental Impact Statement, such surveys are appended in full in the Appendices with the summary findings reported in this Chapter.

3.1 HUMAN ENVIRONMENT

3.1.1 Employment And Economic Activity

The Springfield House site, the proposed location of the wastewater treatment plant, is located in the townland of Gorteens, County Kilkenny. The site, although located in a rural area is situated three miles east of Waterford City and 500 metres west of Belview Port. Both of these areas are important industrial centres. Available statistics in relation to employment in Waterford County Borough indicate a dependence on the manufacturing industry. After the manufacturing industry, the next most important employment sectors are commerce and the professional services. Table 3.1.1 sets out the employment structure of Waterford County Borough as recorded in the 1996 Census.

Table 3.1.1

Employment Structure of Waterford County Borough for 1996.

Sector	Number Employed 1996
Agriculture	131
Mining	15
Manufacturing Industry	4964
Building and Construction	701
Electricity and Gas	135
Commerce	2842
Transport	881
Public Administration	503
Professional Services	2754
Other	1792
Total	14718

Source: Census of Population, Small Area Statistics, 1996.

Important industries in the Belview area include Louisiana Pacific Coillte Ltd, an oriented strand board mill, and ITW Hi-cone, which manufactures polyethylene stretch film.

The Belview Port is currently undergoing phased expansion and once complete it is estimated that it will directly give rise to 200 permanent jobs. In addition, it has been estimated that for each job created at the Port, three full-time jobs could be created in associated industries (repairs, ancillary services, haulage etc.), therefore, potentially giving rise to an additional 600 full time jobs.

The provision of a modern, efficient Port in the Belview area which has direct access to Britain and Europe will have the additional beneficial impact of attracting new industry to the Belview area. In addition, the zoning of lands for the location of strategic industry, i.e. industry with area requirements which prevent location in an industrial estate, means that in a national context the Belview area has significant industrial development potential.

3.1.2 Population and Housing

In 1986, the population of the Waterford Catchment Area (Greater Waterford Area), which contains both the County Borough and Environs, was 44,856 which consisted of a population of 39,529 in the County Borough and 5,327 in the Environs.

The 1989 Waterford City Development Plan forecasted a population of 46,761 for the total Waterford Catchment Area in the year 1991 and projected this figure forward to estimate a population of 52,289 for the year 2006. Table 3.1.2 shows the population figures as given in the Waterford City Development Plan 1989 projected forward from 1986 to 2006.

In the 1991 Census, the population for Waterford County Borough and Waterford Suburbs was 40,328 and 1032, respectively. In the 1996 Census, the population for Waterford County Borough and Waterford Suburbs had increased to 42,540 and 1,615, respectively.

For the purpose of achieving a design figure for the proposed wastewater treatment plant to serve Waterford City and Environs, population projections using the figures of the 1989 Waterford City Development Plan were used as these figures compared well to actual population figures obtained in the 1991 and 1996 Census. The Development plan projections were extended to the year 2025 by applying a 15% increase over the 2006 figures. This represents an increase in the population of 0.8% per annum which, in the context of long term strategic planning, is considered adequate.

TABLE 3.1.2.1

POPULATION PROJECTIONS 1991 - 2025.

Year	Co. Borough	Environs	Total Waterford Catchment Area
1986	39,529	5327	44,856
1991	41,206	5555	46,761
2006	46,070	6219	52,289
2025	52,980	7152	60,132
Ult. Design	60,000	18,000	78,000

Consistent with the rural agricultural nature of the region, the houses in the Belview area surrounding Springfield House site generally are located on individual plots fronting the roads, resulting in a wide spacing pattern of residences. Scattered farm houses and associated outbuildings are interspersed among the fields. The nearest occupied residence to the Springfield House site is located 200 metres to the north-east of the site boundary. Another residence is located 300 metres to the north-west of the Springfield House site boundary. Figure 3.1.2.1 gives details of residences located within a 500 metre radius of the Springfield House site. Given the topography of the area, apart from the residences located to the west of the Springfield House site, all residences are located upslope of the Springfield House site.

In addition to occupied residences there are two unoccupied houses in the vicinity of the site. Springfield House is located within the site boundary and Belview House is located directly adjacent to the western boundary of the site. Both houses are in ruins and are protected structures.

3.1.3 Land-use

The Waterford area supports a variety of land uses including a developed urban centre, residential, industrial/commercial, recreational, agricultural, and open space areas. Immediately surrounding the Springfield House Site agricultural fields segregated by hedgerows dominate the landscape. The main landuse in the area is agriculture with an emphasis on grazing and tillage. There are some farm holdings and non-farmhouse roadside dwellings which are located in clusters about the Belview / Gorteens area. Across the Queens Channel from Springfield House on Little Island is Waterford Castle Golf Course.

N

500m

400m

300m

GORTEENS Td.

200m

100m

PROSPECT HOUSE

SPRINGFIELD HOUSE

PROPOSED W.W.T.P. SITE

RIVER SUIR

FIG. NR. 3.1.2.1.
RESIDENCES LOCATED WITHIN A 500m RADIUS OF THE SITE

Shipping, fishing and mariculture take place on the River Suir. Other land uses include port related activities, industry, and woodland. The Belview Port is located 0.5 kilometres north-east of the Springfield House site. In 1992, the Waterford Harbour Commissioners commenced development of the Belview Port. The Belview area has been identified by Kilkenny County Council as an 'Area of Special Control' and development in this area is controlled under the Belview Area Action Plan, 1997 (as amended May, 1998) which was adopted as part of the Kilkenny County Development Plan 1994. Contained in the plan are specific land-use objectives which aim to facilitate the development of the Belview area without compromising environmental integrity or the amenity value of the area. These objectives are facilitated by the reservation of 'land compartments' within which strategic industry may locate. Figure 2.2.2.2 is taken from the Belview Area Action Plan 1997 (as amended May, 1998) and illustrates the zoning and land-use objectives of the Belview Area. Specific objectives relating to building coverage, roads and areas of hardstanding and landscaping and woodland management for the Belview Area are outlined in the plan.

In total five 'land compartments' (LC) have been designated in the plan, (LC1 to LC5) which vary in size from 18 hectares to 50 hectares. LC2, a parcel of land entailing 50 hectares, is located immediately north of the Springfield House site. The proposed access road to the proposed wastewater treatment plant at the Springfield House site will pass through five fields which are located in this compartment of land.

In addition to zoning of land compartments for the location of strategic industry, three Ancillary Services Sites (AS) have also been zoned in the area for the location of ancillary services, such as offices or other similar commercial uses related to the port or strategic industries.

The proposed development site at Springfield House consists of a parcel of land entailing approximately 18 hectares which is designated as WT 9 in the Belview Area Action Plan (See Figure 2.2.2.2). This site has been reserved for the purposes of a wastewater treatment plant. The site is currently used for agricultural purposes (i.e. grazing).

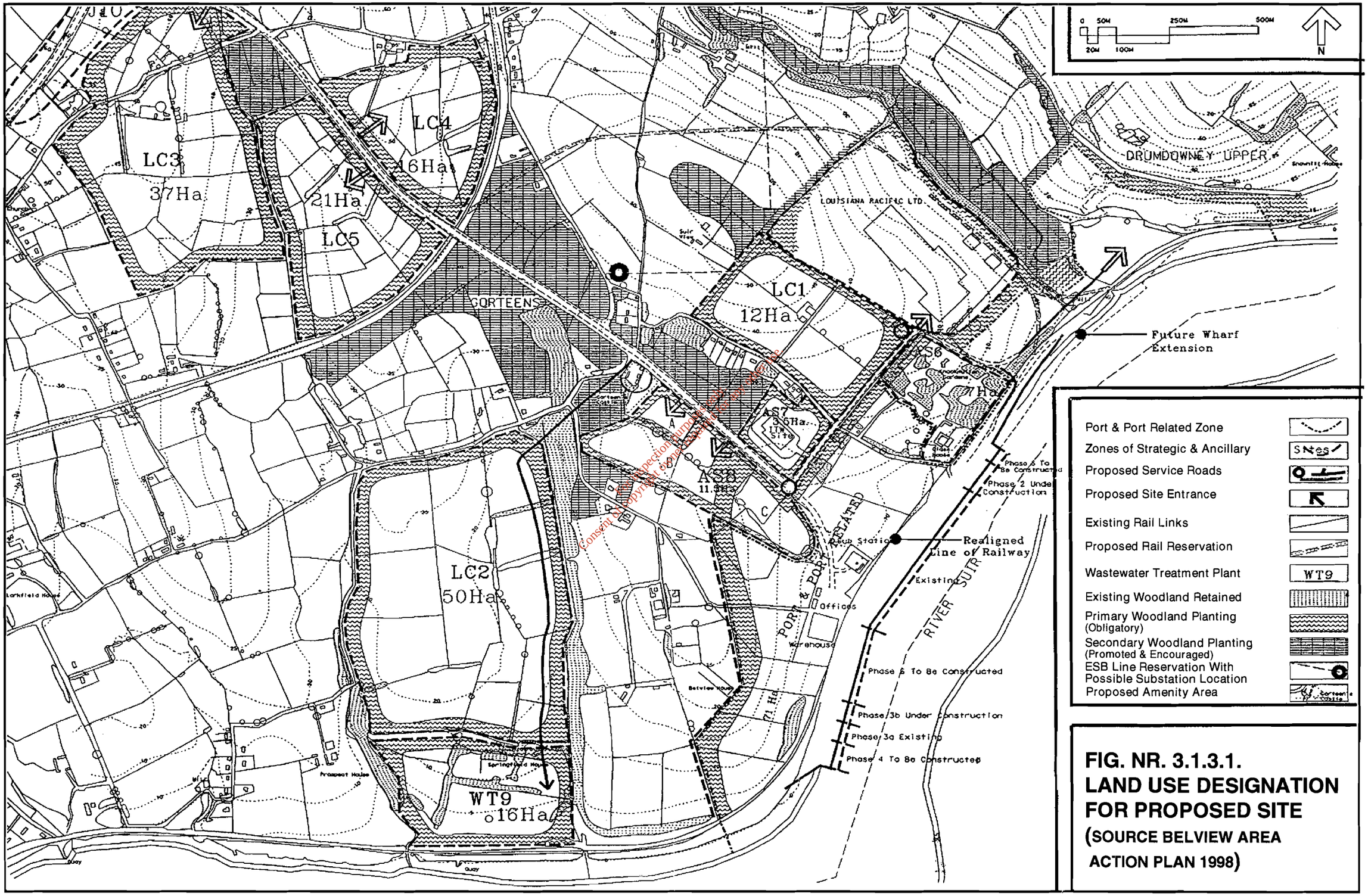

FIG. NR. 3.1.3.1.
LAND USE DESIGNATION FOR PROPOSED SITE
(SOURCE BELVIEW AREA ACTION PLAN 1998)

3.1.4 Recreation

A variety of recreational activities take place in the Waterford area including boating, recreational fishing, sightseeing, golf, jogging/walking, field sports and nature watching. Water-contact activities such as swimming and bathing are uncommon in the area due to poor riverine water quality and a lack of suitable beaches.

In the immediate vicinity of the Springfield House site, recreational activities are extremely limited as the area is dominated by agricultural fields. Some informal utilisation of the shoreline for strolling and birdwatching may occur; however this is limited due to the lack of public access to the areas in the vicinity of the site. A private golf course is located on the grounds of the nearest residence 200 metres to the north-east of the site. Two golf courses, Waterford Castle Golf and County Club and Faithlegg Golf Club are located to the south and south east of the River Suir. Waterford Castle, now an exclusive luxury hotel was built in the 15th century and is located on Little island. The Island is accessed by a car ferry from Ballynakill.

In the Belview Area Action Plan 1997 (as amended May 1998), the area of open space in the vicinity of Gorteens Castle has been identified as suitable for development of public amenity.

3.1.5 Transportation

The development of infrastructure to the Belview area since 1992 has resulted in the area being well serviced in terms of roads. The Port Access Road (N29) is linked with the N24 National Primary Route (Euroroute E30) at Slieverue. Recent traffic counts taken at the N25 at Slieverue indicate an Annual Average Daily Traffic (AADT) figure in excess of 6300 vehicles, inclusive of a Heavy Commercial Grade content of 14.5% (*Belview Area Action Plan 1997 (as amended May, 1998)).*

The Waterford / Rosslare railway line transects the river saltmarshes along the northern bank of the River Suir. This railway line is used by both passengers and goods trains.

The Waterford Port at Belview is one of Ireland's premier ports. In 1990, 673 vessels called at the port transporting 1.574 million tons of goods. These figures represented an increase of 5.3% for the number of vessels and 10.8% for shipped tonnage over the figures for 1989. The Port primarily handles container cargo, although general cargo is also exchanged. The ongoing development of the facilities at the Port will lead to a significant increase of cargo vessels. The number of vessels which are anticipated to visit the Port annually in future are detailed in Table 3.1.5.1 (These figures were taken from the Waterford Harbour Commissioners Environmental Impact Statement 1994).

Table 3.1.5.1

Estimated number of vessels which are anticipated to visit the Belview Port annually in the future.

Type of Vessel	Number of Vessels Per Annum
Dry Bulk	250
Lo-Lo	700
Ro-Ro	100
Semi-Bulk	100
Passenger Cruise	
Liners	10
Total	1160

Presently, the Springfield House site is accessed via an unsurfaced road from west of the site. Routes for future access roads to serve the port and industries in the Belview area have been designated by Kilkenny County Council in the Belview Area Action Plan, 1997 (as amended May, 1998). Access to the Springfield House site will be facilitated by the construction of a new road from the N29, the Belview Port Access Road, in the vicinity of Gorteens Castle, through five agricultural fields, located in Land Compartment 2 (LC2) and will enter the Springfield House site along the northern boundary of the site to the east.

3.2 FLORA AND FAUNA

This section describes the existing flora and fauna at the Springfield House site, focusing on those habitats that will most likely be affected by construction and operation of the proposed wastewater treatment plant. These habitats primarily are the terrestrial habitat of the site and

the estuarine habitat of the River Suir estuary. The Springfield House site consists of the ruined Springfield House and gardens at the north-west corner of the site, a large old meadow immediately south and a relatively large area of impounded saltmarsh, which is transected by a railway line. The survey also examined the proposed route of the access road to the site. The entire Flora and Fauna report with species lists is appended to this report (Appendix E).

3.2.1 TERRESTRIAL ENVIRONMENT

3.2.1.1 Flora

The former garden area of Springfield House, which is now a heavily cattle poached pasture contains a mixture of annual and perennial weeds which are co-existing with native marsh plant species. The old garden area of the house contains small groupings of remaining ornamental plantings of tree and shrub species such as hybrid oak, sycamore, ash and holly.

The boundary hedge to the south to the ruined Springfield House (east-west oriented) holds a particularly impressive series of mature deciduous trees. Within the area of the house-garden, its composition is mainly Sessile Oak and Ash with, the sub-storey consisting of Blackthorn (*Prunus spinosa),* Hawthorn (*Crataegus monogyna*), Holly, Bramble, (*Rubus fruticosus agg.)* and Field Rose (*Rosa arvensis*) and herbaceous plants.

An old damp meadow south of the Springfield House gardens supports a native paludal flora and abuts onto the saltmarshes. The field contains an abundance of Perennial Rye Grass (*Lolium perenne*), Rough Meadows Grass (*Poa trivialis*), and Sweet Vernal grass.

The north south running double hedgebank which effectively divides the Springfield House site is bordered on its eastern side by a semi-dry ditch. The tree/shrub canopy of the hedgebank is well developed. Mature tree species include: Sessile Oak, Ash, Sycamore and Horse Chestnut with shrubs such as Holly, Field Rose, Hairy Dog Rose and Elm saplings.

To the west of the Springfield House site, there is an agricultural field. The field contains nothing of particular botanical interest. The south-western boundary of the site consists of a dense wooded hedgerow which continues to the northern boundary of the site.

The proposed access road to the Springfield House site will be constructed along a linear series of five fields to the north east of the site. The common eastern boundary to all five fields is the freshwater stream, which discharges into the saltmarsh. This stream is bordered

on both banks by mature trees, Ash to the front with Sessile Oak behind the Ash, with a shrub component which consists of Blackthorn, Hawthorn, Rusty Willow, Common Dog Rose, Bramble, Privet Elm suckers and young beech trees. This planting pattern is repeated along the eastern margin of all fields. The first three fields consist of mainly seeded perennial Rye-Grass pastures which are used for grazing by cattle. The west-east oriented hedgebanks contain a limited flora and are severely pruned.

The remaining two fields consist of species rich relict marshy meadows. The hedgebanks are dominated by a few acid loving flora, such as sub-shrub Bilberry (*Vaccitalies myrtillius*) and the rhizomatous perennial grass Brown Bent (*Agitalius vinealis*) which is possibly a new addition to the Kilkenny Flora. Both fields are a rarity in the area consisting of un-reclaimed, damp, circum-neutral meadows. Rush species are subdominant in both fields, with Acute-flowered Rush (*Jatauis acutiflorus*), Hard Rush, Soft Rush, and the interspecific hybrid between these latter two species (*Juncus x diffusus*), which is remarkably frequent here as large, sterile, clonal stands. This hybrid is apparently new to the Kilkenny Flora, and may be one of the largest stands in Ireland for this taxon. In the field immediately north east of Springfield House the north east corner there is a small area of Carr scrubland (wet woodland). The margin of the scrubland bordering the meadow consists of remote Sedge (*Carex remota*), Common Alder (*Alnus glutinosa*), some Maple (*Acer campestre*) saplings, Hart's-tongue Fern (*Phyllitis scolopendrium*), Broad Buckler-Fern, and Water Figwort (*Scrophularia auriculata*).

3.2.1.2 Fauna

Birds

A total of 13 bird species was recorded within the Springfield House site. Most species recorded were associated with woodland or hedgerow habitat, and the most abundant species appeared to be Wren, Robin, Blackbird and Song Thrush. A number of additional species (notably nesting Stock Dove, Swallow and Spotted Flycatcher) were associated with the ruins of Springfield House.

The woodland belt running from north to south along the eastern boundary held several bird species, notably Treecreeper, Chiffchaff and Blackcap. Densities and diversity of birds in the fields and hedgerows immediately west of the wooded belt were lower than in the wooded belt or on the site itself.

A mixture of woodland, scrubland, open country and wetland bird species were recorded during the survey along the proposed outfall route east from the site.

Mammals

The ruined Springfield House and outbuildings are of no importance to mammals, however, west of the house is an enclosed overgrown old orchard. As it is subject to a low level of disturbance it is considered to be of moderate importance to small mammals. East of the old Springfield House there is a waste ground which contains scattered scrub and nettles and is generally degraded. This area is considered to be of low importance to mammals.

In general, it is considered that with the exception of the woodland on the eastern border of the site, the habitats provided elsewhere on the Springfield House site are likely to be utilised by a low to moderate number of mammal species. The field survey recorded the presence of three unprotected species utilising the site namely; brown rat, rabbit and fox. Other small, protected species that may utilise the habitats in part are: woodmouse, pygmy shrew and hedgehog. The habitat requirements of larger protected mammals such as badgers and stoats are provided in the woodland habitat on the eastern border of the site, however none of these species were recorded during the survey. Disused and remaining roofed buildings on site are considered unsuitable for bats, which are also a protected species. The meadow below Springfield House, which is to be encompassed by the development, is severely poached, grazed and low cut with the lower parts subject to wind exposure and therefore considered of little importance to mammals. Woodmice are likely to be present on the drier banks on site. With exclusion of cattle, the area is likely to become a mammal refuge of moderate to high importance.

3.2.2 Estuarine Environment

The saltmarshes, dissected by the railway line, form the southern boundary of the Springfield House site. A freshwater stream discharges into the saltmarsh at the north-eastern end, while tidal inflow/outflow to the River Suir estuary occurs at its south-eastern end, under a small railway viaduct. The railway embankment lies immediately east of the saltmarsh tidal outlet. This well-drained area consists of an admixture of meadow plants and halophytes. The saltmarshes are of considerable botanical interest and considered to be very environmentally sensitive. The value of the habitat is further enhanced by the presence of the rare Hybrid Sea Couch (*Elytrigia x oliveri*), on the Saltmarsh.

Studies of the subtidal habitat at Giles Quay approximately 2km upstream from the development site revealed that 12 species of benthic infauna including five annelid worms, one crustacean (sandshrimp), and two bivalve molluscs (Baltic telin and peppery furrow shell) are present. These species are typical of soft, muddy estuarine

habitats, and would likely be found in the vicinity of the Springfield House site as well.

Migratory fish such as Salmon, Sea-trout, Eel, and Twaite shad and Sea Lamprey pass through the estuary en route to their freshwater spawning grounds. In the publication 'The Irish Red Data Book, Threatened Mammals, Birds, Amphibians And Fish In Ireland, No.2, Vertebrates', by A. Whilde and published by the Department of the Environment in Northern Ireland in 1993, the *Twaite Shad (Alosa fallax)* were classified as 'a vulnerable' species. The Twaite Shad, Sea Lamprey and freshwater Salmon are also listed under the First Schedule of the Habitats Directive, Council Directive 94/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna. Under the directive the Irish Government are required to undertake measures to maintain populations of wild flora and fauna of a nature that corresponds to the ecological, scientific and cultural requirements or to adapt the population to that level. This means that in habitats where this species of fish is present all efforts must be made to maintain the integrity of the habitat and developments must not adversely impact on these species.

Shellfish such as mussels, lobster, crayfish, and crabs also occur and are harvested in the Suir, Barrow, Nore estuary. The nearest wild stocks of shellfish to the preferred site are some 5 kilometres downstream near Cheekpoint. Significant harvesting occurs at various locations throughout the harbour downstream of Cheekpoint (See Figure 3.2.2.1).

Conclusion

The old damp meadows and the saltmarshes in the vicinity of the Springfield House site are considered to be florestically rich and very environmentally sensitive. Both these habitats are achieving rarity status in Ireland due to the constant threat of development. The value of both habitats is further enhanced by the presence of some large populations of the nationally-rare Hard Rush Hybrid (*Juncus x diffusus*) in the meadows and the presence of the even rarer Hybrid Sea Couch (*Elytrigia x oliveri*) in the saltmarshes. Also, the abundance of well-developed, mature, deciduous tree species/hybrids in such a compact site (Springfield House) is of botanical interest and value. In addition, the presence of the Little Egret, which is listed under the EU Birds Directive further enhances the value of the saltmarshes.

3.3 NATURAL HERITAGE AREAS

The term 'Area of Scientific Interest' has now been replaced with the term 'Natural Heritage Area' (NHA). These areas are selected by the Parks and Wildlife Service (Dúchas) according to inherent features of significant scientific interest, either relating to geology, ecology, etc.

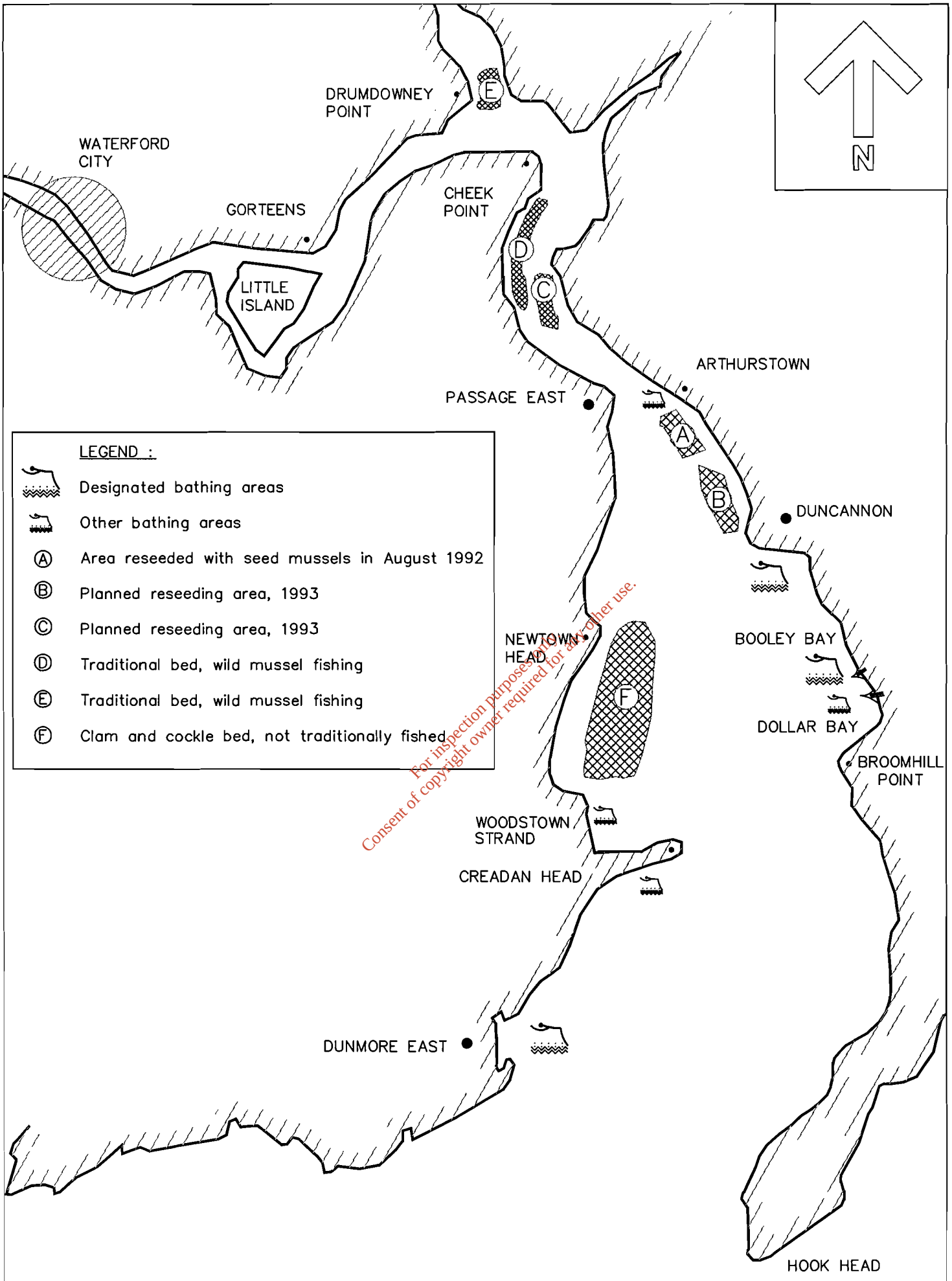

Figure A.4 : Locations of bathing areas and shellfish beds in the outer Suir, Barrow, Nore, Estuary.

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Developments which are proposed adjacent to an NHA must not lead to any ecological damage of these areas.

The saltmarshes east of Belmont House were identified as being of considerable ecological importance in the 1994 Waterford City Development Plan. The site is an important habitat for rare plants and estuarine birds and is considered the best stretch of saltmarsh in Waterford. It is the objective of Waterford Corporation to protect this area from development which would compromise the integrity of the site. These saltmarshes, which occur principally along the King's Channel and the River Suir near Belmont House are in the process of being designated as National Heritage Areas (NHA's). Both these areas host a population of meadow barley (*Hordeum Secalinium*) which is protected under Section 21 of the Wildlife Act, 1976.

The King's Channel, located south of the Little Island, is identified as a proposed NHA in the Belview Area Action Plan, 1997 (as amended May, 1998) and is also considered to be of national ecological interest. This site is noted because of ecological (ornithological) interest. It is classified by the Parks and Wildlife Service (Dúchas) as being of national importance.

Within 8 kilometres of the Belview area are four other important areas, namely; Ballyhack, a grassland heath; Kilbarry Bog, a marsh; Lough Cullin, a lake/fen; and Belle Lake, a marsh/lake.

3.4 GEOLOGY AND SOILS

3.4.1 Geology

The general Waterford area is primarily underlain by hard felstone and feldspathic ash with lesser configurations of greenstone ash, greenstone diorite, and bala beds with limestone (Geologic Survey of Ireland, Map no. 163). Other strata include old red sandstone, upper old red sandstone, lower limestone, and lower limestone shale. Feldspathic ash, an extremely hard bedrock, underlies the Springfield House site.

Two significant fossil deposits have been located in the Waterford area, although these sites are quite distant from the proposed project. The first site is at Gibbet Hill on the south bank of the River Suir to the northwest of Waterford City. Here, the black argillaceous slates of the lower Silurian period contain fossils of two mollusc species. The second site is further west on the north bank of the River Suir approximately 0.8 kilometres east of Granny. The lower limestone shale of the Carboniferous period contains four classes of molluscs. In addition, there are six lesser sites where fossils have been noted in the Waterford area. None of these sites occurs near the proposed project.

3.4.2 Soils

Information on drainage, water table depth, texture, depth to bedrock, slope, rock outcrops, and parent material of each soil series is presented in Table 3.4.2. 1. Eight soil series representing three soil groups occur in the Waterford area.

The soil groups are brown earth, a well-drained loam derived from a mixed sandstone till parent material; clay, an imperfectly drained loam derived from mixed sandstone till, volcanic till, or alluvium; and a mixed brown earth/brown podzolic, a well-drained light loam originating from volcanic bedrock and shallow volcanic till.

The soils are variably suited for agricultural and urban residential land uses. Factors relevant to agricultural uses include wetness, drought, liability to flooding, slope, rockiness, presence of boulders, and textural and structural properties. Suitability for urban residential use is based on slope, internal drainage and water table, soil texture, and depth of bedrock.

In general, the clay soils tend to be better suited for urban residential purposes whereas the brown earth soils are better suited for a variety of agricultural uses.

Soils in the northern half of the proposed site consist of firm, stiff sandy clay or clayey sand, whereas the southern half is peaty or silty material nearer the river.

There is no history that the site was previously used for industrial purposes.

3.5 HYDROLOGY AND WATER QUALITY

The proposed development site at Springfield House does not have any perennial freshwater bodies, and in addition it is not anticipated that the location of the proposed development at this site will have any impact on groundwater resources in the area. For this reason, this section focuses only on the water quality of the estuary into which treated effluent will be discharged.

The water surface area of the Estuary is approximately 80 km^2. The Estuary is relatively shallow apart from areas near Waterford in the Kings Channel and also in the vicinity of Waterford Harbour itself. The channel width of the River Suir is generally narrow and uniform with mid-channel depth varying from 3 to 20 metres below OD and reaching 33 metres below OD at certain sections. The presence of Little Island divides the main river; some of the flow passes through the short,

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Table 3.4.2.1.: Soil Characteristics of the Waterford Area.

Series	Group	Drainage	Water Table (m)	Texture	Depth to Bedrock (m)	Slope (degrees)	Rock Outcrop	Parent Material
Grace Dieu	Brown Earth	Well	3.0	Loam	3.0	1 - 3	None	Mixed sandstone till, deep
Lismore	Gley	Imperfect	Perched 1.0 - 2.0	Loam	3.0	1 - 3	None	Mixed sandstone till, deep
Lismore	Gley	Poor	2.0	Loam	3.0	+ 10	None	Mixed sandstone till, deep
Killure	Brown Earth / Brown Podzolic	Well	3.0	Light Loam	1.0	1 - 6	Few	Volcanic Bedrock & shallow volcanic till
Knockeen	Gley	Imperfect	Perched 1.0 - 2.0	Loam	3.0	1 - 3	None	Volcanic till, deep
Dunmore	Brown earth	Well	3.0	Loam	1.0	1 - 6	Few	Sandstone bedrock & shallow sandstone till
Clonroche	Brown Earth	Well	3.0	Loam	1.0 - 3.0	1 - 6	None	Shale till, moderately deep
Clonroche	Brown earth	Well	3.0	Loam	1.0 - 2.0	6 - 13	None	Shale till, shallow
Callaghane	Brown earth	Well / excessive	3.0	Sandy Loam	3.0	1 - 6	None	Sand, deep
Kilbarry	Gley	Very poor & poor	0.0 - 0.5	Clay	3.0	1	None	Alluvium
Kilbarry	Gley	Very Poor	0.0	Clay	3.0	1	None	Alluvium
Kilbarry	Gley	Very Poor	0.0	Clay	3.0	1 - 13	Abundent	Sandstone, volcanic & shale

Source: Diamond, S. 1977.

straight Queen's Channel north of Little Island, while the remaining flow follows the meandering, deep King's Channel (AFF 1986). Training walls/Groynes were constructed in the vicinity of Cheekpoint for the purpose of reducing the requirements for dredging in this area.

Tide flows in the river stretch near the preferred site are significant. Data for near the Springfield House Site is not available, although mean high and low water springs at Waterford Bridge are 1.62 metres and -2.47 metres respectively. Flows in the vicinity of the Springfield House site are likely to be similar to those reported for Waterford Bridge.

The salinity distribution is important because it reflects freshwater flow and, therefore, waste assimilation capacity (AFF 1986). Salinity levels in the Queen's Channel range from 6%-10% at low tides and 23%-28% at high tides. This variability reflects the relative importance of freshwater input from the rivers. At low tide, river water constitutes a more significant portion of the water in the channel, thereby decreasing salinity. Salinity at the Gorteens area during high tide ranges from 19.5% to 24.5% at the surface and channel bottom, respectively. The estuary shows little salinity stratification. Under conditions which would allow for a maximum saline influx (i.e. high spring water tide and low freshwater flow) the sea water can extend as far as 37 kilometres inland. The typical salinity distribution in the Estuary under such conditions can range from 34 °/oo (parts per thousand) at the ocean boundary to 25 °/oo at Cheekpoint to 5 °/oo at Mount Congreve on the Suir. In terms of water quality, the benefits accruing from the combination of these factors are:

- A large water volume turnover
- Large tidal excursions
- A well mixed estuary with short retention times

With regard to water quality in the Estuary the most crucial period is at neap tides and low freshwater flows, which are more likely to occur during the summer months. The winter period is also important as this period is characterised by minimal biological activity and a high level of nutrient run-off.

In 1985, AFF developed a *Water Quality Management Plan* (W.Q.M.P) for the Suir/Barrow/Nore Estuary based on data collected from 1979 to 1983. This information and additional data from 1982-85 were compiled into a management plan in 1990 by the county councils of the counties surrounding the estuary. The plan included information of the entire estuary. For the purposes of this document only data from the Waterford to Cheekpoint stretch of the River Suir is herein discussed. Details on water quality (summarised in Tables 3.5.1. and 3.5.2 and 3.5.3) have been obtained from the Water Quality Reports for the Suir/

Barrow/ Nore Estuary (1993-1995 and 1997) which were prepared by the EPA.

The water quality standards outlined in the W.Q.M.P are based on the limits of each parameter recommended to protect the identified beneficial use of the area which include fisheries and shellfish, bathing and recreational amenities. The principal water-quality parameters that are referred to are levels of dissolved oxygen (DO), biochemical oxygen demand (BOD), ammonia, oxidised nitrogen (nitrate and nitrite), orthophosphate and chlorophyll , Coliform bacteria, trace metals, and Total and Faecal Coliforms. Average results of water sampling and analysis in the vicinity of the Springfield House site are detailed in Table 3.5.1. Results of sampling are compared to W.Q.M.P set standards.

Current and historic water quality results from the River Suir, particularly in the vicinity of Waterford City, indicate bacteriological and organic pollution from the discharge of urban wastewater. Over the course of several years there has been a slight deterioration in the water quality at Waterford City, where an increase in levels of total and faecal coliforms have been noted during 1993-1995 and in 1997. Otherwise conditions were fairly satisfactory at Waterford City and water quality improved towards Cheekpoint. It was concluded that water quality in the greater part of the Estuary is satisfactory. The most serious pollution is confined to the John's River in Waterford City, which comprises < 0.1% of the total freshwater flow into the Estuary. John's River had high levels of BOD, ammonia, and faecal coliforms and low DO levels.

Sampling of sediments and mussels for trace metals and organic content was undertaken in 1997 by the EPA. The organic matter content recorded in the sediment samples taken at the Smelting House station, upstream of the Springfield House site, was high. The 1997 results of sampling for trace metals are detailed in Table 3.5.2. Generally, the trace metal contents of the sediments were below what is generally accepted as being the average content of near shore sediment (Handbook of Chemistry and Physics, C.R.C, 60th edition), with the exception of lead where, the average result for both 1991/(29.0 mg/kg Pb) and 1997 (24.6 mg/kg Pb) was over the average (20 mg/kg Pb - Report on Water Quality in the Suir/ Barrow/ Nore Estuary 1997 -EPA) for near shore sediment. The results of analysis undertaken on the mussels found in the outer estuary are detailed in Table 3.5.3.

The Department of Marine certifies shellfish for export and utilises a classification scheme for shellfish-producing waters based on the U.S. National Shellfish Sanitation Program (Shellsan). There are three categories of water: "Approved" (no purification necessary); "Conditional" (purification essential);

Table 3.5.1;

Average results for sampling in region of Springfield House Area.

Parameter	Giles Quay	Little Island	King's Channel	W.Q.M.P Standard
T° °C S M B	 14.37 13.58 13.83	 14.18 13.77 13.67	 14.33 13.83 13.77	 < 21.5
DO % Sat. S M B	 89.17 87.5 88.67	 91.5 91.17 91.5	 91.83 90.83 91.33	 > 80% (Guide Shellfish Areas) > 70% (Mandatory Shellfish Areas 70 - 120 % Bathing Areas
Salinity o/oo S M B	 12.56 17.38 15.82	 15.42 17.32 18.6	 15.44 19.05 20.3	-
BOD mg/l O^2	1.4	1.35	1.15	95% < 4
TOC mg/l C	2.38	2.3	4.67	-
pH	8.12	8.13	8.15	6.5 - 8.5
Total Ammonia mg/l N	0.08	0.006	0.06	95% < 3.0 Guide Freshwater 95% < 0.8 Mandatory Freshwater
Un-Ionised Ammonia mg/l NH^3	0.003	0.002 6	0.0027	95% < 0.004 Guide Freshwater 95% < 0.02 Mandatory Freshwater
Nitrite mg/l N	1.95	1.75	1.7	95 % < 1.0
o-Phosphate mg/l P	0.05	0.04	0.04	-
Chlorophyll 'a' mg/m^3	6.48	5.48	6.15	-
Total Coliforms /100ml	16850	-	-	80% < 5,000 Bathing Area 80% < 1000 Bathing Areas 75% < 300 Shellfish Areas
Faecal Coliforms /100ml	2298. 3	-	-	80% < 5,000 Bathing Area 80% < 1000 Bathing Areas 75% < 300 Shellfish Areas

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Table 3.5.2;
Metals in Sediments for the Suir/Barrow/Nore Estuary 1997 and 1991

Sampling Station	Chromium mg/kg Cr '91	Chromium mg/kg Cr '97	Lead mg/kg Pb '91	Lead mg/kg Pb '97	Copper mg/kg Cu '91	Copper mg/kg Cu '97	Zinc mg/kg Zn '91	Zinc mg/kg Zn '97	Cadmium mg/kg Cd '91	Cadmium mg/kg Cd '97
Waterford Bridge	31.3	43.4	33.2	31.7	10.7	17.9	187.7	116.0	0.5	1.0
Smelting House	36.0	42.3	35.6	30.4	20.2	13.7	60.7	88.2	1.0	1.0
King Channel	56.3	30.7	36.2	23.2	21.1	17.4	83.2	78.2	1.0	<0.3
Cheek point	30.1	38.0	24.7	28.2	5.2	13.6	60.3	87.55	0.8	1.0
Duncannon	18.0	21.1	11.2	20.3	<5.0	11.6	40.1	73.4	0.1	<0.3
Dunmore East	15.7	19.8	5.5	13.6	<5.0	10.7	56.8	59.3	0.1	<0.3
Average	32.5	32.6	29.0	24.6	14.5	14.2	79.8	83.8	0.6	1.0

Table 3.5.3; Trace Metals in Mussel Samples

Station Location	Maganese mg/kg Mn	Zinc mg/kg Zn	Copper mg/kg Cu	Cadmium mg/kg Cd	Lead mg/kg Pb	Nickel mg/kg Ni	Chromium mg/kg Cr	Mercury mg/kg Hg
Cheek Point	2.8	12.8	1.6	0.2	0.6	0.6	0.7	-
Passage East	3.3	13.6	1.7	0.2	0.6	0.5	0.8	-
Duncannon	3.0	16.2	1.5	0.2	0.8	0.7	0.8	-
Average Results	3.0	14.2	1.6	0.2	0.67	0.6	0.77	-
Mean B/N/S Estuary '91	-	13.6	1.1	0.28	0.15	-	0.81	<0.01
Mean B/N/S Estuary '89	-	8.7	0.6	0.03	<0.25	-	<0.25	0.04

and "Restricted" (pressure cooking essential). Categorisation of water primarily reflects faecal coliform levels. Coliform Counts were high at Waterford City, however there is a steady decline in Coliform numbers between Waterford City and Dunmore East. All of the samples from the outer Estuary (Cheekpoint to Hook Head) complied with bathing water standards. The bacterial results indicate that, for Shellan Classification purposes, the stretch between Waterford and Cheekpoint is classified as 'restricted', the Duncannon/Bell Buoy area is classified as ' conditional' and the Outer Estuary South of Creadon Head is classified as ' approved' (EPA 1997). It must be noted that these classifications were based on water samples only as no analysis of shellfish flesh was undertaken.

Wastewater discharges into the estuary can greatly impact on water quality. The most recent data available on wastewater loads discharged into the estuary come from the 1992 survey carried out as part of the Prelirminary Report 1994 for the Waterford Main Drainage Scheme.

The wastewater loads can be classed as either domestic, commercial or industrial. The total daily discharge was measured as 7,001 kg BOD in a flow of 22,6974m^3 . This comprised 2,805 kg BOD/day from domestic wastewater, 1,136 kg BOD/day from commercial wastewater and 3,060 kg BOD/day from industrial wastewater. Industrial discharges come from a variety of activities including brewing, meat processing, dairy products and glass production, to name some of the main wastewater producers.

There is no treatment of urban wastewater in the Waterford City area other than a small treatment facility associated with Ardkeen Hospital, and also screening and grit removal of wastewater which occurs at Waterpark pumping station.

There is one principal outfall into the Suir River at Waterpark Pumping Station and numerous other outfalls into both the Suir and John's River. In particular, the release of wastewater into the John's River with its relatively low volume, and low circulation and dilution rates has resulted in very poor water quality of this river as verified by the results of the water quality studies carried out for the Preliminary Report for this scheme.

The nearest outfalls to the proposed development site are from Quest International Ltd and Snowcream. These sources release approximately 200 kg BOD/day and 120 kg BOD/day respectively. Downstream of the site the Louisiana Pacific Ltd. has an outfall.

3.6 CLIMATE AND AIR QUALITY

3.6.1 Climate

Specific climatological information for Waterford is lacking and; therefore, data from Kilkenny, approximately 48 kilometres to the north of the site, was used as the basis for this report.

3.6.2 Winds

Based on data from Kilkenny the prevailing winds are from the south (31.88% of the year) with a secondary maximum from the north-northwest (11.49%). Table 3.6.2 presents the percentages of occurrence of winds from the north, east, south, and west. Wind speeds of 5 m/s or less occur about 80% of the year, and very low wind speeds (less than 2 m/s) occur about 32% of the time. During the summer months (May-September) wind speeds of less than 2 m/s occur about 30% of the time, and calm weather conditions occur about 9% of this period. Wind speeds less than 3 m/s and less than 2 m/s blow directly north about 7% and 4% of the year, respectively. Wind speed and direction affect the intensity and duration of odours at a given location. As wind speed increases, the detectability of odours decreases because dilution occurs more rapidly at higher wind speeds.

Table 3.6.2:

Wind patterns at Kilkenny 1964 - 1989.

Direction (Degrees)	Percentage Occurrence of Winds
North 320 -40	23.54
East 50 - 130	11.51
South 140 - 220	31.88
West 230 - 310	26.54
Calms	6.52

3.6.3 Air Temperature

The annual mean air temperature at Waterford is about 10.0°C with a range in daily averages of 5.5°C in January to 15°C in July. Rarely does the temperature exceed 25°C. Long-term climatological data for Kilkenny indicate that 36% and 3.6% of the days each year have temperatures above 20°C and 25°C, respectively. The incidence of

high temperatures is relevant because the potential for odour nuisance is highest during times of warm, dry weather.

3.6.4 Air Quality/Baseline Assessment

Air quality in the vicinity of the proposed project is considered to be good. A report by Reid Associates (1992) on the environment around Belview Port indicated that daily ambient smoke and sulphur dioxide concentrations were low, less than 20 micrograms per cubic metre (mg/m^3). This is close to the detection limit of monitoring equipment used by local authorities. The annual median levels for Smoke and SO_2, as recorded in Waterford Bay in 1996 were $8\mu g/m^3$ and $4\mu g/m^3$, respectively (Air Monitoring Report, EPA 1996). These figures are below the annual mean concentration guideline of $60\mu g/m^3$. The average values for April 1998 were $14\mu g/m^3$ and $8\mu g/m^3$, respectively. Dust deposition rates averaged less than 50 milligrams per square metre (mg/m^2) per day, which is typical of agricultural areas.

Air emissions near the site can generally be characterised as consisting primarily of diesel exhaust generated by trucks, cars, trains, and ships associated with the Belview Port. The oil-fired power station at Great Island some 5 kilometres downstream, isolated private dwellings, and agricultural activities contribute to limited air emissions which would have the potential to impact on the Springfield House site depending on wind direction.

With regard to odours there are a number of industries in the vicinity of the Springfield House site which have the potential to create odours, these include a meat processing plant with associated wastewater treatment, located to the west of the site and a piggery located approximately 2.2 km to the north west of the Springfield House site.

The area surrounding the Springfield House site is primarily agricultural and therefore, there are a number of potential agricultural sources of odour nuisance. Farm practice would involve the spreading of slurry and this activity has the potential to generate odours. However, recent requirements in relation to the environmental considerations of slurry spreading restricts the method of application to one which significantly reduces odours.

3.7 NOISE

Noise is the level of sound greater than that of the background or ambient sound level. In general, sound levels are measured in terms of decibels (dB). More specifically, type A decibels (dBA) are used to

describe noise because this type measures sound frequencies to which human hearing is most sensitive.

Areas that will be traversed by the proposed collection sewers include urban, commercial, industrial, and rural residential lands. Typical outdoor sound levels for these areas are shown in Fig. 3.7.1.

The development site is located in agricultural fields. Land uses adjacent to and near the site include additional agricultural fields, a few rural residences, the Belview Port, and railway tracks. The single residence 200 metres north-east of the site is the closest noise-sensitive receptor to the Springfield house site. Sources of sounds (noise) near the site include natural sources (e.g., wind, wildlife); agricultural activity; road, rail, and river traffic; and crane and gantry movement at the Belview Port. Port-associated noises are the most noticeable of these mentioned.

A noise monitoring survey was undertaken at the Springfield House site in Co Kilkenny in June 1998. Baseline noise measurements were obtained at the boundary of the Springfield House site in the direction of the nearest residence. Continuous noise measurements were taken from 14.30 hrs on Friday, June 19 1998 to Monday 22 June 1998. The noise survey is appended to this document as Appendix F. The location of the noise monitoring station is illustrated in Figure 3.7.2.

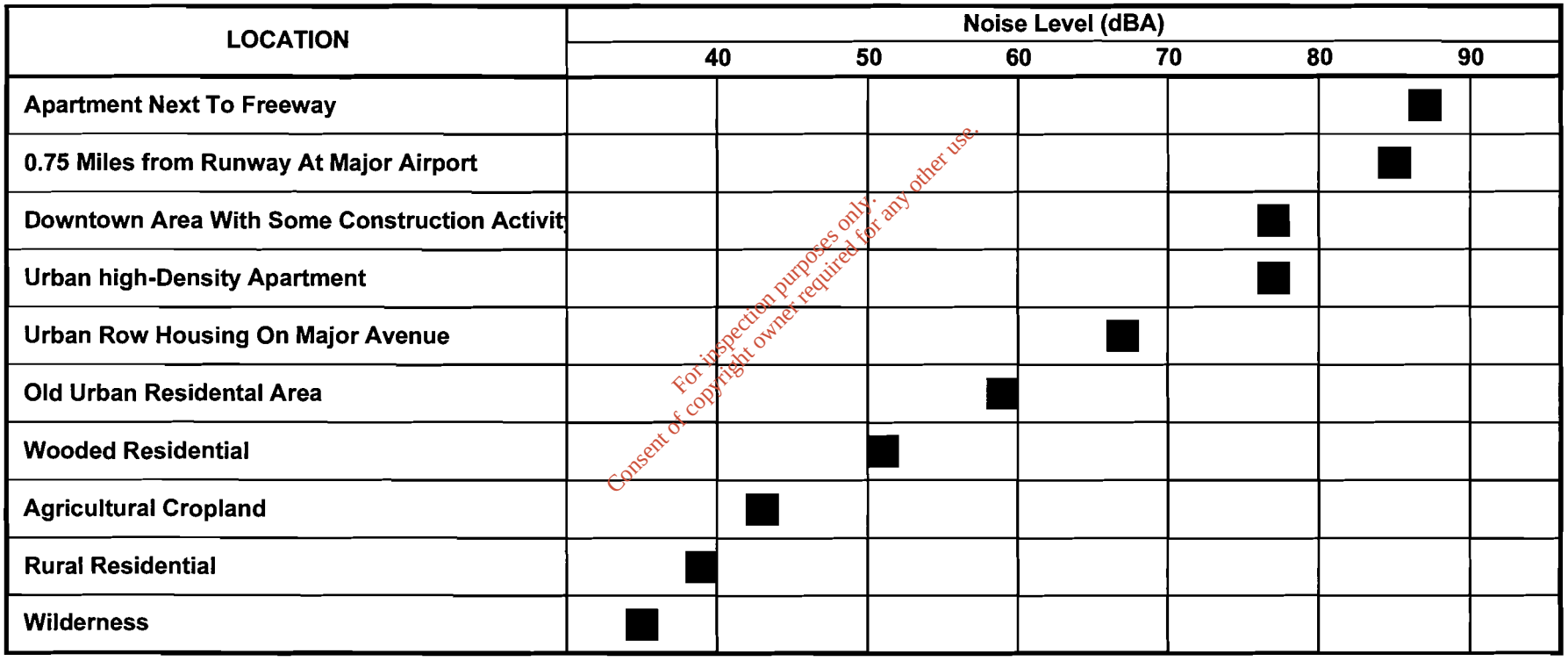
A Larson Davis Integrating Sound Level Meter Type 820 and outdoor microphone (Type 1) were used to obtain the noise readings. At the time of monitoring there was a variable south-easterly wind. A summary of noise measurements obtained are detailed in Table 3.7.1.

Table 3.7.1

Summary of L_{aeq} values (Day and Night) for the Noise Monitoring Interval.

Date/Day	Day (0.800-33.00h) L_{aeq} dBA	Night (22.00-08.00h) L_{aeq} dBA
19/06/98 Friday	43.9 (17.30-22.00h)	37.6
20/06/98 Saturday	44.7	40.7
21/06/98 Sunday	50.2	37.9
22/06/98 Monday	50.0 (08.00-18.30h)	-

Figure 3.7.1
Outdoor Day-Night Average Sound Levels at Various Locations



Source: USEPA 1978

WATERFORD MAIN DRAINAGE - WASTEWATER TREATMENT PLANT
LOCATION OF NOISE MONITORING STATION

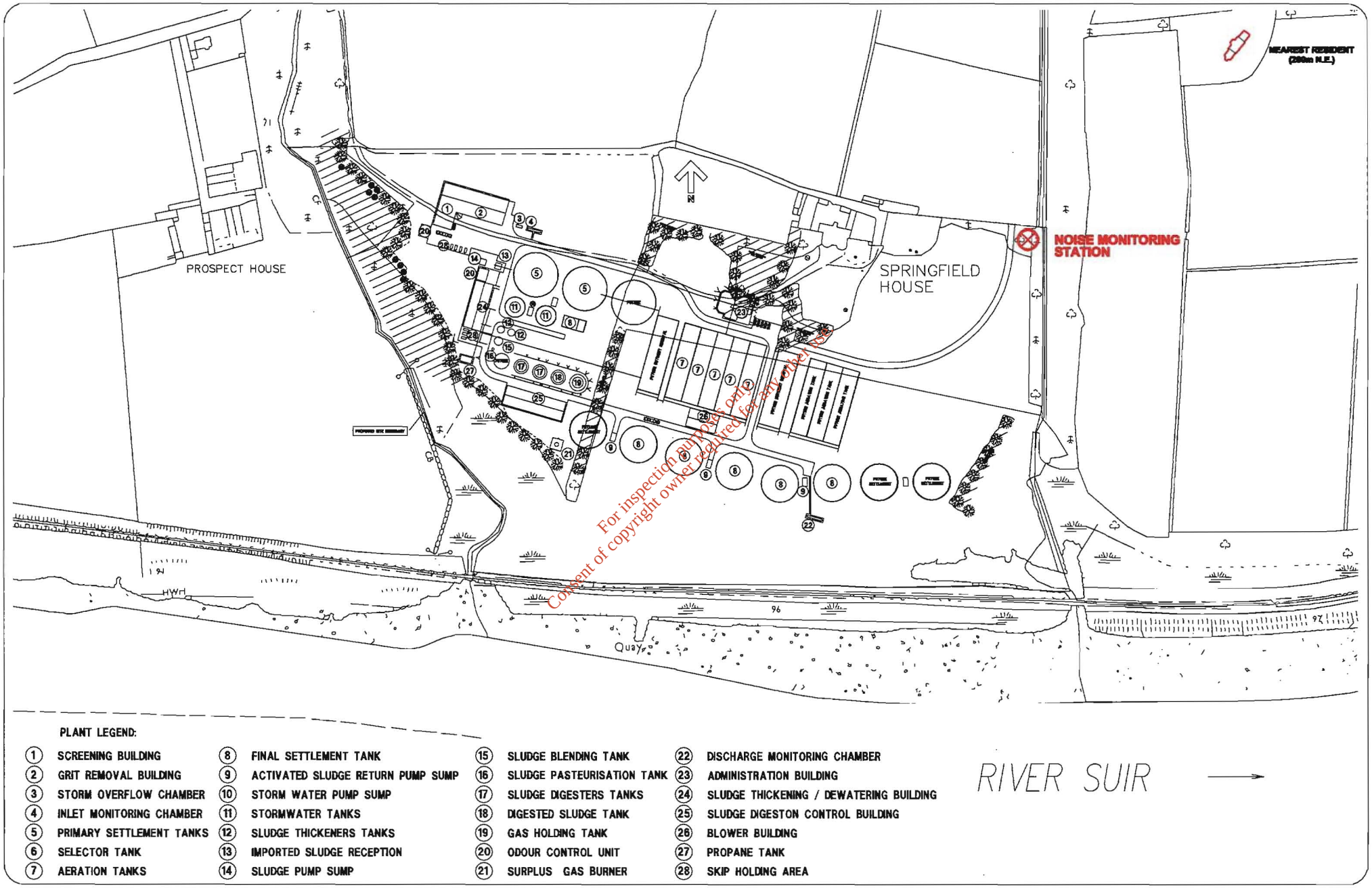


FIG. 3.7.2

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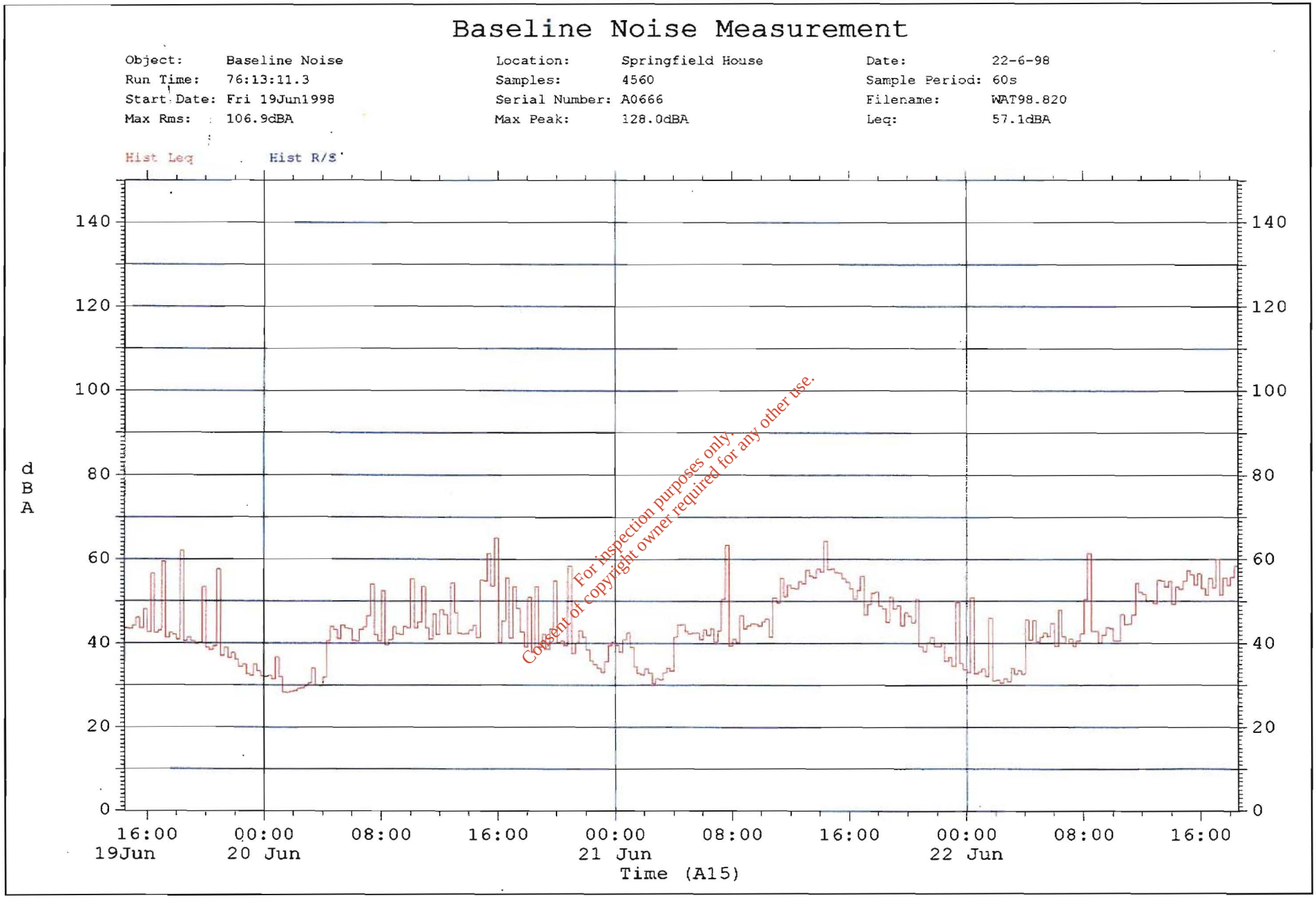
PROJECT & CONSTRUCTION MANAGEMENT
INDUSTRIAL COST CONTROL & ENVIRONMENTAL CONSULTANTS
CONSULTING ENGINEERS & ARCHITECTS

The L_{aeq} (time averaged measurements) from the entire monitoring period recorded background noise levels ranging from 43.9 to 50.2 L_{aeq} dBA during the day and from 37.6 to 40.7 L_{aeq} dBA at night. It should be noted that although the port was in operation at the time of the survey, noise associated with port activities can influence noise levels in the surrounding environs. In particular, the operation of gantries, the mobile crane and hopper with dust control system can significantly increase noise levels in the environs. Impulsive noise is generated by containers being loaded onto ships, trucks or trains. The affect of such activities on ambient noise levels in the vicinity of Springfield House will depend on such factors as wind speed and wind direction. If the wind is blowing from the east or north east noise levels in one vicinity of Springfield House can be significantly affected. Several noise complaints relating to port activities have been received by Kilkenny County Council.

The highest hourly L_{aeq} reading of 75.7 dBA was recorded over a half hour monitoring period (18.00-18.30 hr) on 22 June 1998. The second highest hourly L_{aeq} reading of 56.0 dBA was recorded for the monitoring period 14.00 to 15.00 hrs on 21 June 1998. The lowest L_{aeq} reading of 28.6 dBA was obtained for the monitoring period 01:00 to 02:00 on June 10, 1998. Noise levels recorded at the site were consistent with typical noise levels that would be expected in an predominantly agricultural area as is indicated on Table 3.7.1. At the time of monitoring a clearly audible tone was noted occasionally from the direction of the adjacent Deepwater Berth. Impulsive noises from the same direction were also noted during the measurement period.

A plot of the L_{aeq} for 15-minute intervals throughout the entire measurement period is provided on Figure 3.7.3.



PLOT OF LAEQ FOR EACH 15 MIN. INTERVAL THROUGHOUT THE MONITORING PERIOD

FIG. 3.7.3

3.8 LANDSCAPE

This section addresses the topography and other geographic features in terms of the aesthetic character of the preferred site and immediate environs.

3.8.1 Topography

The Springfield House site is located on the northern bank of the River Suir directly adjacent to Little Island. The topography surrounding the site is of low relief gradually rising to the north. The Springfield House site has a uniform north-to-south grade varying in elevation from 3 to 13 metres OD (Malin Head) with a slope of approximately 3%.

3.8.2 Visual Resources

The area surrounding the site is rural in nature dominated by agricultural farmland, pastures, and hedgerows all fronted to the south by the River Suir Estuary. The rural aesthetic character in the vicinity of the site has been significantly altered by industrial structures, primarily the tall, bright blue container cranes associated with the adjacent Belview Port, and two very tall, white smokestacks of the ESB power station located 5 kilometres downstream of the Gorteens area. Completion of the planned port expansion including an 800-metre wharf will further alter the visual character of the area. Another notable structure in the landscape is Gorteens Castle, approximately 1.2 kilometres north of the Springfield House site. This derelict castle tower, located on the top of the hill, is a focal point for the immediate area.

The Springfield House site is bordered on the south side by the saltmarshes intersected by a railway line and the river, and on the remaining sides by agricultural lands. To the east of the site lies the Belview Port, approximately 500 metres distant. Proposed expansion of this port will bring it to within 300 metres of the site.

The Discovery Series of Maps (Ordnance Survey of Ireland - Map 76) were consulted for the Belview / Waterford Estuary and no designated tourist routes or designated views have been identified in the immediate vicinity of Springfield House.

In the Belview Action Plan 1997 (amended May 1998) adopted by Kilkenny County Council, Landscape Compartments were identified having consideration for visual impact. The Belview Area Action Plan,

also, identifies the major views into the Belview area, and these are discussed below relative to the Springfield House site.

View from the North

To the north of the Springfield House site lie primarily agricultural fields each with a well established wooded boundary which act as visual buffers restricting views of the Springfield House site. In addition, the location of Springfield House to the north of the site, with the dense wooded hedgerows serves to obstruct views of the site from the north.

View from the South

Of more significance are the views of Springfield House from the south. The southern boundary of the site consists of saltmarshes abutting into the Queens Channel of the River Suir separated from the meadow below Springfield House by a spartan tree line and a railway line. The site is therefore relatively open and is particularly visible from the Waterford Castle Golf and Country Club situated on Little Island. Waterford Castle, also located on Little Island is surrounded by dense vegetation which shields views of the Springfield House site.

Long views of the site from Blenheim and Faithlegg Golf Club to the south east are visually obstructed by the presence of dense and mature vegetation.

Long views from Ballynakill to the south west are obstructed by distance from the site and to a certain extent the presence of Little Island to the north east.

View from the East

To the east of the site beyond agricultural fields lies Belview Port. This area surrounding the Port has been designated suitable for the location of strategic industries, i.e. industries requiring sufficiently large areas as to preclude location in an industrial estate. To the north-east of the site, at a distance of 200 metres there is one residential property, however, the densely vegetated eastern boundary at Springfield House in addition to the wooded boundaries of the adjacent fields, means that the site is not visible from this residence.

View from the West.

To the north-west of the site at a distance of 300 metres there is a residential property. The Springfield House site is partially visible from this property, however, the view of Springfield House itself is not possible due to the presence of densely vegetated hedgerows and line of mature deciduous trees surrounding the house to the west.

To the west of the site, roughly 0.5 kilometres in distance and on the far side of Belview House, there are several residences. The residences are separated from the Springfield House site by two large fields. The Springfield House site would be visible to these residences but for the wooded field boundaries which provide a visual buffer. To the south-west of the site, on the far side of the River Suir, long views of the site are afforded from Ballynakill, a large residential area and suburb of Waterford City.

Summary

The Springfield House site is part of the landscape as viewed from the south side of the river at Little Island, where the Waterford Castle Golf and Country Club and Waterford Castle Hotel are located. Long views from Blenheim and Faithlegg Golf Course which are further downstream are well obscured by the extensively developed vegetation along the eastern boundary of the site. In addition, some of the distances involved are in excess of 1 kilometre where the site represents a visually insignificant component of the view. Landscape views from all directions, at one time presided over by Gorteens Castle, are now dominated by the aforementioned industrial structures (the Belview Port container cranes and the ESB power station smokestacks).

3.9 CULTURAL HERITAGE

An archaeological assessment was undertaken by Eachtra Archaeological Projects during October 1998 at the proposed development site at Springfield House (refer to Appendix C). The survey undertook an assessment of the archaeology in the townland of Gorteens, in particular in the area of Springfield House, and also the access road and an assessment was made on the impact of such development on the archaeology of that area (refer to Section 4.9). The archaeological assessment consisted of a desk study (consulting sources such as the archaeological inventory of Kilkenny, an S.M.R map, the topographical files in the National Monument) and field visit.

The Waterford area has a long history of occupation beginning before the Christian era. Use of the Port of Waterford began in 916 as attacking Danes arrived in the harbour. The Anglo-Normans captured the city in 1170 and over the following 750 years erected numerous structures, many of which exist today in varying levels of upkeep. Such structures include churches, castles, towers, walls, gates, and shell middens. Extensive excavations have taken place in Waterford City and a number of findings of national importance have been uncovered.

Springfield House, consisting an estate house and grounds, is located on the northern side of the proposed wastewater treatment plant site. There are a number of associated estate features visible within the ruined house and grounds. A covered passage, aligned north-south, is located to the east of the house. A quay, which is marked on the 1st edition O.S. map (sheet 47), is located on the bank of the river. Large numbers of mature trees and stone walls are visible within the environs of the house.

There is a stand of trees located in the centre of the Springfield House site. In addition, a number of large stones are located within this stand of trees. There are no visible traces of associated earthworks.

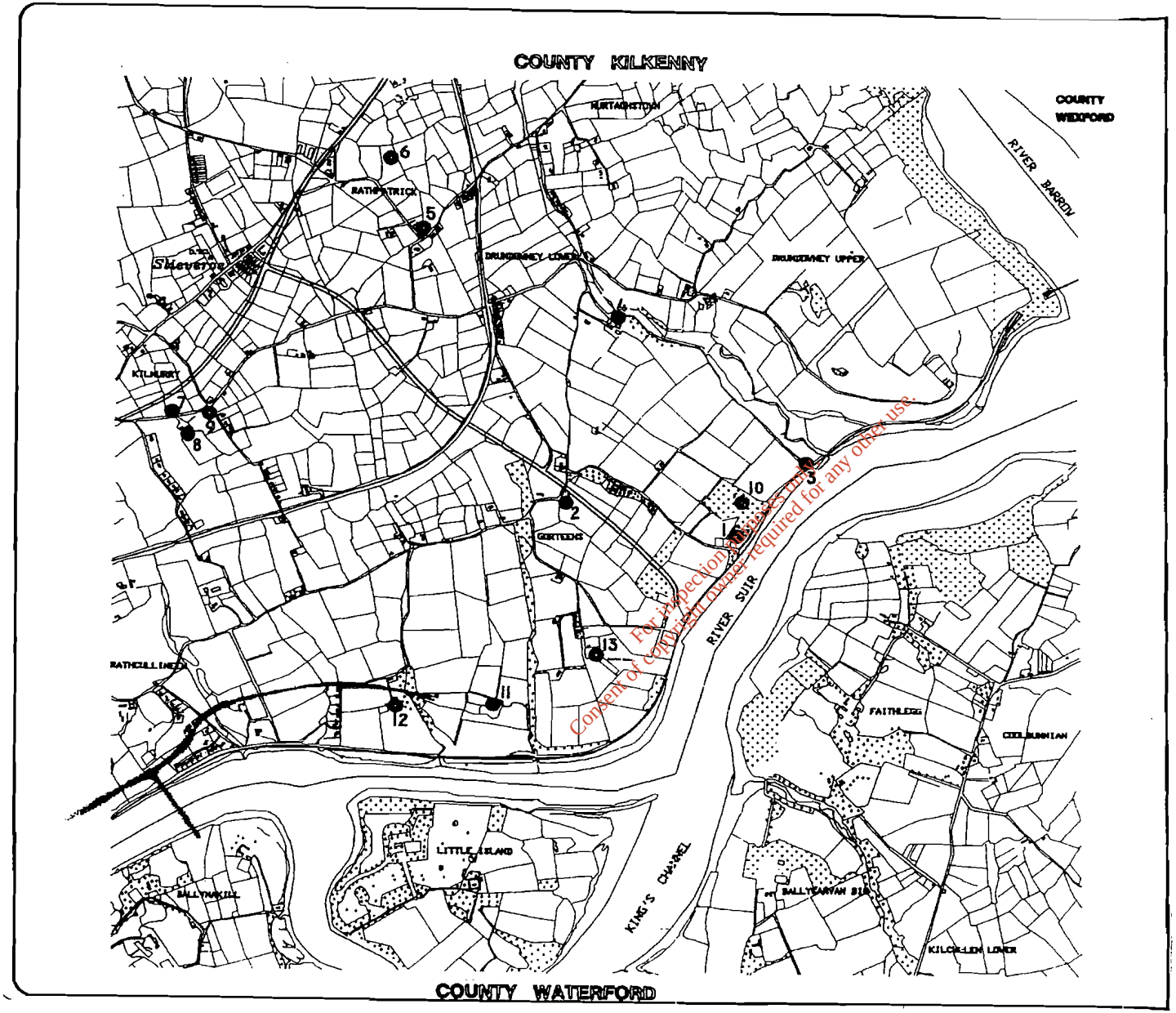
To the east on the northern most field on the line of the proposed access road there is a pond within a copse of trees. A spring is mapped in this location on the S.M.R map. Currently the site is very overgrown with scrub and mature trees.

In the field to the south of the Springfield House site there is a large tree. 30 metres to the east of the tree there are two linear ridges aligned north-south, each 20 metres long by 1 metre wide. The ridges themselves are 20 metres apart. It is possible that these features could be archaeological or geomorphological in nature.

Gorteens Castle, although a protected structure is now in ruins. The castle is located in a farm yard, north east of the Springfield House site.

The Belview Area Action Plan 1997 (as amended May 1998) lists the protected heritage buildings in the Belview area. Springfield House is a listed heritage building. It is considered that this building gives an important identity to the area. In addition to Springfield House there are several other listed heritage features in the Belview area. These are listed and illustrated in Figure 3.9.1.

It is the policy of Kilkenny County Council to protect these heritage features. Under the Local Government (Planning and Development) Acts, 1963-1998 and the regulations made thereunder, the alteration or demolition to a listed building requires planning permission.



HERITAGE FEATURES

1	Glasshouse At Gorteens
2	Gorteens Castle
3	Mill At Gorteens
4	Corn Mill At Gorteens
5	Rathpatrick Church & Graveyard
6	Ringfort At Rathpatrick
7	Tobermurry Well
8	Kilmurry Castle
9	Kilmurry Church & Graveyard
10	Knockmullan Gardens
11	Springfield House
12	Prospect House
13	Bellevue House

Map Indicating The Listed Heritage Features In The Belview Area
Source: Belview Area Action Plan 1997. (As Ammended May 1998)

Figure 3.9.1

3.10 MATERIAL ASSETS

Material assets essentially are components of the environment that may be considered by society to be of value for production, development, maintenance, recreation, and well-being (Bradley *et al.* 1991). For the purposes of the Springfield House site, significant material assets include sustainable development and severance.

3.10.1 Sustainable Development

The concept of sustainable development, discussed and advocated in the report by the World Commission on Environment and Development (1987), is based on a reasonable balance between economic development and conservation of natural systems. The report advocates precautionary actions regarding development, i.e. precautionary actions should be undertaken, even if scientific evidence of potential effects is lacking. Furthermore, all policy decisions should include environmental considerations.

The word "sustainable" denotes an action that can be performed in perpetuity. Regarding the wastewater treatment plant itself, it is germane to note that the present level of discharges of untreated wastewater into the estuary is not ecologically or economically sustainable. Deteriorated water quality can be deleterious to migrating fish and less mobile shellfish (Black 1988). In the context of a growing population and continuing industrial development in the Waterford City and Enviorns including south Kilkenny, continuing discharges of untreated wastewater will result in the estuary being unable to maintain current levels of fish and shellfish harvesting downstream of Waterford. These organisms are both directly susceptible to decreased water quality *vis-a-vis* low oxygen levels and high levels of organic wastes, and indirectly vulnerable in as much as these parameters affect their food sources. Decreased fish and shellfish populations would negatively impact both the estuarine ecosystem function and local economies.

The site is located in the Belview area which has been identified as an area of special control by Kilkenny County Council. The area is controlled under the Belview Area Action Plan 1997 (as amended May 1998). The Belview Action Plan has identified areas adjacent to the Belview Port as future strategic industrial sites, which will concentrate industrial development in a single area. The plan also incorporates layout and landscaping objectives relative to industrial sites and surrounding areas. This will serve to preserve the general nature of the landscape, which may otherwise be compromised by scattered development and also consolidates the requirement for wastewater

treatment, thereby negating the need for several treatment facilities in the immediate area. The Belview Area Action Plan, has identified the Springfield House site (WT9) as the designated location for the proposed wastewater treatment plant to serve Waterford and South Kilkenny.

The Springfield House site also is located in proximity to an outfall location with ample mixing capabilities. The planned outfall will be just north east of Little Island at the downstream confluence of the Queen's and King's Channels. Given the integration of these two flows and the width of the channel, there should be greater mixing and, therefore, assimilation of discharges than at other points along the river. This will further serve to improve water quality of the estuary.

3.10.2 Severance

Another material asset relevant to the proposed site is severance which relates to the possibility of disruption of activities or detrimental division of the landscape. The Springfield House site lies on along the northern bank of the River Suir, with the saltmarshes, traversed by a railway line, abutting into the river forming the southern boundary of the site. Agricultural fields surround the general site, and, more specifically, there is a buffer of hedgerows and trees of varying density delineating the site. Presently, the site is in active agricultural use. The site is not used by the public because of its relative seclusion from populated areas and inaccessibility. Residents of the few dwellings in the area may be susceptible to severance-related impacts, especially scenic amenities or psychological perception of the project and environs.

CHAPTER 4 – ENVIRONMENTAL IMPACTS

4.0 ENVIRONMENTAL IMPACTS

This chapter describes the impacts that will and could potentially arise from the construction and operation of the wastewater treatment facility at the Springfield House site. Impacts relating to the collection system and construction phase of the project are also discussed throughout the chapter. The river crossings are addressed in Section 4.3.2.

4.1 HUMAN ENVIRONMENT

4.1.1 Employment and Economic Activity

The construction of the Waterford Main Drainage Scheme represents a capital investment in excess of £30 million. The proposed wastewater treatment plant is an essential element of this scheme and entails a capital expenditure of circa £13 million. The construction phase of this development will provide more than 200 construction jobs extending over a 5 year period.

The proposed wastewater treatment plant incorporates preliminary, primary and secondary treatment facilities for wastewater from a number of catchment areas in Waterford City and its environs in South Kilkenny, including treatment facilities for the associated on-site generated and imported sludges. It is anticipated that at least 6 full-time, permanent employees will be required to operate the wastewater treatment plant. The proposed staffing structure is outlined in Section 2.2.7.

In terms of direct full time employment the impact associated with this development although positive is imperceptible. However, the provision of a wastewater treatment facility will have a significant positive impact in terms of enhancing the potential for industrial development in Waterford and the Belview area. On commissioning, the wastewater treatment plant will have the capacity to treat current domestic and industrial wastewater loads from Waterford City and Environs with a surplus capacity to allow for future growth. In addition, the site has available space to accommodate further expansions of the plant to cater for future industries.

In the absence of a wastewater plant residential and industrial development in the Waterford and Belview areas would be curtailed due to lack of services for the treatment of domestic and industrial

effluent. The above scenario encompasses both the 'Do Nothing Scenario' and the Worst Case Scenario'.

4.1.2 Population and Housing

Current and projected population and development patterns in the Waterford City and Environs including south Kilkenny will not be adversely impacted by the proposed wastewater treatment facility. The plant is designed to accommodate a projected population of 60,132 and supporting industries in the year 2025 (i.e. Total capacity of plant is 148,500 Population Equivalent).

Housing may be impacted directly and indirectly as a result of the proposed development.

Short term direct impacts generally refer to material impacts to existing residences. Construction of the facility may involve the use of equipment necessary to drill/trench through the hard bedrock. Such equipment can create subterranean vibrations which potentially could have an impact on structures within a 30-metre radius of the impact location. However, the nearest occupied residence to the Springfield House site is 200 metres from the site. In addition, the use of such equipment during the construction phase is expected to be minimal. Therefore, the construction and operation of the proposed plant is not expected to result in any material impacts to surrounding residences.

Long term negative impacts relate to the loss of potential housing sites for new home construction because of reduced desirability of living close to a wastewater treatment plant. The lands to the north of the development site are designated for industrial use in the Belview Area Action Plan, and the zoning of the general area for industrial activity in the Belview Area Action Plan 1997 (as amended May 1998) would preclude residential development and therefore negate this impact.

4.1.3 Land Use

The construction of the wastewater treatment plant at the Springfield House site will result in the permanent conversion of approximately 18 hectares of land which currently comprises agricultural land, saltmarshes and woodland to public utility use. Not all this area will be taken up by buildings, areas of hardstanding, tanks, treatment structures, roadways and pathways associated with the wastewater treatment plant. The proposed development includes a comprehensive landscaping plan which will replace existing woodlands removed for the purposes of construction and includes for plant and new woodlands in accordance with the recommendation of the Belview

Area Actin Plan. The existing Springfield House and immediate gardens will not be disturbed by the development.

Currently, agriculture is the principal land-use in the general vicinity of the proposed site. On a regional basis, given the prevalence of land under agricultural use, the conversion of approximately 16 hectares of land for community services purposes is not considered significant.

Agriculture and industry are generally discordant land uses. However, with the presence of the Belview Port and industries (Louisiana Pacific Ltd and ITW Hi-cone) to the north-east, the development of a wastewater treatment facility at the Springfield House site is consistent with the developing land-use in the immediate area. In addition, the site has been designated in the Belview Area Action Plan 1997 (as amended May, 1998) as the proposed location of a wastewater treatment plant (WT9), therefore, the proposed development at this site will be undertaken in accordance with the planning policies and objectives of Kilkenny County Council.

During preliminary wastewater treatment plant site evaluation and selection, avoidance of residential areas, especially in the more densely populated areas, was a priority. Although the Springfield House site is not located in a densely developed residential area there are several widely scattered residences located in the vicinity of the Springfield House site, including the nearest residence which is approximately 200 metres to the north-east. However, the presence of mature trees and hedgerows bordering the site, particularly to the east and west, provides significant screening of the site from the nearby residences. Proposals for further planting and landscaping are detailed in Section 4.9 which will provide for further screening of the site.

Impacts relating to landuse with regard to the collection system and outfall pipe are not considered to be significant. The collection system will consist of approximately 16,650 metres of gravity sewers and rising mains. A detailed listing of distances of specific roadways to be traversed by the collection system is provided in Table 2.2.8.1 and distances of land types to be traversed are presented in Table 2.2.8.2. The majority of the collection system (51%) will be constructed within public roadways, therefore, the impact in terms of landuse is not considered to be significant. Approximately 19% of the collection system will traverse agricultural fields and pastures. The gravity sewers and rising mains will be located underground and therefore, once the construction phase is complete agricultural activities can continue unabated by the presence of the sewer.

The collection system will not significantly impact on other land uses to be traversed. Approximately 20% of the collection system will pass

through natural areas including grassy marsh (14%), woodlands (2%), and the River Suir (4%) and John's River (<1%). The marsh areas occur principally along the King's Channel and the River Suir near Belmont House. The Maypark, Blenheim, and Slieverue pumping stations will be located in similar silty foreshore areas. Wooded areas to be traversed include approximately 300 metres on the north side of the River Suir, and a small area just east of the Glenville pumping station.

With regard to the construction of pumping stations associated with the proposed collection system, the Rocklands pumping station will be located adjacent to an existing comminuter station. Pumping stations at Ferrybank, Christendom, Freshfield, Glenville, Snowcream, and Bleach Bridge will be small structures each occupying sites less than 0.1 acres. In terms of land-use this is an imperceptible impact.

The collection system will cross the River Suir at two locations, Maypark and Waterpark. The river is approximately 300 metres wide at these points. Also, the John's River will be crossed near Bleach Bridge. Other waterways within the proposed wayleave include a small inlet of the King's Channel near the Blenheim pumping station, and two small streams on the north side of the River Suir both of which will be culverted.

The outfall pipe will extend from the wastewater treatment plant and will be carried by a 1,350 mm diameter pipeline to the outfall location at the confluence of the Queens Channel and Kings Channel north east of Little Island in the River Suir. The outfall pipe will be approximately 900 metres in length.

The laying of the pipework at will negatively impact on the use of the river by boats and ships in the short-term, i.e. during the construction period. Once the pipework is place, however, the impact will cease and use of the river by boats, shipping etc. will be unaffected.

4.1.4 Recreation

Recreational activities are extremely limited in the immediate vicinity of the Springfield House site. The use of the private mini golf course in the grounds of the nearby residence to the north-east of the site will not be impacted upon by the proposed development, however it is possible that short term negative nuisance impacts (i.e. noise) could arise during the construction phase. These impacts will be restricted to daylight hours and will cease on completion of the construction phase. Likewise, there will be no significant impact on the patrons of the golf courses to the south of the river (Waterford Castle and Faithlegg).

Any utilisation of the shoreline and saltmarshes for walking or birdwatching may be temporarily disrupted during construction of the plant and outfall pipe. However, it should be noted that there are is no public access to these saltmarshes and, therefore, access must be gained through private lands that front the Estuary.

Water-contact activities, fishing and boating, although uncommon near the site, may be temporarily disrupted by construction activities relating to laying of the outfall and river crossings. These impacts will be short-term, slight, and restricted to the River Suir at Waterpark and Maypark and the outfall location. More importantly, the improved water quality of the estuary resulting from the elimination of discharges of raw sewage may encourage the development of recreational activities.

4.1.5 Transportation

Access to the Springfield House site, the proposed location of the wastewater treatment plant (WT9), will be provided by the construction of an access road from the N29, the Port Access Road, in the vicinity of Gorteens Castle and passing through 'Landscape Compartment' 2(LC2) as designated in the Belview Area Action Plan 1997 (as amended May 1998).

The proposed development will result in both short term and long term increases in vehicle movements to the Springfield House site. Short term impacts to public and private transportation will result from an increase in traffic, primarily trucks, during the construction phase. Initial estimates suggest that 20,000 tonnes of crushed stone, 10,000 m^3 of concrete, 2,000 tonnes of road surfacing, and 25,000 tonnes of miscellaneous building materials will be transported to the site during a two year construction period. This will result in an approximate total of 6,000 truck movements in total with typically 30-40 truck movements in any one day at the height of the construction activities (i.e. 15 - 20 deliveries per day). During the construction phase, impacts to existing traffic levels on the National Primary Route (N24) and the Port Access Road (N29) will be imperceptible. An access road to the Springfield House site has been specifically designated, therefore, traffic associated with the wastewater treatment plant will not adversely impact on minor roads in the area utilised by local residents.

In the long term shipping traffic at the port and the River Suir will not be affected by the proposed project. During placement of the outfall pipe, ships may be required to manoeuvre around the immediate construction area until the pipe has been installed. This impact will be short-term and minor at most (at the proposed outfall location, the river is approximately 300 metres wide). The outfall pipe will be placed so that its terminus and diffuser structure is approximately 6 metres below

Mean Low Water Spring. The width of the channel and the height of the water above the pipe will be sufficient to allow passage of vessels, therefore not impacting on the river traffic once the construction phase is complete.

Rail traffic will not be affected by construction or operation of the facility. Installation of the outfall pipe will involve thrust boring beneath the tracks, which does not impact aboveground activities. Rail traffic is expected to function normally during construction and operation of the facility.

Once the construction phase is complete, traffic to the site will be restricted to plant personnel and visitors and also traffic associated with the operation of the plant. This traffic will occur during daylight hours and will not impact significantly in terms of traffic levels in the vicinity of the site.

4.1.6 Health and Safety

Public health impacts arise from changes in environmental conditions which affect a target population. These impacts can be direct, through occupational or accidental exposure to high levels of a toxic substance, or indirect, through adverse changes to air or water quality. Currently public health does not seem to be affected by the discharge of untreated sewage effluent from 15 different outfalls into the estuary upstream of the Springfield House site. However if this situation were to continue, it would result in the decline of water quality in the estuary which would ultimately impact on the quality of life of individuals and populations living in Waterford City and Environs and even further afield. The construction of the proposed wastewater treatment plant will have a significant positive impact arising from the elimination of numerous discharges of raw sewage. Wastewaters will receive secondary biological treatment and the resultant sludge will be pasteurised for safe disposal. Secondary treatment of wastewater typically results in a 98.8% reduction in human enteric viruses common to urban wastewater (Slage and Ford 1983).

From a safety viewpoint, the proposed development is located in an relatively isolated area removed from the major centres of population. Access to the site will be restricted and the site will be totally enclosed by a security fence and dense plantations Adequate access is proposed to process tanks and pathways around and between the tanks. Safety measures at the wastewater treatment plant site will provide for the requirements of all plant personnel. The development will consist of a modern wastewater treatment plant at a secluded location and therefore, will impart a neutral impact with regard to safety.

4.2 FLORA AND FAUNA

This section discusses both general, specific and potential impacts to terrestrial and estuarine flora and fauna arising from the proposed development.

4.2.1 Terrestrial Environment

Flora

Construction and operation of the facility will result in both short-term and long-term impacts to the existing terrestrial flora and fauna. The Springfield House site consists of 16 hectares of which 6.8 hectares is woodland. The survey area which included the Springfield House site is of interest for the presence of two ecologically contrasting habitat types, saltmarshes on the southern boundary and un-drained old meadows immediately to the north east of the Springfield House site. In addition, the presence of some large populations of the nationally-rare Hard Rush Hybrid (*Juncus x diffusus*) in the old meadows to the north-east of the site, which will be traversed by the proposed access road, further enhances the botanical value of the site.

Impacts to flora on the Springfield House site relate to the removal of vegetation in certain areas of the site to make room for certain structures such as the administration building and also the primary and final settlement tanks. The construction of the wastewater treatment plant will require the removal of the east-west boundary hedge to the south of the Springfield House site and sections of the north-south running wooded hedgerow, which effectively divides the site. Both contain mature collections of deciduous trees. Although removal of mature deciduous trees will result in a negative localised impact, given the presence of the mature deciduous trees in the boundary hedgerows (west and east) and the quantity of woodland in the Belview area, this impact is not considered significant on a regional basis.

The construction of the access road to the site through five fields to the north-east will have a significant short term negative impact associated with the construction phase. However, once the construction phase is complete, the road structure will not result in a significant loss of land or vegetation. Removal of vegetation will only be affected along the proposed route of the access road. Some habitat loss and habitat fragmentation will occur as a result of roads traversing hedgerows on its route north from the site to the port access road. However given the overall amount of hedgerows and wood remaining, the impact is considered to be slight rather than significant. Construction of the road should not impact significantly on the species (*Juncus x diffusus*) which

is present in abundance in a relict marshy meadow north east of Springfield House.

Construction of the access road and the wastewater treatment plant itself will not impact on the saltmarshes to the south of the Springfield House site.

Most of the collection system lies within roadways and other existing wayleaves, therefore, flora and fauna will be minimally impacted. Minor impacts to the terrestrial flora and fauna will occur in the grassy marsh areas and woodlands as vegetation will be removed during trenching and pipelaying. The species to be impacted are typical of the region (apart from the marsh areas) and, therefore, the proposed collection system will not result in significant ecological impacts. The marsh areas occur principally along the King's Channel and the River Suir near Belmont house. The marsh areas at Island View and Belmont house are in the process of being designated as national Heritage Areas (NHA's). Both these areas host a population of Meadow Barley (*Hordeum Secalinium*) which is protected under Section 21 of the Wildlife Act, 1976. The route of the pipework takes this into account.

Birds

The main impact of the proposed development on birds is likely to be through the loss of some breeding habitat at the proposed Springfield House site directly related to the removal of the wooded hedgerow (including oak) across the middle of the site. The existing trees along the western, northern and eastern boundaries of the site will be retained or, if removed during construction activities, will be replaced by new planting. Few, if any, birds were breeding on the cattle-grazed pasture at the site. Based on the relative amounts of habitat to be lost or retained, perhaps a 30% reduction in birds numbers (and the loss of a few species) might be expected on the immediate Springfield House site. Some additional losses can also be expected to result from disturbance during construction of the wastewater treatment plant, however this impact, although likely to be significant, will be short term in duration and in the longer term there would be some recovery. Birds breeding in and around Springfield House will not be affected directly by the development, although some temporary disturbance may occur during the construction phase. In a wider context, given the availability of other suitable habitat in this part of south Kilkenny, and the species involved, losses are likely to be of little significance.

The proposed access road to the Springfield House site is likely to have minimal impact on birds using the adjacent wooded belt and hedgerows. Short sections of hedgerow, and an area of rushes and scrub will be removed, but most breeding bird species are likely to be

retained in the immediate area. The relatively small volume of traffic involved is likely to have only a minimal impact on breeding birds compared with busier roads in the area.

Mammals

The permanent loss of vegetation at the site may result in loss of habitat for small mammals and birds. However, the removal of the east-west running hedgerow, which contains several large trees, will not have a significant impact on mammals given its low level of importance for the group at present.

Short term impacts will occur through temporary disruption or displacement of faunal activities of those species utilising surrounding hedgerows and trees as a result of construction activities. However, this vegetation will be retained and therefore it is expected that bats, birds, and small mammals occupying this vegetation will resume normal foraging and nesting activities following construction.

The disused orchard area and some of the drier banks in the garden and other hedgerows immediately south of the derelict Springfield House, which are considered to be of moderate importance to small mammals will not be impacted by the development. This area is to be retained and if cattle were to be excluded, some areas of the site may become more important for small mammals.

The meadow below Springfield House, which is to be encompassed by the development, is severely poached, and considered of little importance to mammals. However the area is likely to become a mammal refuge of moderate to high importance.

Hedgerows traversed by the access road on its route north from the site to the main road, will result in some loss of habitat and habitat fragmentation, however, given the overall amount of wood remaining, the impact on mammals is likely to be moderate rather than severe and the overall impact can be described as minor.

4.2.2 Estuarine Environment

Habitat alteration along the route of the proposed outfall is likely to be minimal and temporary, and the most serious potential impact would involve drainage of marsh pool habitat. There will be no direct adverse impact on riverside mudflats used by feeding waterfowl in winter, apart from temporary disturbance during the construction period.

No significant negative impact arising from the operation of a wastewater treatment plant, on wetland birds is expected. In

particular, birds feeding along the river channel or its mudflats are not considered to be at risk, given the species and numbers involved.

The interface between the shoreline and wetland habitats are likely to be significantly disturbed during the construction phase and in particular the laying of the outfall pipeline. The presence of the rare Hybrid Sea Couch (*Elytrigia x oliveri)* in the saltmarsh will may be temporarily affected, however, given the abundance of the species at the site, the interference will be minimal. Otters may temporarily abandon the habitat in the short term, however, provided there is not a significant impact on freshwater bodies and wetland habitat otters will again utilise the area.

Water quality models (see Section 4.5) predict a significant overall decrease in coliform levels near the mussel beds and bathing areas in the outer estuary following implementation of the proposed wastewater treatment plant at Springfield House. Improved water quality will allow increases in population levels and species diversity of estuarine flora and fauna. Short term adverse impacts to the estuarine environment will occur during construction of the river crossings at Waterpark and Maypark, as well as at the outfall pipe. At the location of the two river crossings the River Suir is approximately 280 metres wide. At the Springfield House site outfall location, the river is over 300 metres wide.

Operation of the heavy equipment needed for installing the pipeline cradle and piles on the river banks and the trenching of sediments and bedrock and pipe installation will result in a direct displacement of certain species, and some localised increases in turbidity of the nearby water column due to displacement of the existing sediments. Sediment releases are not expected to impact the shellfish beds at Cheekpoint owing to their distance from the disturbance. Installation of the outfall pipe will result in short-term localised sedimentation that will minimally affect organisms in the immediate vicinity. In addition, there are few benthic species present in the area, and those that are, are quite common in estuarine habitats. Overall, construction will result in minimal impacts to estuarine species.

4.3 NATURAL HERITAGE AREAS

The site for the proposed wastewater treatment plant will not directly impact on the proposed Natural Heritage Areas in the vicinity of the Springfield House site. The saltmarshes at Island View and east of Belmont House are in the process of being designated as National Heritage Areas (NHA's). The route of the collection system pipework en route to the wastewater treatment plant from Maypark pumping station takes this into account.

4.4 GEOLOGY AND SOILS

4.4.1 Geology

Localised areas of hard felstone and felspathic ash bedrock underlie much of the Waterford area. The geology of the site at Springfield House is suitable for supporting large structures and will not be adversely affected by the construction of the proposed wastewater treatment plant and its associated outfall discharge pipe.

The recorded fossil areas in the Waterford vicinity will not be impacted given their distance from planned activities.

4.4.2 Soils

Construction of the wastewater treatment plant will necessitate re-grading of a majority of the development site. This will result in an alteration of soil profiles and soil productivity. However, any change in productivity will not affect agriculture on the site as the site is being converted to industrial land use.

Some soil erosion resulting from removal of vegetation and alteration of soil profiles may occur on the site. Erosion is not expected to be significant given the relatively flat nature of the site. Any runoff that may occur is expected to be retained by the vegetation surrounding the site or sediment fences, which will be used as necessary. Following construction, the site will be re-vegetated as quickly as possible.

Construction of the outfall pipe will necessitate thrustboring through the railway embankment, and into the river. This activity will have a imperceptible short-term and localised impact on the area.

4.5 HYDROLOGY AND WATER QUALITY

4.5.1 Construction of the submarine portions of the rising mains and the outfall pipe will require dredging and trenching of the river channel substrate. These operations will result in temporary slight localised impacts to water quality due to the introduction of sedimentation into the water column. In addition to the increase in turbidity, BOD and nutrient levels may also increase as a result of re-suspension of settled solids in the channel bed. Sediment plumes are expected to diffuse rapidly given the strong flushing action of the estuary. Short-term localised impacts to water quality could also occur through accidental releases of lubricating oils or fuels from barges and construction

equipment utilised during the river crossings. The probability of such an occurrence is low, and, moreover, contaminant releases of this sort tend to be localised slight negative impacts. The flushing action of the estuary would quickly disperse such accidental releases should these occur.

4.5.2 The proposed wastewater treatment facility will involve secondary treatment of urban wastewater consistent with EU guidelines. Such treatment generally results in 90% reductions in BOD, total coliform bacteria, and suspended solids, and a 25% decrease in nutrient levels. Secondary treatment also typically results in a 98.8% reduction in human enteric viruses common to urban wastewater (Slage and Ford 1983). At present, water quality in the Waterford area is adversely affected by urban (domestic and industrial) discharges from 15 different outfalls. Operation of the proposed wastewater treatment facility will have the effect of reducing the current pollution loading to the estuary.

4.5.3 In order to determine the likely impacts of the proposed development mathematical modelling of four water quality parameters, BOD, total phosphorous, Kjeldahl nitrogen, and total coliforms in the River Suir and outer estuary was carried out in 1994 (Ref. Appendix A). Parameter levels at selected measurement stations were simulated under eight wastewater discharge regimes. The two regimes most relevant to this report are:

- Load Case 1: 1994 urban (domestic and industrial) wastewater discharges.
- Load Case 3: Treated effluent discharge from wastewater treatment plant (present loads) and partially treated industrial discharge at Grannagh (1994 loads).

Water quality simulations were used to predict parameter levels at the sampling stations given the location of a wastewater treatment outfall pipe north-east of Little Island at the confluence of the Kings and Queens channels. For this report, only total coliform levels are presented since they are most relevant to concerns of the effects of outfall pipe location on commercial shellfish harvesting. Predicted total coliform levels at 10 sampling stations for the two load cases identified above are shown in Tables 4.5.1 and 4.5.2. Sampling station numbers correspond to Figure 4.5.1.

Table 4.5.1

Load Case 1- Total Coliforms (counts/100ml): Summary of predicted conditions at selected stations (95 percentile river flow and neap tides. 12 Hr. T90).

Station	Maximum	Mean	Minimum
Waterford (50)	18300	5393	604
Abbeylands (51c)	23310	7806	4644
Smelting House Point (52)	13790	7538	1182
Giles Quay (53)	10590	5583	874
Little Island (57)	8727	4090	232
Ballymaclode - Kings Channel (55)	8120	4247	738
Glasshouse Quay (59)	4576	1824	55
Cheekpoint Pier (60a)	2328	657	16
Spit Light Passage E. (63)	69	18	1
Duncannon (64)	14	4	0

Table 4.5.2

Load case 3: Total Coliforms (counts/100ml): Summary of predicted conditions at selected stations (95 percentile river flow and neap tides, Goteens Outfall. 24 Hr. T90).

Station	Maximum	Mean	Minimum
Waterford (50)	1117	444	9
Abbeylands (51c)	1196	525	44
Smelting House Point (52)	1275	605	78
Giles Quay (53)	1409	691	165
Little Island (57)	3245	1098	356
Ballymaclode - Kings Channel (55)	868	542	375
Glasshouse Quay (59)	1224	789	143
Cheeckpoint Pier (60a)	860	440	67
Spit Light Passage E. (63)	242	84	8
Duncannon (64)	93	29	3

Comparison of the tables indicates significantly lower coliform levels in the River Suir given the existence of the wastewater treatment plant. Notably, predicted levels at the sampling station immediately downstream of the proposed outfall location, Glasshouse Quay, are lower than predicted levels at this point given present discharge practices. In the areas of interest downstream of this location, predicted coliform values are well within the stipulated EU levels for shell fish and bathing waters and also comply with the corresponding standards recommended in the 1990 Water Quality Management Plan for the Suir/ Barrow/ Nore Estuary.

The predicted coliform levels do not incorporate background levels resulting from non-point runoff and urban discharges not treated by the proposed facility. This is not considered to be a significant deficiency in the model, however, as the majority of discharge emanates from Waterford Main Drainage sources, which are part of the proposed wastewater treatment scheme.

The proposed outfall pipe location at the confluence of the Queen's and King's channels north east of Little Island has greater mixing characteristics than upstream locations which will increase dispersion and assimilation of discharged treated wastewater. The pipe will be placed approximately 6 metres below Mean Low Water Spring. Treated effluent will be dicharged at a temperature slightly higher than that of the river water and therefore once discharged the warmer effluent will rise to the surface of the colder receiving waters resulting in relatively rapid dispersion.

In summary, although there will be short term negative localised impacts associated with the construction of the wastewater treatment plant, collection system and outfall, these will cease on completion of the construction phase. The long term impact of the proposed development will be positive and significant on both a local and regional scale. The construction of the facility will result in the elimination of 24 outfalls of untreated sewage and industrial and their replacement by one controlled treated wastewater outfall. The outfall will be located in an area of the estuary with optimum mixing characteristics. In addition, the provision of a diffuser will allow for discharge of the effluent in a manner which will imperceptibly impact on the local water quality.

4.6 CLIMATE AND AIR QUALITY

4.6.1 Climate

The local climate will not be impacted by location of the wastewater treatment plant at Springfield House site in Belview, Co. Kilkenny.

4.6.2 Air Quality

In general, impacts of the proposed project on air quality will be short-term, localised, and slight.

Operation of construction equipment will result in crankcase emissions, exhaust, and fugitive dust being released. Construction equipment will produce emissions of nitrogen oxides (NOx), hydrocarbons, and

suspended particulates along with limited quantities of sulphur dioxide (SO_2) resulting from the use of diesel fuel. However, the overall amount of emitted pollutants will be low and will imperceptibly negatively impact on ambient air quality. Vegetation clearing and grading may result in occasional dust emissions, especially during dry weather.

4.6.3 Odours

Treatment of urban wastewater including domestic, commercial and industrial discharges has the potential to release odorous gases into the atmosphere. This potential can be practically eliminated within the design of modern wastewater treatment plants. The composition of odorous gases is dependent on the chemical composition of the incoming wastewater. Domestic input is fairly uniform; however, industrial discharges are specific to types of industry.

As part of the detailed Industrial Wastewater Survey (refer to Appendix B), monitoring of wastewater was undertaken to characterise the various industrial discharges to the Waterford Main Drainage Scheme. The results of monitoring indicated that all the industrial wastewaters which will discharge to the proposed treatment facility are biodegradable and do not contain any significant levels of inhibitors to the micro-organism in the activated sludge process. Emission of volatile organic compounds during the treatment of this wastewater will therefore not be significant. Sulphur compounds (H_2S, mercaptens, organic sulphides) represent the majority of odorous molecules typically found in an urban wastewater treatment plant.

With regard to the proposed wastewater treatment plant, the sludge dewatering, primary settlement and screening/screening's treatments have the greatest potential for odour emissions, while the aeration tanks are generally not susceptible to odour emissions.

Air Quality Dispersion Modelling was undertaken for the site using predicted odour emission rates for the proposed plant and climatoloical data for the area. The report is included as Appendix D.

The short-term odour concentrations were computed using the Industrial Sourcxe Complex (KSC 3) air quality gaussian dispersion model developed by the US. EPA. Predicted maximum (worst case scenario) and 99.5%ile (the 43rd highest hourly predicted concentration) short term odour concentrations were established for three scenarios, no covering of the primary settlement tanks, no covering of overflow channels and with the tanks and channels covered. The model predicted, as expected, maximum odour contours of 8.0 o.u./m^3 at the western site boundary of the site with the primary

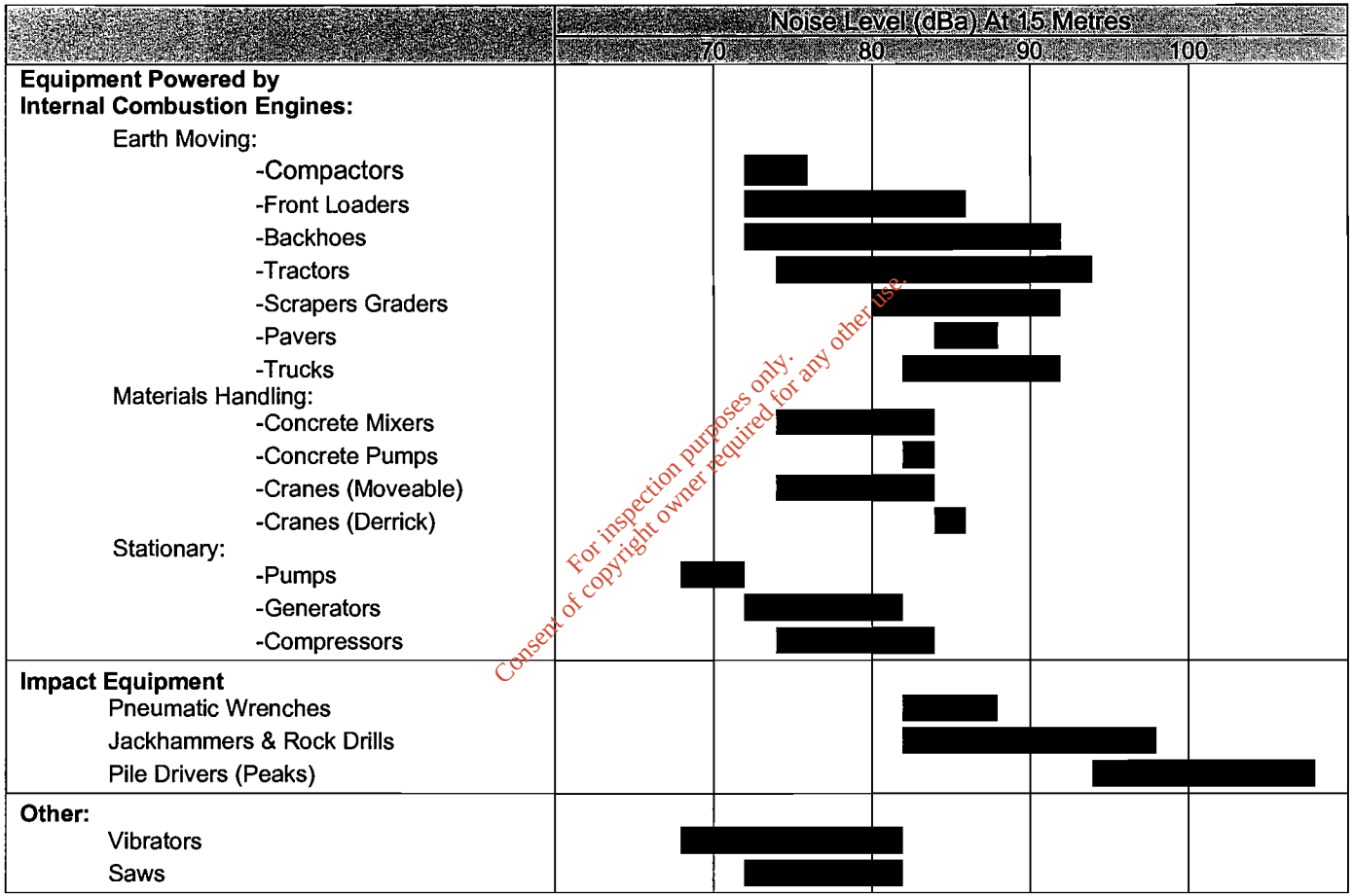
settlement tanks uncovered and contours of 4-5 o.u./m^3 predicted at the nearest resident to the west of the site (Figure 2). The maximum predicted odour contours with the primary settlement tanks covered was 2.5 o.u./m^3 within the site boundary and 1.5 o.u./m^3 at 500 metres from the centre of the site and 1.0 o.u./m^3 at a distance of >500 metres (Figure 4), with the primary tanks covered the 99.5%ile short-term contours predicted a concentration of 0.5 o.u./m^3 500 metres from the centre of the site (Figure 6).

Plant design will incorporate numerous ameliorative measures regarding odour emissions. Treatment facilities at the plant which are susceptible to odour emissions will be covered and the head spaces positively extracted with the extracted gases being treated in suitably designed bioscrubbers prior to discharge to the atmosphere. The results of the Air Quality Dispersion Modelling (Appendix D) clearly show that the proposed wastewater treatment plant will not have an imperceptible impact on the surrounding area from an odour point of view.

4.7 NOISE

Construction of the proposed wastewater treatment plant will cause temporary, localised increases in the ambient sound levels. The specific impact will depend on the method of construction and the equipment used. Noise emission levels for the equipment typically used in wastewater treatment plant construction are shown in Fig 4.7.1.

Figure 4.7.1
Construction Equipment Noises



Source: USEPA 1971
Note: Based On Limited Available Data Samples

Impulsive noise levels during construction may be expected to range from 68 to 95 dBA, (measured from 16 metres) with the occasional exception of impact equipment for blasting, which can yield noise levels up to 105 dBA., however it is not envisaged that blasting will be undertaken during construction of the wastewater treatment plant at the Springfield house site.

The noise levels emitted during construction of the proposed facility will exceed the levels that currently characterise the project area. A noise survey undertaken at the Springfield House site during June 1998 indicated indicate background noise levels of 43.9 to 50.2 Laeq dBA (time averaged measurements) during the day and 37.6 to 40.7 L_{aeq} dBA at night. The aforementioned construction sound levels are noticeably higher. However, acceptable sound levels are generally higher during the daytime than at night.

Activities associated with the operation of the Belview Port located 0.5 km north-east of the site can also impact on ambient noise levels. Complaints related to noise arising from activities at Belview Port have been made to the Environmental Health Section of Kilkenny County Council.

The Environmental Protection Agency noise level guidelines for the boundaries of industrial sites during daytime and night-time are 55dBA and 45 dBA, respectively. Daytime is classified as the hours 08:00 to 22:00 hrs.

The main sources of noise associated with the proposed development are as follows:-

- Screening Equipment
- Compressors associated with grit removal
- Blowers/Compressors associated with aeration equipment
- Gas burning generating equipment (CHP plant)
- Sludge thickening and dewatering equipment.

Other minor sources of noise include:-

- Pumps
- Extraction fans
- Conveyors
- Motors
- Vehicle engines.

All of the major noise sources identified above are to be located within buildings. Furthermore acoustic enclosures around blowers and compressors will reduce the noise at source with the building fabric providing further attenuation. Acoustic louvres are to be provided at

the blower building which will provide attenuation at the air inlet points. With proper equipment specifications and designs for the building fabric, the noise impacts from these sources will not be significant.

The blowers and CHP plant will be the most significant noise sources on site. The CHP plant will most likely only operate during peak demand periods i.e. from 8.00am to 10.00am and from 5pm to 7.00pm.

Manufacturers of blowers and CHP plant have advised that with silencers on the exhaust systems, acoustic louvres on the air intakes and acoustic treatment within the buildings, the sound power level at the nearest boundary of the site can be maintained below the day time and night time noise of 55 dB(A) and 45dB(A) respectively.

Acoustic treatment will be less effective when the buildings are being accessed by plant personnel. However, this will be for short durations and only during day time hours. Further the blower building and the screenhouse have lobbies at the personnel doors to minimise noise escapes from the building.

It is therefore concluded that the overall impact from noise at the boundaries of the site will not be significant and most probably imperceptible.

4.8 LANDSCAPE

4.8.1 Topography

Impacts to the topography of the site will be minimal but long-term as the site will undergo regrading necessary for the construction of various elements of the wastewater treatment plant. The design maintains the existing north-to-south orientation of the present slope, although some limited grading will slightly decrease the change in elevation, this is determined to be insignificant. The ground elevations at the southern boundary of the site will be increased to provide berms associated with landscaping and screening of the site. These modifications are considered to provide a beneficial impact to the proposed development.

4.8.2 Aesthetic Resources

Any alteration to a landscape will have a corresponding impact on the character of the landscape. Aesthetically, the site will sustain a significant and long-term negative impact from the change from an active agricultural field to a wastewater treatment facility. An aerial perspective of the development which is proposed for the site is shown on Plate Nrs. 1 and 2. Plate Nr. 1 shows the development prior to landscaping and planting and Plate Nr. 2 shows the impact of the landscaping proposals.

The Springfield House site forms part of the landscape as viewed from Little Island south of the river. The presence of the proposed wastewater treatment plant will impact significantly on long views of the site from the south. The site is currently surrounded on three sides by a buffer zone of woody vegetation, which is especially thick on the eastern and western boundaries and which will provide screening from views from the south east, east and west. Much of the view of the wastewater treatment plant site from the south will be obscured by the planting and landscaping which is proposed as part of this development. The proposed landscaping plan has been devised in accordance with the recommendations and guideline contained in the Belview Area Action Plan 1997 (as amended May 1998). The proposed extensive camouflage will ultimately permit only the very tops of the taller facility structures (i.e., the digester tanks) to protrude above the vegetation. However, the dominant industrial features on the landscape such as the bright blue cranes at the nearby Belview Port and the two very tall, white smokestacks of the ESB power station located approximately 5 kilometres downstream, and, to a lesser extent, Gorteens Castle approximately 1.2 kilometres north-east of the site, will tend to be the focal points of landscape views. By comparison to these existing structures, the proposed wastewater treatment plant will not be visually obtrusive. Planned port expansion will further draw attention away from the developed site.

View from the North

It is not anticipated that views from the North of the site will be significantly impacted by the presence of the wastewater treatment plant structures. The eastern portion of the northern boundary currently provides an extensive vegetation buffer. In addition, the proposed additional landscaping along this boundary will obscure the proposed buildings (Refer to Plate 2). The tall tanks in the southwest of the site are at a lower elevation and will not be visible from the north.

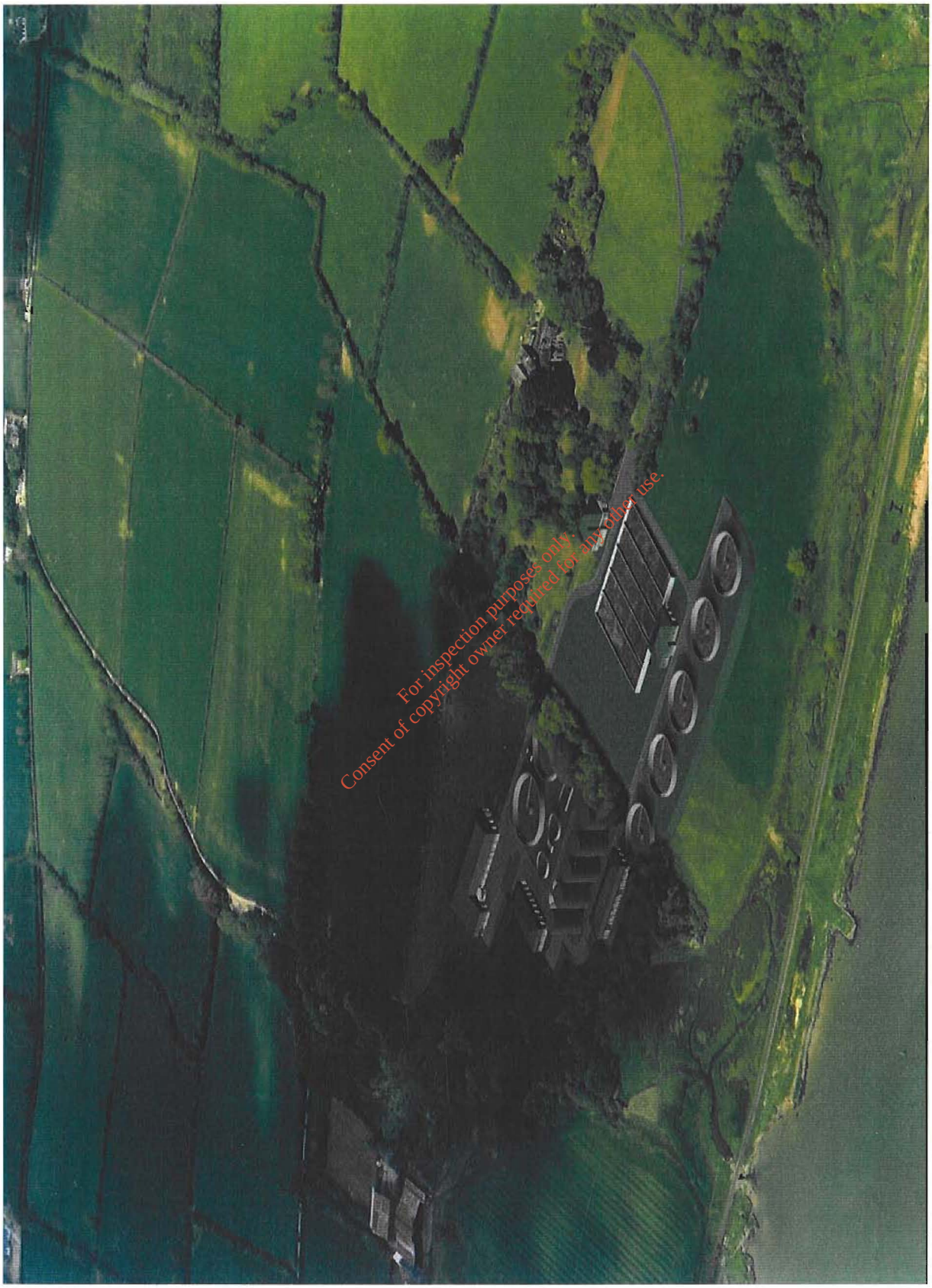


PLATE NR. 1
PROPOSED
AERIAL VIEW

PLATE NR. 2
PROPOSED
AERIAL VIEW

View from the South

Views from across the river to the south of the Springfield House site will be significantly adversely impacted by the presence of a wastewater treatment plant. Significant short terms adverse impacts will arise during the construction phase and prior to the landscaping proposals being implemented (refer to Plate Nr. 3). Once planting has taken place, however, the visual impact will be significantly reduced, as the proposed vegetation will act as a visual buffer, allowing only the taller structures to be viewed above the tree line. The impact will be further reduced as the plantations mature becoming taller and more dense (Refer to Plate 4).

Views from the East

The presence of an extensive boundary of vegetation along the east of the site means that the Springfield House site is currently not visible from this location. Therefore, views from the east will not be impacted by the presence of a wastewater treatment facility at this site. The nearest residence to the site is located to the north east (200 m).

With regard to long views from Blenheim and Faithlegg Golf Club. These views which are located in excess of 1 kilometre from the Springfield House site, are well obscured by extensively developed vegetation. In addition from this distance the Springfield House site represents a visually insignificant component of the view.

Views from the West

There are several residences to the west of the site located at a distance of over 0.5 kilometres separated from the site by two large agricultural fields Vegetation along the western boundary is well developed,. The proposed wastewater treatment plant is to be constructed at a lower elevation on the far side of existing vegetation as viewed from the existing residences. The outline of the proposed structures as they would appear behind the existing vegetation is shown in Plate 5 (Proposed View 02). It is clear that there will be no impact from the proposed development from this view point.

Site Lighting

A further potential impact of the proposed wastewater treatment plant relates to site lighting. The proposed site which is relatively secluded is located in a mainly rural setting albeit that the new port development is located at approx. 0.5km to the north-east. There are two residences in the immediate vicinity of the site 200m to the north east and 300 metres to the north west. The site is also visible along the southern boundary and the access road will be constructed through

PLATE NR. 3
PROPOSED VIEW
FROM Ist TEE

PLATE NR. 4
PROPOSED VIEW
FROM Ist TEE

PLATE NR. 5
PROPOSED VIEW FROM
WEST OF PROSPECT HSE.

elevated ground north of the site. It is not intended to provide site lighting along the access road outside of the boundary of the site. The site lighting proposed for the internal roads will be high intensity low pressure sodium lamp incorporating cut-off hoods to reduce glare and direct the light downwards. Flood lighting installed at plant and equipment is intended only to be utilised during maintenance operations and as such will not have a significant adverse impact. Other ancillary lighting necessary for safe access through the plant will be low intensity lighting. The overall impact of sight lighting on the site is considered to have a slight negative impact from the southern view only.

4.9 CULTURAL HERITAGE

4.9.1 There are no documented occurrences of any archaeologically significant finds on the Springfield House site. The nearest site of archaeological interest is Gorteens Castle located approximately 1.2 kilometres from the site.

Whilst there are no recorded findings of archaeological interest on the site, despite extensive agricultural use, the impacts of the proposed development must be considered in two ways, that is the impacts associated with the known archaeology and the unknown archaeology of the area affected by the development.

The impact of the proposed development on the known archaeology refers to possible disturbance of existing structures such as Gorteens Castle and Springville House associated with excavations for the proposed roadways, buildings, aeration and settlement tanks. Construction of the facility may involve the use of equipment necessary to drill / trench through hard bedrock. This type of equipment has the potential to impact structures within a 30 metre radius. However, given the distances from the house and castle to the nearest below ground structure, any impacts of this type are unlikely.

In any site there exists the potential to impact on buried archaeological sites / artefacts etc., which may have no visible remains above grounds.

It is not proposed to carry out any works to Springfield House. However, the setting of the house in the country environs forms an integral part of the site. Therefore, the proposed development works will impact on the setting of the house, changing it from the original country setting.

The Springfield House site is situated on the northern banks of the River Suir across from Little Island. The River Suir has traditionally

been used as a transportation route. The location of a quay on the south of the site on the river is likely to be associated with Springfield House and the potential for riverine archaeology in this area is likely. However, it is not proposed to undertake any excavation at this area and therefore, no impact to the unknown archaeology (if any) of this site will occur.

4.10 MATERIAL ASSETS

4.10.1 Sustainable Development

The concept of sustainable development in the Waterford area will not be negatively impacted by the location of the wastewater treatment plant at Springfield House. Rather, sustainable development will be promoted.

Implementation of a wastewater treatment facility for the Waterford area will result in improvement in water quality consistent with EU directives. Without such compliance, future development would be limited. Additional wastewater discharges originating from new developments could not be assimilated by the river, thereby necessitating mitigation in order to meet EU standards. The most effective measure to meet these standards is a single wastewater treatment facility for the entire area capable of accommodating present and future wastewater loads.

In addition to allowing additional development with associated economic benefits, the improvement of water quality in the estuary will promote a diverse and dynamic natural ecosystem capable of supporting greater numbers of harvestable fish and shellfish with the potential to result in significant positive economic and ecological benefits.

The location of the wastewater treatment plant specifically at the proposed Springfield House site is sufficiently far downstream to easily service a large catchment around Waterford, yet far enough upstream to leave unaffected the mussel beds and bathing areas at Cheekpoint. Construction of a wastewater treatment facility on this site is also consistent with the development policies of Kilkenny County Council as outlined in the Belview Area Development Plan 1997 (as amended May, 1998). The site is located adjacent to current and planned industrial developments, thereby readily accommodating treatment of wastewater arising from such developments.

Overall, the proposed wastewater treatment facility at Springfield House will have positive, significant impact on sustainable development in the greater Waterford area.

4.10.2 Severance

Construction and operation of the proposed project at Springfield House is not expected to cause significant long-term severance impacts in the site vicinity. Present activities involving the site are restricted to agriculture. Although this activity will clearly be curtailed, activities in the immediate vicinity will be unaltered. Access to surrounding areas including the shoreline and saltmarshes will be unaffected.

Severance impacts related to psychological perceptions may occur. Such impacts are unavoidable in mixed land use areas like the residential, agricultural, and industrial in Gorteens and Belview areas. However, given the design and efficient operation of the proposed facility, noticeable severance impacts are expected to occur only during the construction phase. Operation of the wastewater treatment plant is not expected to create significant severance-related impacts to nearby residences or to the area as a whole.

4.11 INTERACTIONS

The interactions between the various environmental impacts, outlined in this section, have been incorporated in the previous discussions on each individual environmental topic. It is concluded that there are no significant synergistic effects due to these interactions.

The ameliorative measures, which will be undertaken to counteract the significant impacts identified in this chapter, are outlined in Chapter 5.0.

4.12 DO NOTHING SCENARIO

In the case of the proposed wastewater treatment plant at Springfield House, the "Do Nothing Scenario" relates to not constructing a wastewater treatment plant. At present there are 26 points of discharge to the River Suir upstream of the Springfield House site. The present quality of the estuary although generally satisfactory, is unsatisfactory in the vicinity of Waterford City with regard to Total Coliforms and Faecal Coliform counts. As the population of Waterford Borough and Environs would increase, the associated increase in domestic

wastewater loading to the Suir would also increase. Future industrial development in the Waterford / Belview area would also discharge to the estuary. This would result in an overall decline in the quality of the estuary over a period of time with associated impacts on the shellfish and mariculture in the Suir/ Barrow/ Nore estuary. Also, this would contravene the EU Directives relating to water quality.

The provision of the wastewater treatment plant will serve to improve the water quality in the Suir/ Barrow/ Nore estuary. Also, the provision of advanced sludge treatment at the plant, which will serve areas of South Kilkenny, will result in reduced volumes of sludge requiring disposal.

CHAPTER 5 – IMPACT AMELIORATION

5.0 GENERAL

The following chapter details ameliorative measures which may be considered in order to further minimise some of the adverse impacts which have been identified in this document. Some of the suggested measures will depend on factors yet to be determined, such as ground conditions, and as such, may not prove possible. Likewise, engineering and economic factors need to be considered in determining appropriate ameliorative measures.

5.1 HUMAN ENVIRONMENT

No negative impacts are anticipated in terms of employment and economic activity and therefore no mitigation measures are necessary.

Long term negative impacts relate to the loss of potential housing sites for new home construction because of the non desirability of living close to the wastewater treatment plant. There are no short term ameliorative measures which will change public perception concerning wastewater treatment plants which would encourage residential development in close proximity to the site. However, good environmental management practice should be put in place to minimise any potential for environmental nuisances such as noise, odours, etc. Over time, with good plant performance, public perception may change thus encouraging residential development in close proximity to the plant.

The change in present agricultural land use to public utility is an unavoidable impact. Zoning of the general area around Belview Port to Port Related Industrial Use has been incorporated in the Belview Actin Plan 1997 (as amended to May 1998). Impacts to roadways and open spaces resulting from the collection system construction, can be minimised by timely completion of the construction activities.

5.2 FLORA AND FAUNA

The impacts which have been identified in regard to flora and fauna are judged to be minimal and only short term. The loss of habitats will occur during construction and by the permanent removal of some existing hedgerows, woodlands etc. However, the proposed additional landscaping will see a recovery of some of this lost habitat. The most serious potential impact concerns the protection of the existing

estuarine environment, comprising the marsh pools adjacent to the southern boundary of the site. Whilst the proposed permanent works do not constitute a significant negative impact, it is recommended that construction techniques with regard to the outfall pipeline should be scrutinised to avoid any interference with the long term status of the marsh area.

5.3 NATURAL HERITAGE AREAS

The salt marshes adjacent to the site are in the process of being designated "Natural Heritage Areas" (NHA's). The development incorporates a wide buffer zone between the treatment plant and the marsh area and as such negative impacts on these areas are not envisaged. The operation of the treatment plant should include for the proper maintenance of this buffer zone to maintain the status quo.

5.4 GEOLOGY AND SOILS

No adverse impacts are anticipated in regard to these items and therefore no ameliorative measures are proposed.

5.5 HYDROLOGY AND WATER QUALITY

The whole concept of wastewater treatment plant is to improve water quality and hence the proposed development will have an overall beneficial effect with regard to these matters. The design layout of the plant includes for the possible addition of nutrient removal facilities if and when such become statutory requirements. The improvement in water quality etc will depend ultimately on the performance of the wastewater treatment plant. In order to ensure good performance from the plant, an environmental management system together with appropriate and sufficient monitoring equipment, should be incorporated as part of the development.

5.6 CLIMATE AND AIR QUALITY

There would be no impacts in respect of climate change as a result of the proposed development and as such no ameliorative measures are proposed.

The impacts from potential odour emissions have been assessed using computer modelling techniques which indicate that there will not be any adverse impacts concerning odours resulting from this development. Data from the nearest Meteorological Station at

Kilkenny (approx. 40 kilometres to the north of the site) was used in the development of the model to predict the potential impacts. In order to demonstrate the accuracy of the model it is recommended that odour monitoring and odour audits are carried out as part of the monitoring of plant performance. This information can thereby be used to make any further addition/modifications to the plant, to ensure that the predictions of the model are complied with.

Regular maintenance of the odour treatment equipment will also avoid any potential for odour emissions from the plant.

5.7 NOISE

It is not expected that the existing noise levels at the boundaries of the site will be impacted by the proposed development. Equipment manufacturers have advised that equipment noise can be attenuated by acoustic treatment, either at the equipment or within the building fabric which houses such equipment. It is recommended that noise monitoring be included as part of the procedures for commissioning items of plant and equipment installed at the treatment plant. An environmental management plan should be in place with procedures for regular maintenance of plant and equipment. Such regular maintenance will reduce the potential for increases in equipment noise. Regular monitoring of boundary noise levels is also recommended in order to detect any increases in same, such that proactive measures can be taken before nuisance complaints arise.

5.8 LANDSCAPE

The proposed development incorporates a comprehensive landscaping plan which will more than replace any existing plantations which are to be moved as part of the development. The most significant visual impact will be from the views from the south. The proposed berm and landscaping will go some way to obscuring the visual impact of this development. However, in the short term there will be a significant impact on this view until such time as the proposed plantations grow in height and density to provide effective screening. In order to reduce this impact, it is recommended that a number of the proposed tree species are planted as mature trees where possible, taking into account availability and cost.

Dark green has been proposed for above ground tanks and building roofs. This is consistent with the guidelines contained in the Belview Area Action Plan. However dark brown and black are sometimes more effective than green in reducing the visual impact of tall tanks,

buildings etc. Consideration should be given to utilising such colours where appropriate.

The five tall sludge treatment tanks are the tallest structures on the site and will appear above the tree line, even after the proposed landscaping plan has matured. Consideration should be given to partially constructing these tanks below ground. It is recognised that engineering difficulties may be associated with this recommendation, i.e. suitable ground conditions, and economic implications may also be prohibitive. However, this proposal should be investigated at the detailed design stage to further minimise the visual impact.

5.9 CULTURAL RESOURCES

It has been noted that there are no records of findings of artefacts of ecological significance on the site and that there are no visible signs suggesting the potential for such artefacts. However, it has also been noted that there is always a potential to impact on buried archaeological sites and artefacts which are unknown. The proposed development site is in close proximity to Gorteens Castle and Springfield House. Under such conditions it is recommended that a suitably qualified Archaeologist be retained during the construction phase to monitor excavations. Action can then be taken, should any findings of significance be uncovered.

5.10 MATERIAL ASSETS

The proposed development will have a beneficial impact with regard to the concept of sustainable development. The provision of this facility will encourage industrial development within the Belview area and will facilitate the natural expansion of populations in Waterford City and environs. No ameliorative measures are required in this regard.