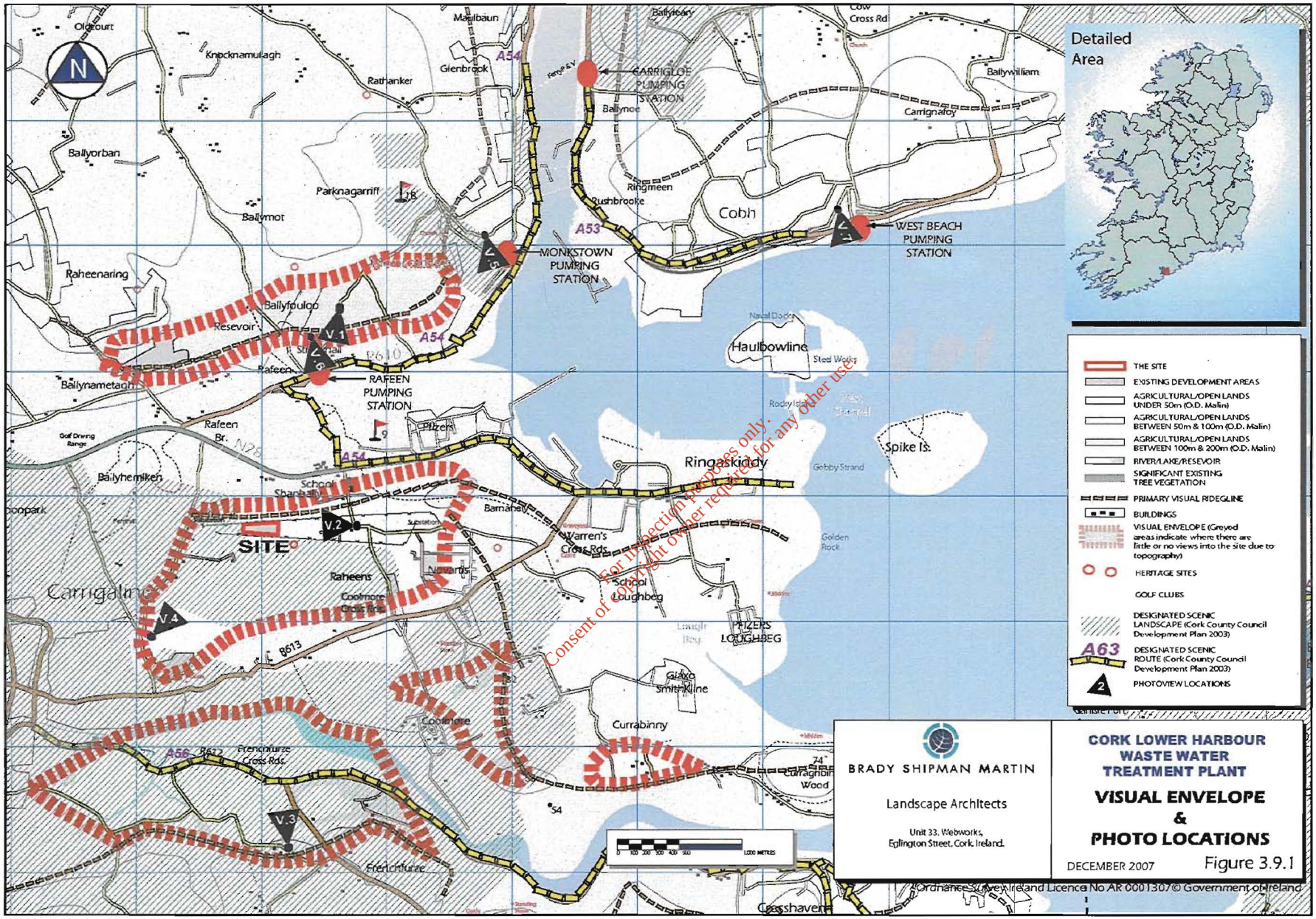
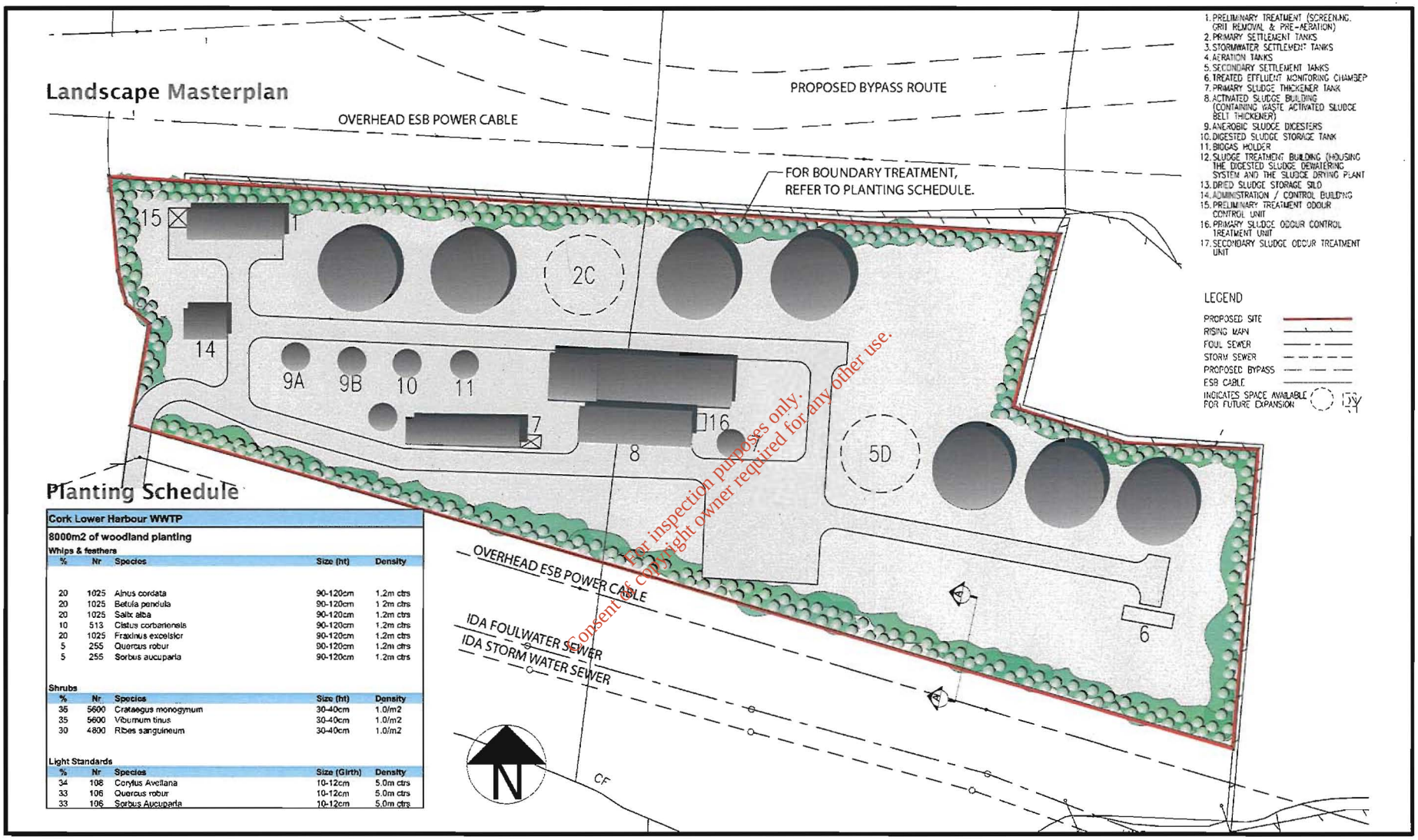


Mott MacDonald

FIGURE 3.9.1 VISUAL ENVELOPE & PHOTO LOCATIONS

CORK HARBOUR MAIN DRAINAGE SCHEME
ENVIRONMENTAL IMPACT STATEMENT
JOB NR. 234541
DRG NR. 5670FG131



Planting Schedule

Cork Lower Harbour WWTP

8000m2 of woodland planting

Whips & feathers

%	Nr	Species	Size (ht)	Density
20	1025	Alnus cordata	90-120cm	1.2m ctrs
20	1025	Betula pendula	90-120cm	1.2m ctrs
20	1025	Salix alba	90-120cm	1.2m ctrs
10	513	Cistus corbariensis	90-120cm	1.2m ctrs
20	1025	Fraxinus excelsior	90-120cm	1.2m ctrs
5	255	Quercus robur	90-120cm	1.2m ctrs
5	255	Sorbus aucuparia	90-120cm	1.2m ctrs

Shrubs

%	Nr	Species	Size (ht)	Density
35	5600	Crataegus monogynum	30-40cm	1.0/m2
35	5600	Viburnum tinus	30-40cm	1.0/m2
30	4800	Ribes sanguineum	30-40cm	1.0/m2

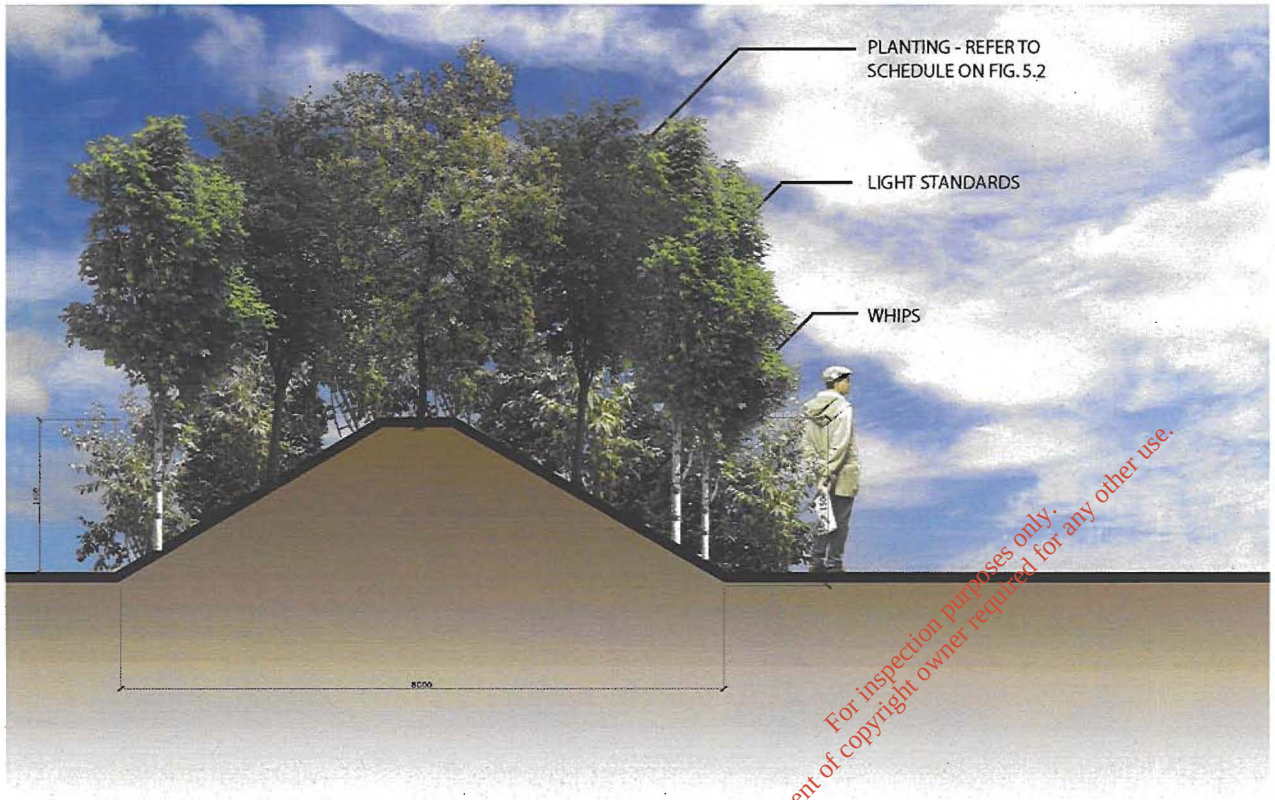
Light Standards

%	Nr	Species	Size (Girth)	Density
34	108	Corylus Avellana	10-12cm	5.0m ctrs
33	106	Quercus robur	10-12cm	5.0m ctrs
33	106	Sorbus Aucuparia	10-12cm	5.0m ctrs

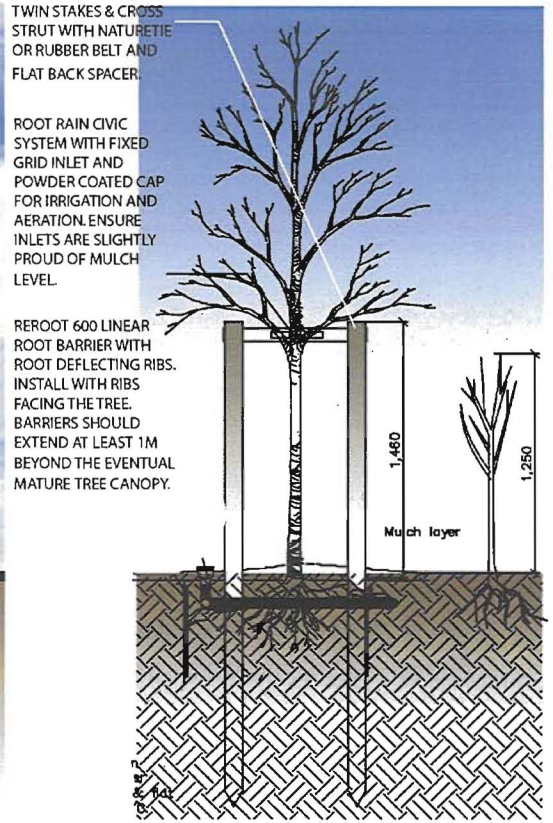
Mott MacDonald

FIGURE 3.9.2 PLANTING SCHEDULE

CORK HARBOUR MAIN DRAINAGE SCHEME
ENVIRONMENTAL IMPACT STATEMENT
JOB NR. 234541
DRG NR. 5670FG132



Section A-A'
Proposed Boundary (5-10 years)

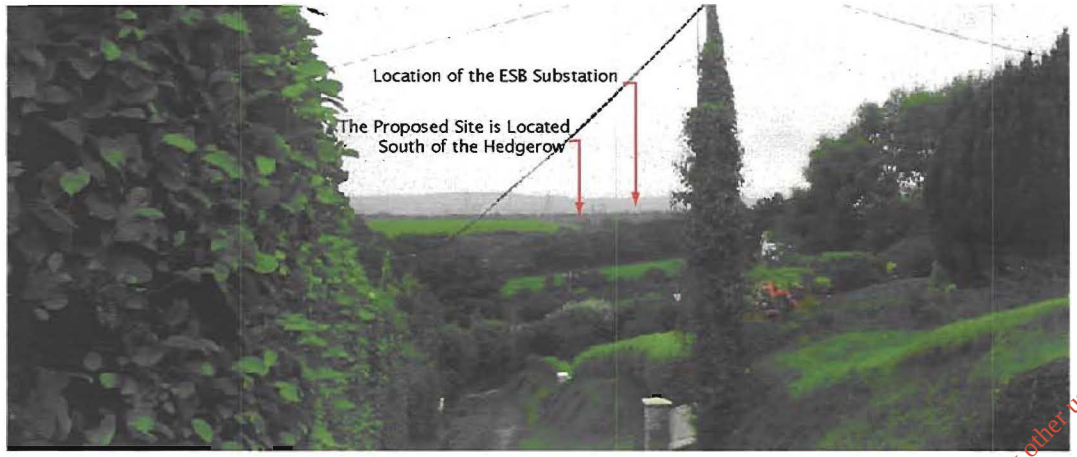


Detail 1
Tree & whip planting

Mott MacDonald

FIGURE 3.9.3 LANDSCAPE PROPOSALS BOUNDARY TREATMENT, SECTION A–A & DETAIL 1

CORK HARBOUR MAIN DRAINAGE SCHEME
ENVIRONMENTAL IMPACT STATEMENT
JOB NR. 234541
DRG NR. 5670FG133



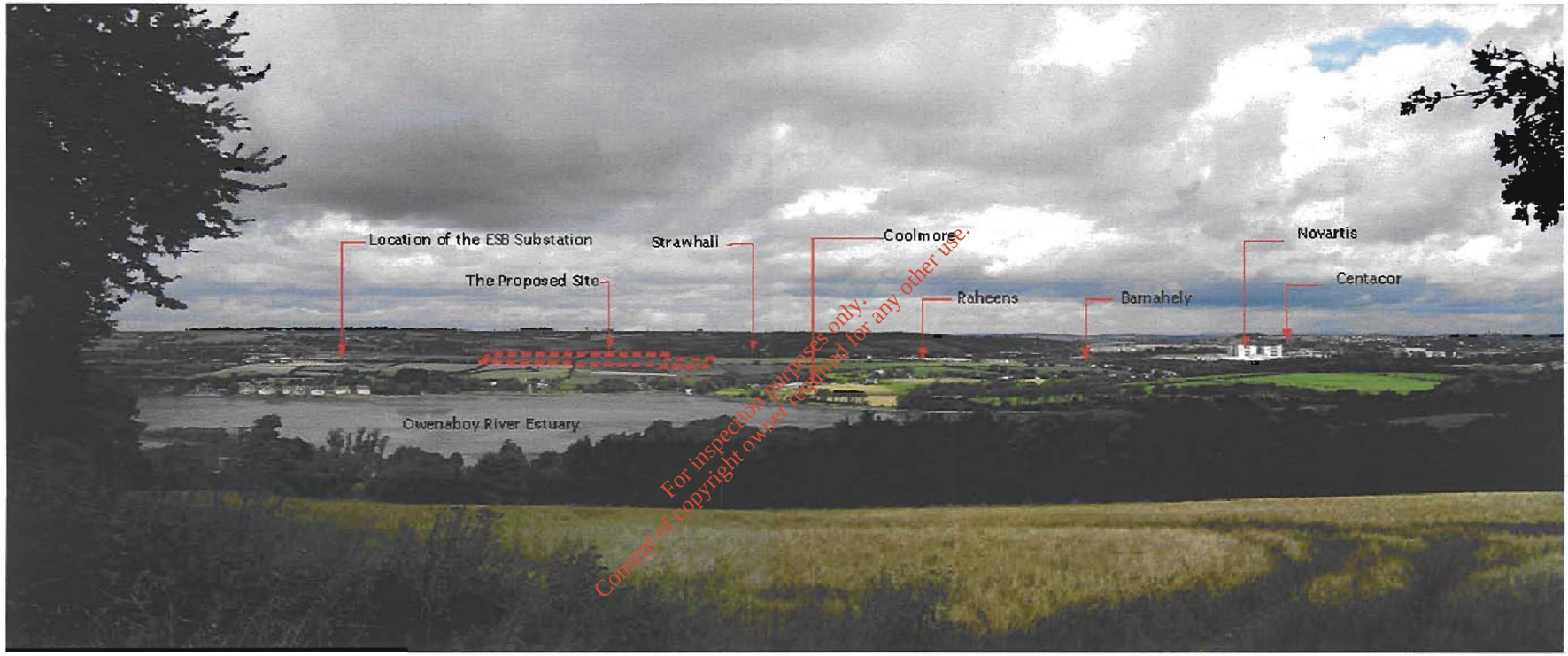
Photograph View 1 - View From the North Towards the Site Which is Barely Visible on the Ridgeline.

Photograph View 2 - View From the East at Raheens/Barnaheely, Local Hedges Screen the Site.

Mott MacDonald

PLATE 3.9.1 VIEW 1 & VIEW 2

CORK HARBOUR MAIN DRAINAGE SCHEME
ENVIRONMENTAL IMPACT STATEMENT
JOB NR. 234541
DRG NR. 5670FG134

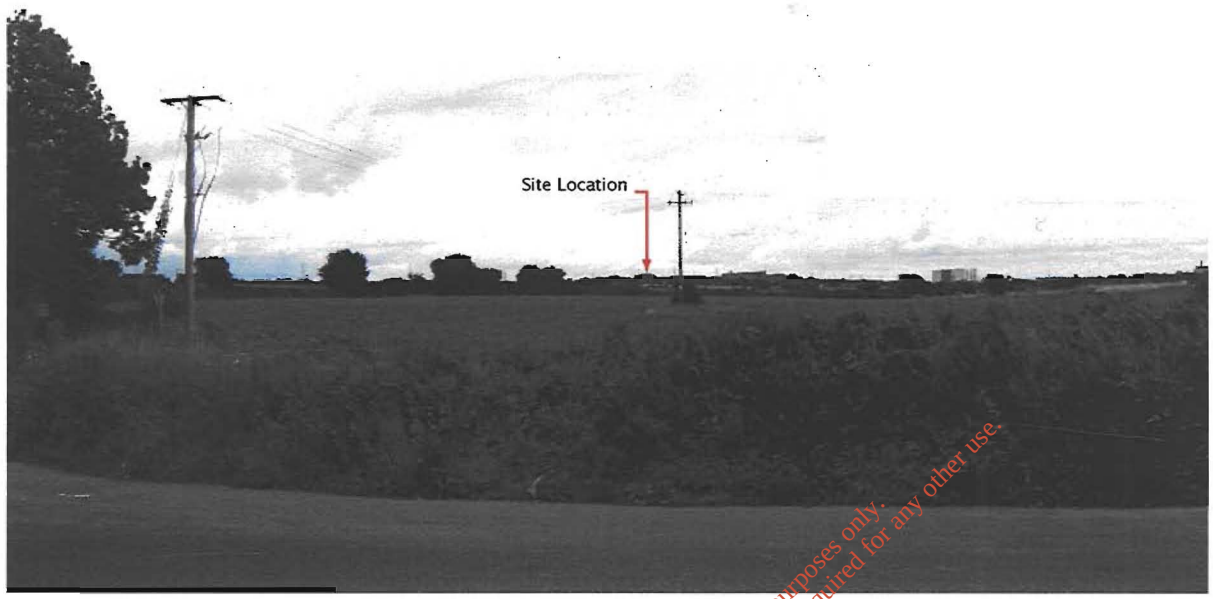


Photograph View 3 - View from the South at Frenchfurze Across the Owenaboy River to the Site
Relevant Local Locations are Highlighted.

Mott MacDonald

PLATE 3.9.2 VIEW 3

CORK HARBOUR MAIN DRAINAGE SCHEME
ENVIRONMENTAL IMPACT STATEMENT
JOB NR. 234541
DRG NR. 5670FG135



Photograph View 4 View from the West at the Eastern Extents of Carrigaline. The Site is Barely Visible Beyond Existing Vegetation

Photograph View 5 - Proposed Location of the Monkstown Pumping Station

Photograph View 6 - Proposed Location of the Rafeen Pumping Station

Mott MacDonald

PLATE 3.9.3 VIEW 4, VIEW 5 & VIEW 6

CORK HARBOUR MAIN DRAINAGE SCHEME
ENVIRONMENTAL IMPACT STATEMENT
JOB NR. 234541
DRG NR. 5670FG136

Photograph View 7 View from the harbour wall at West Beach, Cobh towards the old Post Office Building

Photograph View 8 - View from Pearse Square to the harbour at West Beach, Cobh

Mott MacDonald

PLATE 3.9.4 VIEW 7 & VIEW 8

CORK HARBOUR MAIN DRAINAGE SCHEME
ENVIRONMENTAL IMPACT STATEMENT
JOB NR. 234541
DRG NR. 5670FG137

4 Interactions of the Foregoing

This section describes the interactions between the various impacts identified in the previous sections of the present statement during both the construction and operational phases of the proposed development.

While all environmental factors are inter-related to some extent, the significant interactions and inter-dependencies were taken into consideration by the specialist environmental consultants when drafting their technical reports. Consequently these interactions were integrated into the individual sub-sections in Section 3.0 of this EIS.

A simple matrix method has been used (Introduction to Environmental Impact Assessment, Glasson, Therivel and Chadwick, 1999), in which the environmental components addressed in the previous sections of this statement have been placed on both axes of a matrix, and interactions between the various components have then been identified and given a significance rating. It must be noted that each impact is therefore identified twice in the symmetric matrix (refer to the following Table 4.1 Interaction of Impacts during Construction and Operational Phase).

4.1 Human Beings Interactions

Human Beings and Water Quality

It is expected that during the operational phase the development of development there will be a positive impact on human beings due to the improvement in infrastructure and water quality associated with the development.

Human Beings and Material Assets

During the construction phase of the development, there will be short-term, slight negative impact on human beings, due to increased traffic, short-term nuisance impacts to nearby recreational facilities and natural amenities. Human beings will be positively impacted by the improved resource of Cork Lower Harbour during the operational phase of the development, due to improved water quality which will facilitate continued growth and development in the surrounding towns and villages. The improved water quality will also positively impact the recreational value of the waters, fishing and shellfish production.

Human Beings and Air Quality, Odour and Climate

Due to the scale of the proposed development, neither during the construction phase nor operational phases are impacts identified on climate. As such, consequently there are no envisaged interactions between the regional and local climate with human beings.

The primary interaction between air quality and human beings will be the release of odour from the waste water treatment process and traffic emissions from vehicles travelling to and from the facility. However, on effective implementation of the proposed mitigation measures, no residual impacts to the air quality due to the proposed development are envisaged.

Predicted vehicle exhaust emissions as a result of the average vehicle movements to and for the proposed development will be significantly below the relevant limits, as contained in the national Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002) and indicate an imperceptible air pollution impact as a result of increased traffic volumes.

Odour and pollutant emissions have the potential to cause the nuisance to human beings; however, since there are no significant impacts envisaged in relation to odour due to the proposed development, interactions between odour and human beings are considered to be imperceptible.

Human Beings and Noise and Vibrations

During construction and operation of the WWTP noise levels are predicted to have negligible impacts on human beings. During the construction of the major pumping stations, noise impacts will be slight at the nearest houses, however, should not exceed the NRA 70dB(A) criterion. During construction of the pipelines the noise levels will be typically less than 65dB(A), however, occasionally levels of over 70dB(A) may be reached but only for short periods and therefore residences in close proximity may experience short periods of noise levels over 70dB(A). Impacts from vibration at residences in proximity to pumping stations will be mitigated for by incorporation of suitable vibration isolation as appropriate.

Human Beings and Landscape and Visual Assessment

The proposed development is likely to have slightly or moderately negative impacts on visual amenity in the short term during the construction phase, but no significant medium or long term impacts on the landscape or visual amenity of the area are anticipated.

4.2 Terrestrial and Marine Ecology Interactions

Terrestrial and Marine Ecology and Water Quality

During construction of the marine crossing, increased sedimentation will result in temporary slight impacts on water quality. During the operation of the WWTP and collection system, water quality in Cork Lower Harbour is expected to improve, which will affect the type of organisms present in the water. Species diversity in the Lower Harbour is expected to increase with improved water quality resulting in a moderate positive impact in terms of ecology.

Terrestrial and Marine Ecology and Soils, Geology and Hydrogeology

During the construction phase of the development, the removal of soils and overburden for the construction of the WWTP will result in the loss of some hedgerow and improved agricultural grassland. However, these impacts are deemed slight to imperceptible following the implementation of mitigation measures.

Terrestrial and Marine Ecology and Material Assets

During the construction phase, there will be slight negative impacts on ecology and the natural heritage and natural resources adjacent to construction works. Howerver, the proposed development will result in improved water quality in the Lower Harbour, thus positively impacting on the ecology of the harbour environment. This in turn will have a positive effect on fish and shellfish in the harbour waters. Thus the value of this natural resource will increase during the operational phase of the proposed development.

Terrestrial and Marine Ecology and Air Quality, Odour and Climate

During construction of the WWTP and increase in dust may alter soil and water chemistry, which may have impacts on the composition of plant and invertebrate communities. Dust can have direct impacts on insect and other invertebrate populations. Impacts on plant and invertebrate communities may result in knock-on affects further up the food chain. However, upon the implementation of mitigation measures, impacts of dust on ecology will be temporary and slight.

Terrestrial and Marine Ecology and Noise and Vibration

During construction activities, noise and movement created by people and machinery will generate a certain amount of disturbance to local mammals and birds. The disturbance, if any, is likely to be limited to the construction phase of the proposed development. Birds are able to acclimatise to regular patterns of noise disturbance. However, due to the proximity of some of the works to pNHAs and Cork Harbour SPA, method statements for works along the foreshore and for the marine crossing will be developed in consultation with the NPWS, DAFF and SWRFB. The NPWS will be consulted with respect to the protection of the badger sett to the north east of the WWTP site. It is not anticipated that there will be any significant negative impacts on ecology resulting from the operation of the proposed development.

Terrestrial and Marine Ecology and Landscape

The removal of trees, hedgerow and agricultural grassland will alter the landscape at the WWTP site. However, upon implementation of mitigation measures, the amount of hedgerow to be removed will be minimised and as the proposed screen planting on the northern boundary of the site matures visual impacts will reduce from slight negative to imperceptible.

4.3 Water Quality Interactions

Interactions between water quality and human beings and ecology have previously been discussed in Sections 4.1 and 4.2.

Water Quality and Material Assets

During the construction phase there will be temporary slight negative impacts on water quality in Cork Lower Harbour, due to increased sedimentation, thus temporarily affecting this natural amenity and resource. Cork Lower Harbour is a major natural resource and is used extensively for recreational purposes as well as for fishing and shellfish production and the operation of the proposed development will result in improved water quality in the Lower Harbour thus positively impacting on the recreational and economic value of the harbour.

4.4 Soils, Geology and Hydrogeology Interactions

Interactions between Soils, Geology and Hydrogeology and Terrestrial and Marine Ecology have been previously discussed in Section 4.2.

Soils, Geology and Hydrogeology and Material Assets

The permanent removal of soil and overburden for the construction of the WWTP will result in an imperceptible impact in both a local and regional context, for both the construction and operational phases of the development.

Soils, Geology and Hydrogeology and Air Quality, Odour and Climate

Following the implementation of dust suppression mitigation measures the removal of topsoil and stockpiled material will result in a temporary slight to imperceptible negative impact on air quality (particulates) during the construction phase. No impacts are predicted for the operation phase.

Soils, Geology and Hydrogeology and Landscape

There may be a temporary impact on soils arising from the storage of topsoil material for re-use, the view of which will have a slight negative impact on the landscape. The interaction will be temporary only during the construction phase.

4.5 Material Assets Interactions

Interactions between Material Assets and Human Beings, Terrestrial and Marine Ecology and Water Quality have been previously discussed in Sections 4.1, 4.2 and 4.3 respectively.

Material Assets and Air Quality, Odour and Climate

Dust impacts during construction and odour impacts during the operational phase can cause a reduction in amenity value, in the proximity of developments of this nature. With appropriate design and effective management in addition to the implementation of the mitigation measures, odour and air impacts on recreational and amenity assets is predicted to be imperceptible during both construction and operational phases.

4.6 Air Quality, Odour and Climate Interactions

Interactions between Air Quality, Odour and Climate and Human Beings, Terrestrial and Marine Ecology, Soils, Geology and Hydrogeology and Material Assets have been described in Sections 4.1, 4.2, 4.4 and 4.5 respectively.

4.7 Noise and Vibration Interactions

Interactions between Noise and Vibration and Human Beings and Terrestrial and Marine Ecology have been described in Sections 4.1 and 4.2 respectively.

Noise and Vibration and Cultural Heritage

During the construction phase, the potential exists for the vibration of machinery to negatively impact on nearby extant archaeological features. However, following the implementation of mitigation measures the impact is deemed to be imperceptible.

4.8 Cultural Heritage Interactions

As specified in section 3.8 *Cultural Heritage*, there exists the potential for previously un-recorded findings of cultural heritage value to be discovered during the construction phase of the proposed development. In the event of the excavation of a cultural heritage finding being required, this activity could result in environmental impacts on a number of media, e.g. landscape, terrestrial ecology, marine and aquatic ecology. It is inappropriate at this stage to attempt quantification of these impacts due to the lack of specific information. Cultural Heritage and Noise and Vibration interactions have been discussed in Section 4.7.

Cultural Heritage and Landscape and Visual Assessment

The landscape in general is rich in cultural heritage elements with the most important being Cobh Town with its historic past and protected structures. Construction of the collection system and pumping station at West Beach, Cobh will have a significant negative visual impact on this cultural heritage site. This impact will be mitigated by the appropriate design of the building and the loss of views will be mitigated by improved views from the new public amenity area.

4.9 Landscape and Visual Assessment Interactions

Interactions between Landscape and Visual Assessment and Human Beings, Terrestrial and Marine Ecology and Cultural Heritage have been discussed previously in Sections 4.1, 4.2 and 4.8 respectively.

Table 4.1: Interactions of Impacts during Construction and Operation of Proposed Development

	HUMAN BEINGS		TERRESTRIAL AND MARINE ECOLOGY		WATER QUALITY		SOILS, GEOLOGY AND HYDROGEOLOGY		MATERIAL ASSETS		AIR QUALITY, ODOUR AND CLIMATE		NOISE AND VIBRATION		CULTURAL HERITAGE		LANDSCAPE AND VISUAL ASSESSMENT	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
Human Beings			-	-			-	-							-	-		
Terrestrial and Marine Ecology	-	-													-	-		
Water Quality							-	-			-	-	-	-	-	-	-	-
Soils, Geology and Hydrogeology	-	-			-	-						-	-	-	-	-		-
Material Assets													-	-	-	-	-	-
Air Quality, Odour and Climate					-	-		-					-	-	-	-	-	-
Noise and Vibration					-	-	-	-	-	-	-	-				-	-	-
Cultural Heritage	-	-	-	-	-	-	-		-	-	-	-		-				
Landscape and Visual Assessment					-	-			-	-	-	-	-	-				

LEGEND	
No Interaction	-
Neutral	
Positive	
Imperceptible Negative	
Slight Negative	
Moderate-Significant Negative	

References

Amoore J.E., 1985. *The perception of hydrogen sulfide odor in relation to setting an ambient standard.* California Air Resources Board Contract A4-046-33.

AQUA-FACT, 2005. *Hydrographic Survey and Water Quality Model*, Spiddle, Co. Galway.

Bacon, S. and Carter, D.J.T. 1993. *A connection between mean wave height and atmospheric pressure gradient in the north Atlantic.* International Journal of Climatology 13, 423-436.

Barnes, R.S.K., 1994. *The brackish-water fauna of North-western Europe.* Cambridge University Press.

Blaber, S. J .M., 1997. *Fish and fisheries of tropical estuaries.* Chapman and Hall, London.

Blenkinsop, S. & Fowler, H.J., 2007. *Changes in drought frequency, severity and duration for the British Isles projected by the PRUDENCE regional climate models.* Journal of Hydrology 342: 50-71.

Boelens, R.G.V., Maloney, D.M., Parsons, A.P., Walsh, A.R., 1999. *Ireland's Marine and Coastal Areas and Adjacent Seas: An Environmental Assessment.* Marine Institute, Dublin, Ireland.

Boland, H., and Crowe, O., 2006. *Irish Wetland Bird Survey: Results of waterbird monitoring in Ireland in 2003/04 and 2004/05.* Irish Birds, (8):1.

BS 5228, 1992. *Noise and Vibration Control on Construction and Open Sites.*

BS 4142, 1997. *Rating Industrial Noise Affecting Mixed Residential and Industrial Areas.*

BS 8233, 1999. *Sound insulation and noise reduction for buildings – A code of practice.*

Bus Eireann, 2007. www.buseireann.ie/site/your_journey/cork

Cabanes, C., Cazenave, A. and Le Provost, C., 2001. *Sea level rise during the past 40 years determined from satellite and in situ observations.* Science 294, 840-842.

Callan, B.T., 1993. *Noses Knows Best.* In malodour measurement and control. Proceedings of the International Tydnall School, September. 134-145.

Carrigaline Community Association, 2007. *Carrigaline.* www.carrigaline.ie

CEN, 2003. *EN13725-Air-quality-Determination of odour concentration by dynamic olfactometry.* Brussels, Belgium.

Central Statistics Office, 2002. *Census of Population, Small Area Population Statistics.*

Central Statistics Office, 2007. *Census 2007 - Local Population Report, County Cork*

Charlton, R., Fealy, R., Moore, S., Sweeney, J. and Murphy, C., 2006. *Assessing the impact of climate change on water supply and flood hazard in Ireland using statistical downscaling and hydrological modelling techniques.* Climatic Change 74: 475-491

Church, J.A., Gregory, J.M., Huybrechts, P., Kuhn, M., Lambeck, K., Nhuan, M.T., Qin, D. and Woodworth, P.L., 2001. *Changes in sea level. Intergovernmental Panel on Climate Change Third Assessment Report.* Cambridge: Cambridge University Press, ch.11, pp 639-694.

Clark, R. B., 1997. *Marine Pollution.* 4th ed. Clarendon Press, Oxford.

Cork County Council, 2002. N28 *Cork to Ringaskiddy: Constraints Study Report (Atkins).*

Cork County Council, 2005. *Carrigaline Electoral Area Local Area Plan.*

Cork County Council, 2006. *N28 Bloomfield-Ringaskiddy Traffic Flows and Turning Counts (Paul Castle Consultancy).*

Crowe, O. 2005. *Ireland's Wetlands and their Waterbirds: Status and Distribution.* BirdWatch Ireland, Newcastle, Co. Wicklow.

Cusack, C. Chamberlain, T., Lyons, J. Salas, R., Clarke, D. Devilly, L. McMahon, T. O Cinneide, M.and Silke, J., 2004. *Review of Phytoplankton and Environmental Monitoring 2003. Proceedings of the 4th Irish Marine Science Biotoxin Workshop,* Renvyle, County Galway, 7th November 2003, 3-7.

David J., A., 2006. *Likely sensitivity of bottlenose dolphins to pile-driving noise.* Water and Environment Journal 20 (1), 48-54.

Davies, J. Baxter, J., Bradley, M. Connor, D., Khan, J., Murray, E., Sanderson, W. Turnbull, C. & Vincent, M., 2001. *Marine Monitoring Handbook*, 405 pp. ISBN 1 85716 550 0

Design Manual for Roads and Bridges (DMRB). *Calculation of Road Traffic Noise.*

DOE, 1993. *Report by the Inspector on a Public Inquiry into the Appeal by Northumbrian Water Limited for Additional Sewage treatment facilities on land adjacent to Spitial Burns, Newbriggin-by-the-Sea, Northumberland in March 1993.* DoE ref APP/F2930/A/92/206240.

Dravniek, A., 1986. *Atlas of odor character profiles.* ASTM Committee on sensory evaluation of materials and products, ASTM data series. Baltimore, MD, USA.

Dunlop, N. & Green, P., 1992. *Sea Angling.* Central Fisheries Board Irish Angling Guides. Gill and MacMillan.

E.G. Pettit & Company. *Cork Harbour Main Drainage Scheme Preliminary Report, Volumes 1-5.*

Ehlers, J., 1998. *The Morphodynamics of the Wadden Sea.* Balkema Rotterdam.

Environment Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999).

EPA, 2001. *Odour impacts and odour emission control measures for intensive agriculture.* Commissioned by the Environmental Protection Agency (Ireland). OdourNet UK Ltd.

EPA, 2002. *Guidelines on the information to be contained in Environmental Impact Statements.* Environmental Protection Agency, Wexford.

EPA, 2003. *Advice notes on current practice.* Environmental Protection Agency, Wexford.

EPA, 2006. *Air quality monitoring report Old Station Road.* Environmental Protection Agency, Wexford.

EPA, 2006. *Air quality monitoring report Wexford station.* Environmental Protection Agency, Wexford.

EPA, 2007. *Estuarine and Coastal Water Quality Map.* http://www.epa.ie/downloads

European Society of Clinical Microbiology and Infectious Diseases 16th European Congress of Clinical Microbiology and Infectious Diseases. Nice, France, April 1-4, 2006.

Failte Ireland, 2007. www.failteireland.ie

Fealy, R. and Sweeney J., 2005. *Detection of a possible change point in atmospheric variability in the North Atlantic and its effect on Scandinavian glacier mass balance.* International Journal of Climatology 25, 1819-1833.

Fealy, R., 2003. *The impacts of climate change on sea level and the Irish coast.* In: Sweeney et al. (eds) Climate Change: Scenarios and Impacts for Ireland. Environmental Protection Agency, Wexford

Fossitt, J., 2000. *A guide to habitats in Ireland.* The Heritage Council, Kilkenny.

FSAI (Food Safety Authority of Ireland), 2007. *Live Bivalve Molluscs (Production Areas) (No 2) Designation, 2005.* www.fsai.ie

FSAI (Food Safety Authority of Ireland), 2007. *Molluscan Shellfish Production Areas, Sample Points and Co-ordinates for Biotoxin and Phytoplankton Samples, 2005.* www.fsai.ie

Gibbons, D.W., Reid, J.B. & Chapman, R.A., 1993. *The new atlas of breeding birds in Britain and Ireland: 1988-1991.* T. & A.D. Poyser.

Glynn, D., Tyrrell, L., McHugh, B., Rowe, A., Monaghan, E., Costello, J., and. McGovern, E., 2003. *Trace metal and chlorinated hydrocarbon concentrations in shellfish from Irish waters, 2001.* Marine Institute, Marine Environment and Food Safety Services Abbotstown, Dublin 15.

Hansen, K. and Kristensen, E., 1997. *Impact of macrofaunal recolonisation on benthic metabolism and nutrient fluxes in shallow marine sediment previously overgrown with macroalgal mats.* Estuarine and Coastal Shelf Science, 45, 613-628.

Hayward, P.J., and Ryland J. S., 2005. *Handbook of the Marine Fauna of North-West Europe.* Oxford University Press.

Houghton, J. and Cinneide, M.O., 1976. *Distribution and synoptic origin of selected heavy precipitation storms over Ireland.* Irish Geography 9, 1-8.

Hulme, M., Jenkins, G.J., Lu, X., Turnpenny, J.R., Mitchell, T.D., Jones, R.G., Lowe, J., Murphy, J.M., Hassell, D., Boorman, P., McDonald, R. and Hill, S., 2002. *Climate Change Scenarios for the United Kingdom: the UKCIP02 Scientific Report,* Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia, Norwich, UK. 120pp.

IEA (Institute of Environmental Assessment), 1995. *Guidelines for Baseline Ecological Assessment.* E & FN Spon, London, UK.

IEEM, 2002. *Guidelines for Ecological Evaluation and Assessment.* Institute of Ecological and Environmental Management, Draft Report.

Intergovernmental Panel on Climate Change (IPCC), 2007a. *Climate Change 2007: The Physical Science Basis.* Contribution of Working Group 1 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, UK. (In Press).

Intergovernmental Panel on Climate Change (IPCC), 2007b. *Climate Change 2007: Impacts, Adaptation and Vulnerability.* Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, UK. (In Press).

Intergovernmental Panel on Climate Change (IPCC), 2001. *Climate Change 2001: The Scientific Basis.* Contribution of Working Group 1 to the Third Assessment Report of the Intergovernmental Panel on Climate Change. (Houghton, J.T., Ding, Y., Griggs, D.J., Noguer, M., van der Linden, P.J., Dai, X., Maskell, K. and Johnson, C.A. (eds)). Cambridge University Press, UK. 944pp.

ISA (Irish Sailing Association), 2007. http://www.sailing.ie

ISO 1996, 2003. *Description and Measurement of Environmental Noise*

ISO 9613, 1996. *Attenuation of sound during propagation outdoors*

ISSSW, 2005. 6th *Irish Shellfish Safety Scientific Workshop.* Galway, Organised by the Marine Institute, Food Safety Authority of Ireland and Bord Iascaigh Mhara.

J.A. Baeza, D. Gabriel, J. Lafuente, 2004. *Effect of internal recycle on the nitrogen removal efficiency of an anaerobic/anoxic/oxic (A2/O) wastewater treatment plant (WWTP),* Process Biochemistry 39, 1615-1624

J.P.J. O'Kane, 1980. *Estuarine Water Quality Management with moving element models and optimization techniques.* Pitman, London. Pp155.

JNCC (Joint Nature Conservation Committee), 1993. *Handbook for Phase 1 Habitat Survey.* Joint Nature Conservation Committee, Peterborough, UK.

JNCC (Joint Nature Conservation Committee), 1995. *Guidelines for Selection of Biological SSSIs.* Joint Nature Conservation Committee, Peterborough, UK.

Jones, S.E.a and Jago, C.F., 1993. *In situ assessment of modification of sediment properties by burrowing invertebrates.* Marine Biology, 115, 133-439.

Kelly S., Foley B., Coughlan S., Dunford L., O'Neill H., Smyth B., McKeown P., Lynch M. *Epidemiology and molecular analysis of Norovirus outbreaks in Ireland.* Abstract p1030

Kiely, G., 1999. *Climate change in Ireland from precipitation and streamflow observations.* Advances in water resources 23 141-151.

King, J., 2002. *Investigations of Conservation Fish species in 2001.* Summary Report and Recommendations. Central Fisheries Board. February, 2002.

Kowalski, R., 1955. (English Summary) Untersuchungen zur Biologie des Seesternes Asterias mbens L, in Brackwasser. Kieler Meeresforsch. 11: 201-213

Little, C., 2000. *The Biology of Soft Shores and Estuaries*. Oxford University Press Inc, New York.

Longhurst, P., 1998. *Odour impact assessment of an extension to the Brogborough landfill site*. IREC, Cranfield University, England.

Lowe, J.A. and Gregory, J.M., 2005. *The effects of climate change on storm surges around the United Kingdom.* Phil. Trans. R. Soc. A 363, 1313-1328.

Mackenzie, B.R. & Schiedek, D. 2007. *Daily ocean monitoring since the 1860s shows record warming of northern European seas.* Global Change Biology 13:1335-1347.

Martin, J., 2002, *De-Watering the Lower Feale - "A Virtual Water World"*, Ph.D. Thesis,

McElwain, L., and Sweeney J., 2006. *Implications of the EU Climate Protection Target for Ireland.* Co Wexford, Ireland: Environmental Protection Agency, pp 33.

McGrath, R., Nishimura, E., Nolan, P., Semmler, T., Sweeney, C. and Wang, S., 2005. *Climate Change: Regional Climate Model Predictions for Ireland.* Environmental Protection Agency, pp 45.

McIntyre, A., 2000. *Application of dispersion modelling to odour assessment; a practical tool or a complex trap*. Water Science and Technology, 41 (6). 81-88.

MERC Consultants, 2006. *A compilation report of information on Irish aquaculture (with a view to key programs during the years 2000 to 2006)* Marine Institute, Bord Iascaigh Mhara and Taighde Teo.

Minchin, D., 2003. *Monitoring of Tributyl Tin contaminations in six marine inlets using biological indicators.* Marine Institute, Marine Environment and Food Safety Services, Parkmore Industrial Estate, Galway.

Morrisey, D.J., 1998. *Differences in effects of grazing by deposit feeders Hydrobia ulvae (Pennant) and Corophium arenarium (Crawford) on sediment microalgal populations. 1. Qualitative differences.* Journal of Experimental Marine Biology & Ecology, 118, 33-42.

Murphy, C. and Charlton R., 2006. *Climate change impact on catchment hydrology and water resources for selected catchments in Ireland.* Proceedings of the National Hydrology Seminar 2006: Water Resources in Ireland and Climate Change Available online at http://www.ria.ie/committees/pdfs/hydrology/Murphy.pdf (last accessed 23-08-2007)

National Roads Authority, 2004. *N28 Cork to Ringaskiddy Project - Emerging preferred route corridor.* Public Consultation December 2004.

National Road Authority, 2004. *Guidelines for Treatment of Noise and Vibration in National roads Schemes.*

National Roads Authority, 2007.
www.nra.ie/NetworkManagement/TrafficCounts/MeasurementofTrafficFlowonNationalRoads/

NERC (Natural Environment Research Council), 2007. *The ecology, behaviour and ecosystem effects of the estuarine infaunal ragworm Nereis diversicolor.* NERC Reference: NER/S/A/2006/14028

NIWA Science, 2007. *Effect of increased suspended sediment on suspension-feeding shellfish*. Water and Atmosphere online publication, Vol. 10 No. 4.http://www.niwascience.co.nz/pubs

Office of Environmental Health Hazard Assessment (OEHHA), 2000. *Air Toxics Hot Spots Program Risk Assessment Guidelines. Part III. Technical Support Document for the Determination of Non-cancer Chronic Reference Exposure Levels.*

Olaffson, E.B., 1986. *Density dependence in suspension-feeding and deposit-feeding populations of the bivalve on infaunal recruitement Macoma balthica.* Marine Ecology Press Series, 55, 171-179.

Orford, J.D., 1988. *Alternative interpretation of man-induced shoreline changes in Rosslare Bay, southeast Ireland.* Transactions of the Institute of British Geographers 13 65-78.

OSPAR, 2000. *Quality Status Report 2000 Region III- Celtic Seas.* OSPAR Commission, London, UK.

OSPAR, 2000b. *Quality Status Report 2000.* OSPAR Commission, London, UK.

O'Connor, D.W., Allen J.H., Golding, Howell, Kieberneicht, L.H., Nothern, K.H., & Recker, J.B ., 2004. *The Marine Habitat Classification for Britain and Ireland Version 04.05* JNCC, Peterborough.

O'Kane, J.P.J., & Barry, K. J., *Modelling the Norovirus contamination of an oyster farm in Cork Harbour, Final Report to Cork County Council.*

O'Leary, G., Meaney, B. and Carty, G., 1997. *Urban Wastewater Discharges in Ireland with a Population Equivalent Greater Than or Equal to 2000: A Report for the Years 1994 and 1995.* Report by the Environmental Protection Agency, Ardcavan, 33pp.

Passage West Town Council, 2007. *Passage West and Monkstown.* www.passagewestmonkstown.ie

Pommepuy, M. *et al.*, 2006. *Faecal contamination in coastal waters: An engineering approach*, in Oceans and Health: Pathogens in the Marine Environment. Springer. http://www.springerlink.com.

Pommepuy, M. *et al.*, 2004. *Sewage impact on shellfish microbial contamination.* Water Science and Technology. Vol. 50, No. 1 pp 117-124. IWA publishing.

Quigley, D.T.G., and O' Connor, W., 1997. *Specimen marine fish from the Southwest Region of Ireland (1955-1996).* A report to the Marine Natural Resources Division, Regional Technical College, Tralee. August.

Raine, R., 2003. *Harmful Algal Blooms.* The Irish Scientist yearbook, 2003. The Martin Ryan Institute, NUI Galway. http://www.irishscientist.ie.

Reynolds R L, Kamper RL., 1984. *Review of the State of California Ambient Air Quality Standard for Hydrogen Sulfide (H2S). Lakeport (CA): Lake County Air Quality Management District.*

Richardson, J.W., C.R. Greene Jr., C.I. Malme, and D.H. Thomson, 1995. *Marine mammals and noise.* Academic Press, San Diego, California.

Sea angling, 2007. http://www.sea-angling-ireland.org/shore

Sheridan, B.A., 2002. *In house odour intensity and hedonic tone profile data of different odourous sources.* Unpublished.

Sheridan, B.A., 2001. *Controlling atmospheric emissions-BAT Note Development,* UCD Environmental Engineering Group, Department of Agricultural and Food Engineering, UCD, Dublin 2.

Sheridan, B.A., Hayes, E.T., Curran, T.P., Dodd, V.A., 2003. *A dispersion modelling approach to determining the odour impact of intensive pig production units in Ireland.* Bioresource Technology. Published.

Shorthouse, C. and Arnell, N., 1999. *The effects of climate variability on spatial characteristics of European river flows.* Physics and Chemistry of the Earth 24, 7-13.

Smiddy, P., O'Hallloran, J., Coveny, J.A., Leonard, P.G., and Shorten, M., 1995. *Wintering waterfowl populations of Cork harbour: an update.* Irish Birds (5): 285-294.

Smith, J. A., 1994. *The Operational Storm Surge Model Data Archive*, Proudman Oceanographic Laboratory, Report, No 34, 34pp

Stace, C., 1997. *New flora of the British Isles.* Cambridge University Press, London.

Suchanek, T.H., 1986. *Mussels and their role in structuring rocky shore communities.* In P.G. Moore and R Seeds (eds), The ecology of rocky coasts, 70-96. New York. Columbia University Press.

Sweeney, J. and O'Hare, G., 1992. *Geographical variations on precipitation yields and circulation types in Britain and Ireland.* Transactions of the Institute of British Geographers 17, 448-463.

Sweeney, J., 1985. *The changing synoptic origins of Irish precipitation.* Transactions of the Institute of British Geographers 10, 467-480.

Sweeney, J., 2003. *Climate change: scenarios and impacts for Ireland.* Environmental Protection Agency, pp 229.

TALuft Air Quality Guidelines, 2002. *Federal Air Pollution Control Act* (*"Bundes–Immissionsschutzgesetz"*).

Tchobanoglous, G.; Burton, F.L. and Stensel, H.D., 2003. *Wastewater Engineering: Treatment and Reuse*/Metcalf & Eddy Inc. 4th Ed./Revised.

Toner, P., Bowman, K., Clabby, K., Lucey, J., McGarrigle, M, Concannon, C., Clenaghan, C., Cunningham, P., Delaney, J., O'Boyle, S., MaCarthaigh, M., Craig, M., and Quinn, R., 2005. *Water Quality in Ireland 2001-2003.* Environmental Protection Agency, Wexford.

Tsimplis, M.N., Woolf, D.K., Osborn, T.J., Wakelin, S., Wolf, J., Flather, R., Shaw, A.G.P., Woodworth, P., Challenor, P., Blackman, D., Pert, F., Yan, Z. and Jevrejeva, S., 2005. *Towards a vulnerability assessment of the UK and northern European coasts: the role of regional climate variability.*

VDI 2119, 1986. *Measurement of Dustfall Using the Bergerhoff Instrument (Standard Method).*

Venstrom P, Amoore JE., 1968. *Olfactory threshold in relation to age, sex or smoking.* J Food Sci., 33:264-265.

Warwick, R. M., 1986. *A new method for detecting pollution effects on marine macro-benthic communities.* Marine Biology, 92, 557-562.

Waters, A., *et al.,* 2006. *Molecular epidemiology of Norovirus strains circulating in Ireland from 2003 to 2004.* Epidemiol. Infect., Page 1 of 9. Cambridge University Press. http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=420336#

Webb, D. A., Parnell, J. & Doogue, D., 1996. *An Irish Flora.* Dundalgan Press, Dundalk

Wentworth, C. K., 1922. *A scale of grade and class terms for clastic sediments*; Journal of Geology, 30: 377-392.

Widdows, J., Lucas, J.S., Brinsley, M.D., Staff, F.J., 2002. *Investigation of the effects of current velocity on mussel feeding and mussel bed stability using an annular flume.* Springer Berlin / Heidelberg 1438-387X (Print) 1438-3888 (Online) Vol 56, No. 1, 3-12.

Woolf, D. K., Challenor, P.G. and Cotton, P.D., 2002. *The variability and predictability of North Atlantic wave climate.* Journal of Geophysical Research. 107, 3145.

World Health Organization, 2003. *WHO Guidelines for safe recreational water environments Volume 1 Coastal and Fresh waters.* Geneva: World Health Organization.

World Health Organisation, 1999. *Guidelines for Community Noise.*

World Health Organization, 1981. *Hydrogen sulfide. Environmental Health Criteria No. 19.* Geneva.