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**Local Government (Water Pollution) Act , 1977.
(Water Quality Standards for Phosphorus) Regulations, 1998.**

Phosphate Measures Report - December, 1999.

Dublin Corporation River Catchments :

E.P.A. Hydrometric Area 09

**C2 : River Camac
D1 : River Dodder
S1 : River Santry
T1 : River Tolka**

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Phosphate Measures Report
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Section 1

Background

1.1 Introduction

Article 4(2) of the Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998, requires that local authorities submit a report to the E.P.A. setting out measures to be taken to secure compliance with the standards set by the Regulations.

In summary, these Regulations require :

1. Maintenance of Q indices deemed satisfactory ($Q > 4$) by the E.P.A.
2. Improvement of unsatisfactory Q indices ($Q < 4$) at river sampling locations where biological surveys have been carried out by the E.P.A. during (or after) the 1995-1997 monitoring period.
3. Submission of a Measures Report detailing measures required to improve stretches of rivers classified as unsatisfactory by the E.P.A.
4. Submission of subsequent reports on implementation of the measures identified, the proposed phosphate monitoring programmes, progress made on reduction of phosphate levels and improvements in Q values. These reports are due on 31/07/00 and at least every 2 years following, until 31/07/08.

The E.P.A. assesses biological water quality in rivers using the Q-index which is based on the abundance and diversity of benthic macro-invertebrates. The following rivers in the Dublin Corporation area (E.P.A. Hydrometric Area 09) were surveyed by the E.P.A. in the 1995 - 1997 period and provide baseline Q data for the phosphate measures report :

| | |
|-------------------|-----------------|
| C1 - River Camac | (2 locations) |
| D1 - River Dodder | (2 locations) |
| S1 - River Santry | (2 locations) |
| T1 - River Tolka | (1 location) |

No biological monitoring of the Rivers Liffey, Poddle and Finglas was carried out by the E.P.A. in the Dublin Corporation area in the 1995 - 1997 period so these catchments are not for consideration in the current measures report.

The E.P.A.'s "Water Quality in Ireland" 1995 - 1997 report was issued in early June, 1999. A total of 43 sampling stations in the Dublin County were biologically surveyed during this 3-year period, 7 of which were in the Dublin Corporation area.

The surveys were carried out on 1 date in the 3 year period at sampling locations on the rivers Camac (2), Dodder (2), Santry (2) and Tolka (1). All 7 sampling stations had unsatisfactory Q values (< 4) on the date of survey.

Of the 43 river sampling stations surveyed in the Dublin County area, 10 had satisfactory biological ratings ($Q > 4$) and 33 had unsatisfactory biological ratings ($Q < 4$).

No lakes in the Dublin County area were assessed by the E.P.A. for baseline trophic status. There is therefore no reporting of phosphate control measures required for lakes in this report.

Dublin Corporation carries out physicochemical monitoring of rivers and streams in its area on a routine basis. 6 main river catchments are surveyed - the Liffey, Dodder, Camac, Poddle, Tolka and Santry. All Central Laboratory monitoring data for these catchments is submitted to the E.P.A. for the preparation of National Water Quality reports. Phosphate data for the baseline establishment period is included in the E.P.A.'s amended Statistical Compendium of River Quality Data for the 1995 - 1997 period.

An environmental management approach is to be extended to phosphate reduction in the 4 catchments identified in the Dublin Corporation area. This is detailed in the following report.

1.2 Physical Background

Dublin Corporation occupies an area of 117.2 square kilometres, situated in a low-lying area centred on the Liffey Valley and bounded by the lands of Fingal County Council to the north / north-west, South Dublin County Council to the west / south-west and Dun Laoghaire Rathdown County Council to the south / south-east. The Liffey Estuary and Dublin Bay lie to the east. See Map 1.

All rivers in the Corporation area flow towards Dublin Bay and most are influenced to some degree by its daily tidal variations. All major rivers flow into the Dublin Corporation area from the surrounding Dublin local authority areas, some from the neighbouring counties of Meath, Kildare and Wicklow as indicated in Table 1. The largest areas of river catchment for the Liffey, Dodder, Camac and Tolka lie outside the Dublin Corporation catchment areas.

The majority of the existing phosphate load in these rivers therefore arises outside the Corporation area. Phosphate concentrations at the Corporation border confirm this fact. See Section 2 - Current Water Quality Status.

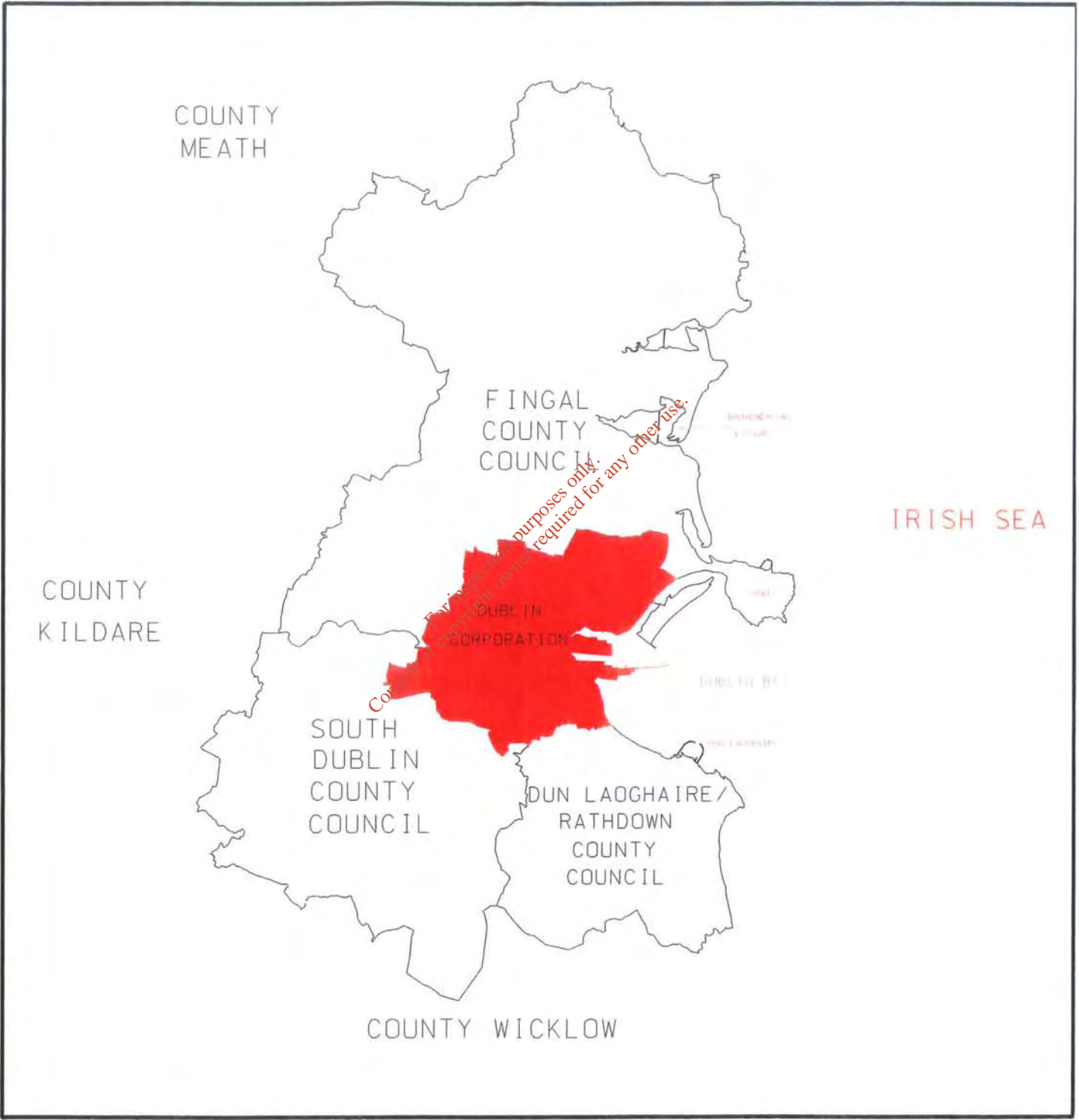


Table 1. Main River Catchments - Dublin Corporation Area.

| River | Source County | Passing Through County | Catchment Area in Other L.A.'s (km²) | Catchment Area Dublin Corporation (km²) |
|--------------------------------------|----------------------|--|--|---|
| Liffey* * U/S Islandbridge | Wicklow | Kildare Meath Fingal South Dublin | 1100* (98%) | 22* (2%) |
| Dodder | Wicklow | South Dublin Dun Laoire Rathdown | N/A | N/A |
| Camac | Wicklow | South Dublin | N/A | N/A |
| Tolka | Meath | Fingal | 128.8 (85%) | 22.7 (15%) |
| Santry | Fingal | - | N/A | N/A |
| Poddle / Tymon | South Dublin | - | N/A | N/A |

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Population Centres

The 1996 population of the Dublin Corporation area is given as 480,996 with a density of 4,104 per square kilometre.

The bulk of Dublin Corporation's 117.2 square kilometres is urban development - domestic and industrial (including Port and Docks activities).

Exceptions include 14 square kilometres of parkland areas - including the Phoenix Park, St. Anne's Park, Herbert Park, North Bull Island, Fairview Park, Tolka Valley Park, Ringsend Park and Lansdowne Valley Park.

The number of industrial estates listed in the Ordinance Survey of Ireland's 1995 Dublin Street Guide is 162 with activities ranging from light through to heavy industry. Some 250 trade effluents are licensed by Dublin Corporation to discharge trade effluent to the foul sewerage systems under the Water Pollution Act, E.P.A. I.P.C and Waste Management Acts. 5 licences to discharge trade effluents to waters cater for cooling water discharges to the River Liffey and the Liffey Estuary. Industry types covered include Electricity Generation, Laundries, Garages and Engineering Workshops, Printers and Photographic Studios, Food Processors (including brewers), Electroplaters and Metal Workers, Pharmaceutical and Chemical manufacturers, Hospitals and Laboratories, Leisure Industry and Waste Processors. No significant agricultural activities are carried on within the Dublin Corporation area.

Water Resources

Water resources in the Dublin Corporation area include 3 designated bathing areas - Dollymount, Sandymount and Merrion Strands, the Liffey and Tolka estuaries and Dublin Bay for a range of coastal recreational activities, the freshwater stretches of the Liffey, Dodder, Camac, Tolka, Santry, Finglas and Poddle rivers and the Grand Canal (and Dock) and Royal Canal for inland aquatic amenities including fishing

The Port and Docks Board control the economic activities of goods import and export through the Liffey Estuary. Passenger and cargo ferry terminals are located in the inner estuary.

The water services infrastructure serving Dublin Corporation's population includes a primary wastewater treatment plant and sludge treatment plant at Ringsend, an independent untreated sewage system serving the North Dublin Catchment and a comprehensive sewerage system. These facilities are all being upgraded in the next few years to comply with the Urban Wastewater Treatment Regulations, 1994.

Drinking water resources include a comprehensive distribution network feeding potable water from Ballymore Eustace, Roundwood, Ballyboden and Leixlip treatment plants via reservoirs located in the South Dublin, Fingal and South Dublin County Council areas.

The main river catchments in the Corporation area are those of the Liffey, Dodder, Tolka and Santry. Sub-catchments of the Liffey in the area include the Rivers Camac and Poddle. Sub-catchments of the Tolka in the area include the River Finglas and the Claremont Stream. Smaller catchments include those of the Kilbarrack Stream, Blackbanks Stream, River Nanniken and River Wad (which discharge direct to Dublin Bay via the North Lagoon at Bull Island and the Tolka Estuary) and the Elm Park and Booterstown Streams which discharge directly to Dublin Bay

There is no current usage of groundwater resources in the Dublin Corporation area. While the local authority drinking water supply is currently abstracted from surface water sources outside the Dublin Corporation area, it is possible that city groundwater resources may be required for future usage. There is currently no systematic groundwater quality monitoring programme in place in the Dublin Corporation area. City groundwater is vulnerable to pollution mainly caused by accidental spillages, pipeline and underground bulk liquid tank failures. Contaminated groundwater is present on some industrial sites due to poor historical disposal practices. This is dealt with on a case by case basis by Dublin Corporation and/or the E.P.A. during the planning procedure when such sites are being redeveloped. Groundwater phosphorus contamination has not yet been identified.

Abstraction of surface and groundwaters currently listed in the Water Pollution Act Register are tabulated below (Table 2).

The main significant natural aspects that influence water quality in the Dublin Corporation area are due to geographic location. Dublin is centred on the Liffey Estuary and Dublin Bay so rivers discharging to the Estuary and Bay are affected to variable degrees by tidal exchanges. The freshwater flow in the River Liffey is controlled to a large degree by the E.S.B. at Golden Falls and Leixlip where the River is dammed for electricity production.

Climatic aspects that influence water quality can be isolated to rainfall. In periods of heavy rainfall surface water drainage is largely road-runoff. Foul sewer overflows are also triggered to a large degree by heavy rainfall in the relevant catchments. Average annual rainfall in the Dublin area is in the range 666mm to 814mm (as supplied by Met Eireann). The rainfall pattern is of course seasonal. Wind direction in the Dublin area is predominantly from the west / south west.

The Dublin Regional Authority area covers the 4 Dublin local authorities. This area covers the immediate hinterlands of bordering counties which share the catchments of the Rivers Liffey, Dodder, Tolka, Santry, Camac and Poddle / Tymon with Dublin Corporation. Activities in Fingal, South Dublin and Dun Laoire Rathdown County Council areas have very immediate effects on water quality in the Dublin Corporation catchment.

Table 2. Water Pollution Act Register of Abstractors

| Name | Source | Water Type | Normal Volume (m3/day) | Maximim Volume (m3/day) |
|------------------------|-----------------|------------|--------------------------|---------------------------|
| Elm Park Golf Club | Elm Park Stream | S/W | 2 | 20 |
| R.D.S., Ballsbridge | Well | G/W | 9 | 180 |
| C & C, Ballyfermot | Well | G/W | 655 | |
| Royal Dublin Golf Club | Well | G/W | 12 | 55 |
| Smurfit, Clonskeagh | River Dodder | S/W | 1520 | 1740 |
| Hanlon Seafood | Well | G/W | 34 | 94 |
| Clontarf Golf Club | Well | G/W | 14 | 91 |
| E.S.B., Poolbeg | Liffey Estuary | S/W | Variable | 1250000 |
| E.S.B., Alexandra Rd. | Liffey Estuary | S/W | 102272 | |
| A.Guinness, D.8. | Well | G/W | 4545 | 5454 |
| Gateaux | Well | G/W | 95 | 232 |
| Glasnevin S.S. | Well | G/W | 3 | 13 |
| Ballygall S.S. | Well | G/W | 2 | 3 |
| St.Mary's Laundry | Well | G/W | 5 | 10 |
| Reheis, Kilbarrack | Well | G/W | 295 | |
| Ballyfermot S.S. | Well | G/W | 4 | 8 |
| Leo Labs., Crumlin | Well | G/W | 227 | 409 |
| Artane S.S. | Well | G/W | 5 | 10 |
| G.E.S.I., Clonshaugh | Well | G/W | 150 | 250 |
| G.E.S.I., Clonshaugh | Well | G/W | 270 | 350 |

S/W = surface water

G/W = ground water

Section 2

2. Current Status of Water Quality

2.1 Rivers

4 river catchments in the Dublin Corporation area are currently covered by the 1998 Regulations - the Rivers Camac, Dodder, Santry and Tolka.

Summary data and plots of current water quality status in terms of phosphate concentrations / Q indices and catchment maps are included as appendices for each river as follows :

- Appendix 1 : River Camac
- Appendix 2 : River Dodder
- Appendix 3 : River Santry
- Appendix 4 : River Tolka

Q values

Table 2.1 summarises the current biological water quality status in terms of Q values at the 7 locations surveyed by the E.P.A. in 1996.

All 7 locations are classified as unsatisfactory ($Q < 4$) by the E.P.A.

Phosphate P

Plots of median phosphate P concentrations at each sampling location in the local authority monitoring programmes for 1995 - 1997 are presented in each Appendix listed above. These demonstrate river phosphate P concentrations moving downstream through each local authority area.

Median phosphate concentrations did not increase significantly within the Dublin Corporation area in the Rivers Camac and Tolka. Median phosphate concentrations did increase in the Dublin Corporation area in the Rivers Dodder and Santry. Measures are needed to reduce phosphate inputs to the Rivers Dodder and Santry in the Dublin Corporation area as a matter of priority.

2.2 Lakes

No lakes in the Dublin County area were assessed by the E.P.A. for baseline trophic status. There is therefore no reporting of phosphate control measures required for lakes in this report. Table 2.2 is not applicable at present.

ANNEX C - TEMPLATE TABLES

SECTION 2: CURRENT STATUS OF WATER QUALITY

Table 2.1: Summary of Current Status of River Water Quality in Functional Area

| River Name | River code | Biological Monitoring Station Code | Station Location Name | Existing Quality | Is existing quality satisfactory? (yes/No) |
|------------|------------|------------------------------------|---------------------------|------------------|--|
| Camac | 09C02 | 0400 | Kylemore Road Bridge | 1 | No |
| | | 0500 | Emmet Road | 1-2 | No |
| Dodder | 09D01 | 0620 | Bridge Springfield Avenue | 3 | No |
| | | 0800 | Millway Bridge | 3 | No |
| Santry | 09S01 | 0300 | Clonshaugh | 2 | No |
| | | 1100 | Bettyglan | 2-3 | No |
| Tolka | 09T01 | 1100 | Violet Hill Drive | 3 | No |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

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2.3 Groundwaters

No groundwater routine phosphate monitoring data is available for the Dublin Corporation area to date. Compliance with the recommended phosphate limit (20ug/l P) cannot therefore be assessed.

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Section 3

3. Pressures on Water Quality

In summary median phosphate concentrations at the Dublin Corporation borders with neighbouring county councils were elevated. The 1995 - 1997 baseline median phosphate concentrations at the border of the functional area were as tabulated below.

| River | Median Phosphate 1995 - 1997 (mg/l P) Dublin Corporation Border | Neighbouring Local Authority |
|--------|--|---|
| Camac | 0.280 | South Dublin County Council |
| Dodder | 0.062 0.062 | South Dublin County Council Dun Laoire Rathdown County Council |
| Santry | 0.066 | Fingal County Council |
| Tolka | 0.310 | Fingal County Council |

Measures are required to be taken by all 3 adjoining local authorities to reduce phosphate P inputs within their areas and also by Meath County Councils for the River Tolka catchment to reduce phosphate P concentrations at the Meath border with Fingal County Council.

3.1 Point Source Inputs of Phosphate P

Key point source inputs of phosphate P have been identified in the 4 river catchments as follows :

River Camac : Saggart Sewage Treatment Works in South Dublin County Council
(treated effluent outfall and storm water overflow)
Wastewater overflows to surface waters in South Dublin
Misconnections to surface waters in South Dublin

Wastewater overflows to surface waters in Dublin Corporation
Misconnections to surface waters in Dublin Corporation

River Dodder : Tallaght Stream tributary in South Dublin County Council
Wastewater overflows to surface waters in South Dublin
Misconnections to surface waters in South Dublin

Slang tributary in Dun Laoire Rathdown County Council
Little Dargle tributary in Dun Laoire Rathdown County Council
Wastewater overflows to surface waters in Dun Laoire Rathdown
County Council (Farrenboley Surface Water)
Misconnections to surface waters in Dun Laoire Rathdown

Tributary from Bushy Park Pond in Dublin Corporation
Wastewater overflows to surface waters in Dublin Corporation
Misconnections to surface waters in Dublin Corporation

River Santry : Wastewater overflows to surface waters in Fingal County Council
Misconnections to surface waters in Fingal County Council

Nanniken Diversion tributary in Dublin Corporation
Wastewater overflows to surface waters in Dublin Corporation
(Clonshaugh Industrial Estate and Coolock Industrial Estates)
Misconnections to surface waters in Dublin Corporation

River Tolka : Major source between Dunboyne Rd. Bridge U/S Clonee and Clonee
Bridge in Meath County Council
Agricultural point sources in Meath County Council
Wastewater overflows to surface waters in Meath County Council
Misconnections to surface waters in Meath County Council

Agricultural point sources in Fingal County Council
Wastewater overflows to surface waters in Fingal County Council
Misconnections to surface waters in Fingal County Council

Finglas River tributary in Dublin Corporation
Wastewater overflows to surface waters in Dublin Corporation
Misconnections to surface waters in Dublin Corporation

Phosphate Detergent Usage

Domestic and industrial wastewaters contain phosphates which are broadly classified as ortho-phosphates, condensed (pyro-, meta-, poly-) phosphates and organically bound phosphates. Ortho-phosphates are major constituents of many commercial cleaning products and are also used extensively as boilerwater treatment chemicals.

The Irish Detergent and Allied Products Association (I.D.A.P.A.) have provided information showing current phosphate content of typical household detergents to be in the range 30.00 % to 40% w/w in non-phosphate free market leader products.

Domestic sewage in the Dublin Corporation area contained a median ortho- phosphate concentration of 4.38 mg/l P during 1998 (N = 156) with a range of 1.06 mg/l P to 8.48 mg/l P. Wastewater overflows to rivers via the surface water system and misconnections of washing machines / dishwashers to the surface water system are the main phosphate inputs to rivers within the Dublin Corporation area, and a significant input in the surrounding local authority areas.

The loading of phosphate P from these inputs has not yet been quantified. Data is required on the frequency, duration, and flows of active overflows in the catchment so that P input loads can be estimated. Misconnections form a more chronic phosphate input. Identification and diversion of misconnections to foul sewers require systematic survey and monitoring programmes in each river catchment area.

3.2 Diffuse Sources of Phosphate P

Landspreading

Agricultural activities are insignificant within the Dublin Corporation area. Dublin Corporation maintains 116 parks, occupying some 14 square kilometres (including the Bull Island) many of which contain active sporting areas where grass maintenance is required. Landspreading of nitrogen and phosphate fertilisers takes place on some of these areas on a seasonal basis (mainly June to August). The Parks Department of Dublin Corporation operates a controlled approach to fertiliser application as grasslands are non-productive. Slow release phosphate fertilisers (8% P) are applied where necessary. Nitrogen fertilisers are far more essential for grass maintenance than phosphate fertilisers and are therefore more widely used. Runoff to surface waters from parklands is therefore considered to be minimal. Soil P testing has been carried out on some of these lands on an occasional basis.

Septic Tank Percolation Areas

Most of Dublin Corporation area is serviced by sewerage systems. The number of isolated septic tanks in the area is regarded as insignificant in terms of overall inputs of phosphate P to percolation areas discharging to groundwaters and / or surface waters.

Section 4

4. Standards to be Achieved by 31/12/2007

4.1 Standards Table

Table 4.1 sets out targets for Q values and Median ortho-phosphate P for the 7 river sampling locations requiring measures to be taken to reduce phosphate concentrations.

4.2 Monitoring

The existing 7 monitoring locations will require additional monitoring to ensure a minimum of 10 phosphate results per year as required by the Regulations. A 4-weekly sampling of the 7 locations is one of the measures proposed to supplement phosphate data and monitor progress. Existing full river monitoring programmes will continue.

4.3 Compliance Date Extension

As compliance with target phosphate concentrations at these sampling locations is largely outside the direct control of Dublin Corporation, and dependent on major engineering works (upgrading of sewage treatment plants and sewerage catchment systems) it may be necessary to request an extension of the final compliance date (31st.December, 2007) for target median phosphate P concentrations. This is provided for under Article 3.9 of the 1998 Regulations.

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SECTION 4: STANDARDS TO BE ACHIEVED BY 2007

The Tables set out here are identical to those for Section 2 with the exception that a column is added for the standard to be achieved by 2007.

Table 4.1: River Water Quality Standards to be Achieved by 2007

| River Name | River code | Biological Monitoring Station Code | Station Location Name | Existing Quality | Is existing quality satisfactory? (Yes/No) | Standard to be Achieved by 2007 |
|------------|------------|------------------------------------|--------------------------|------------------|--|---------------------------------|
| Camac | 09C02 | 0400 | Kylemore Road Bridge | 1 | No | Q 3 / 70ug P / l |
| | | 0500 | Emmet Road | 1-2 | No | Q 3 / 70ug P / l |
| Dodder | 09D01 | 0620 | Bridge, Springfield Ave. | 3 | No | Q 3-4 / 50ug P / l |
| | | 0800 | Milltown Bridge | 3 | No | Q 3-4 / 50ug P / l |
| Santry | 09S01 | 0300 | Clonsaugh | 2 | No | Q 3 / 70ug P / l |
| | | 1100 | Bettyglen | 2-3 | No | Q 3 / 70ug P / l |
| Tolka | 09T01 | 1100 | Violet Hill Drive | 3 | No | Q 3-4 / 50ug P / l |
| | | | | | | |
| | | | | | | |
| | | | | | | |

5. Programme for Implementation

5.1 Standards Summary

Table 5.1 (Standards Summary Table) has been completed for the 4 river catchments.

5.2 Measures Lists

General measures :

Table 5.2 lists general measures to be taken in the Dublin Corporation area to reduce annual median phosphate P over the 8 years covered by the Regulations. Appendices 1A/ 2A/3A and 4A list specific measures to be taken in each of the 4 river catchments.

The environmental management approach will be implemented as applicable by Dublin Corporation. As many of the measures involve completion of major engineering works, both within and adjoining the functional area, the principle of *continual improvement* implicit in environmental management will be replaced by *phased improvement* in the case of Dublin Corporation. In general phased or stepped improvements in water quality will quickly follow completion of engineering works.

(1) Planning, Control and Enforcement Measures

A Draft Water Quality Management Plan has been prepared by M.C.O'Sullivan Consulting Engineers for the River Tolka (March, 1995). The water quality standard set for phosphate in the WQMP was 0.20 mg/l (as PO_4), equivalent to 0.065 mg/l (as P). This will need amending to an annual median phosphate concentration of < 0.05 mg/l P to be complied with by 2007 as set by the Regulations

Water Quality Management Plans should be prepared for the Rivers Camac, Dodder and Santry which include the relevant phosphate P and Q target values.

Control of trade effluent discharges containing phosphates will be implemented primarily using licensing under the Water Pollution Act and the consent system under the E.P.A. IPC licensing system and Waste Management Act.

Enforcement measures will be taken if licence conditions are exceeded. As detailed previously, only 5 discharges to waters waters were licensed in the Dublin Corporation area during the 1995 to 1997 period. All of these discharge to the River Liffey and the Liffey Inner Estuary. 4 discharges are high volume cooling water discharges and 1 is a low volume trade effluent. As the River Liffey does not require measures under this report, and the discharges concerned are not phosphate containing, section 4 discharges in the Dublin Corporation area are not prioritised for measures in this report.

Table 5.1 Standards Summary Table

| Part of River, Lake or Part of Lake | Current Quality Status | Satisfactory/ Unsatisfactory | Standard to be achieved by 2007 (or interim standards where they might apply such as immediate/short/medium term) |
|-------------------------------------|------------------------|------------------------------|---|
| 09/C/02 Camac | Q 1 / Q 1-2 | Unsatisfactory | Q 3 and < 70 ug P / l by 31/12/2007 * |
| 09/D/01 Dodder | Q 3 | Unsatisfactory | Q 3-4 and < 50 ug P / l by 31/12/2007 |
| 09/S/01 Santry | Q 2 / Q 2-3 | Unsatisfactory | Q 3 and < 70 ug P / l by 31/12/2007 |
| 09/T/01 Tolka | Q 3 | Unsatisfactory | Q 3-4 and < 50 ug P / l by 31/12/2007 * |

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* Extension of compliance date may be required under Section 3.9

Table 5.2: Implementation Programme Summary Table - Dublin Corporation General Measures

| Statement | Measures | Targets | Actions | Timeline | Responsible for Implementation |
|--|---|--|--|--|---|
| To improve the Camac, Dodder, Santry and Tolka to the targets required by 2007 | Encourage the usage of phosphate free detergents in the Dublin Regional area | Reduce P inputs from overflows / misconnections within the Dublin Corporation and Dublin Regional area | Public Awareness Campaign needed. Best carried out nationally by the D.O.E.L.G. and/or E.P.A. | 1999 to 2007 | D.O.E.L.G. E.P.A. |
| | Recruit scientific staff to implement the additional workload demanded by the Regulations | Report to the E.P.A. on progress as required by the Regulations by deadlines given | Prepare follow-up reports to the E.P.A. on measures implementation, water quality changes and target compliances | 1999 to 2007 | Central Laboratory |
| | Set up a river flow database using EPA calibrated hydrometric data | Prepare P inputs / P loadings for each catchment | Request EPA hydrometric data Prepare river P load data | 1999 to 2007 | E.P.A. Drainage Design Pollution Control Central Laboratory |
| | Set up a Rivers and Groundwaters G.I.S. for Dublin Corporation and the Dublin Region | Itemise P input locations graphically | Set up a River / Groundwater Quality GIS database with each river and aquifer catchment as a specific module | 1999 to 2007 | Pollution Control Central Laboratory Information Systems Section Drainage Design |
| | Upgrade foul sewerage system capacity Rathmines/Pembroke and North Fringe Projects | Reduce overflows from foul to surface water systems | Upgrade foul sewerage systems to comply with Urban Wastewater Regulations and avoid hydraulic overloads | 1999 to 2007 1999 - 2004 1999 - 2002 | Drainage Design |

Phosphorus Regulations - EPA Guidance on Preparation of Measures Repo

| Standard | Measures | Targets | Criteria | Timeframe | Responsible for Implementation |
|------------------------|--|--|--|--------------|---|
| General measures cont. | Implement phosphate control in new licences and reviews for trade effluents to sewers and waters | Reduce phosphate P in wastewaters and receiving waters | Identify phosphate P in existing discharges to sewers and waters Apply limits to achieve target values in receiving waters where relevant | 1999 to 2007 | Pollution Control Central Laboratory |
| | Liaise with all stakeholders identified on a regular basis | To co-ordinate measures and achieve targets set by 2007 | Set up a "Phosphate Measures Group" with representatives from all stakeholders identified | 1999 to 2007 | Dublin Corporation |
| | Prepare Water Quality Management Plans for the Rivers Camac, Dodder, Santry. Review WQMP for the River Tolka | Catchment Management including phosphate measures / targets | Appoint Steering Groups | 1999 to 2004 | Dublin Corporation South Dublin C.C. DunLaogire Rathdown C.C. Fingal C.C. |
| | Supplementary River P monitoring programs | Assess P status for future reports and audits. Assess measures progress | Monthly sampling programme | 1999 to 2007 | Pollution Control Central Laboratory |
| | Misconnection survey programme to begin | Reduce P inputs to rivers | Survey housing estates and redirect misconnections | 2000 to 2007 | Pollution Control Central Laboratory |
| | Additional "Q" index monitoring programme | Determine current status Monitor measures effects | Biological surveys | 2000 to 2007 | E.P.A. |

By contrast, some 250 existing trade effluent discharges, licensed under the Water Pollution and E.P.A. Acts, will require measures to include phosphate limits, where relevant. The measures will consist of phosphate limit inclusion in all new licences and consents issued in the catchments of the 4 rivers concerned, and phosphate limit inclusion (where relevant) in all reviews of licences and consents.

(2) Consultative and Co-operative Measures

The Stakeholders Group identified for the purposes of implementing the phosphate measures will include representatives from the following bodies :

Dublin Corporation
South Dublin County Council
Dun Laoire Rathdown County Council
Fingal County Council
Meath County Council

Central Fisheries
Eastern Regional Fisheries Board

I.D.A.P.A. (Irish Detergents and Allied Products Association)
I.B.E.C.
Teagasc

(3) Monitoring Measures

River Catchments

Rivers and their tributaries are routinely monitored by Dublin Corporation. The test suite used has always included phosphate P. To comply with the monitoring and reporting requirements of the Regulations, a new specific phosphate monitoring campaign has been commenced (August 1999) at / near the 7 sampling stations used by the E.P.A. for Q monitoring. Monthly samples will be taken and monitored for phosphate P to monitor progress and prepare an annual median phosphate P value for each location for the next report due (July 2000)

Flow measurements will be compiled in a new database for each of 4 river monitoring stations used by Drainage Design section. A new flow monitoring station has been recently agreed with the E.P.A. Hydrometric Section for the River Santry.

Q value surveys are necessary during the 1999 - 2000 reporting period at the 7 sampling points used by the E.P.A. The last surveys in the Dublin Corporation area were carried out in 1996. Additional Q value surveys are required throughout the term of the current Regulations.

Algal and weed identification and quantification is also required in each of the 4 river catchments.

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3.1 Surface Water Inflows

A systematic programme of surface water P monitoring must be carried out in the 4 river catchments requiring measures. This will detect misconnections of foul wastewaters (particularly washing machine and dishwasher misconnections) to the surface water systems. A pro-active diversion campaign must follow identification of misconnections. This will reduce point source inputs of phosphate P within the Dublin Corporation area.

3.2 Overflows from Foul to Surface Water Sewers

A systematic programme of overflow monitoring will be carried out in the 4 river catchments requiring measures. Overflows have been itemised on each river catchment map and each of these will be monitored to establish their frequency and duration. Priority must then be given to upgrading the foul sewerage system so that hydraulic capacity is adequate and overflows are minimised. The following measures are necessary :

1. Remove surface water drainage from existing foul sewerage systems in the 4 river catchments. This will maximise existing hydraulic capacity for foul wastewaters and minimise foul wastewater overflows to surface waters. This is current Corporation policy.
2. Increase foul sewerage capacity in the 4 river catchments by physically upgrading the size of the network to projected capacity requirements. This is required under the 1994 Urban Wastewater Regulations and has already been commenced e.g. North Fringe / Northern Interceptor Sewer, Rathmines and Pembroke study.
3. Install monitors on each overflow identified and monitor frequency and duration of overflows. It is intended that this be carried out in the future.

This will reduce point source inputs of phosphate P within the Dublin Corporation area.

(4) Public Education and Advisory Measures

It is likely that a National campaign to educate and advise the general public on phosphate reduction is the best option. Radio and television campaigns highlighting the effects of phosphate on surface waters, rivers and groundwaters should be initiated by the D.O.E.L.G. and the E.P.A. Domestic, agricultural and industrial phosphate sources should be highlighted for minimisation. The co-operation of each citizen should be targeted.

(5) Financial Measures

A large capital budget is necessary to upgrade the foul sewerage system in the Dublin Corporation and surrounding county council areas. This will be covered under the Urban Wastewater Regulations. Emphasis, to date, has been concentrated on the upgrading of sewage treatment works and sludge treatment works (Dublin Bay Project). Emphasis now needs to be shifted to provision of adequate sewerage systems.

A monitoring budget needs to be allocated by Dublin Corporation to the implementation of the general and specific measures listed in this report. Funding will be required for computer / G.I.S. systems, analytical equipment, river flow and overflow monitoring equipment, analytical and executive scientific staff and sampling staff. Funding will be required to prepare water quality management plans for 3 of the 4 catchments and to review the plan prepared for the River Tolka in 1995.

Funding will be required to carry out algal / weed identifications and quantification in each of the 4 catchments. Detailed internal budgets will be prepared by the sections involved in the implementation of the proposed measures.

Consideration shall be given to applications for funding for the new monitoring programmes required as measures under section 29 of the Water Pollution Act.

(6) National Agri-Environmental and Other Measures

Agri-environmental measures are required in the adjoining local authority areas. As reported above Dublin Corporation does not have significant agricultural activities within its functional area. R.E.P.S. uptake has been poor in the greater Dublin regional area with only approximately 10% uptake to date. Farm surveys in the 4 river catchments should be reviewed in the adjoining local authority areas in the light of the targets set for phosphate in surface waters.

Section 2 Appendices - Current Water Quality :

Appendix 1 - River Camac

Appendix 2 - River Dodder

Appendix 3 - River Santry

Appendix 4 - River Tolka

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River and Code : **CAMAC**
 Tributary of : Liffey
 OS Grid Ref : N 137 343

09/C/02
 OS Catchment No: 168

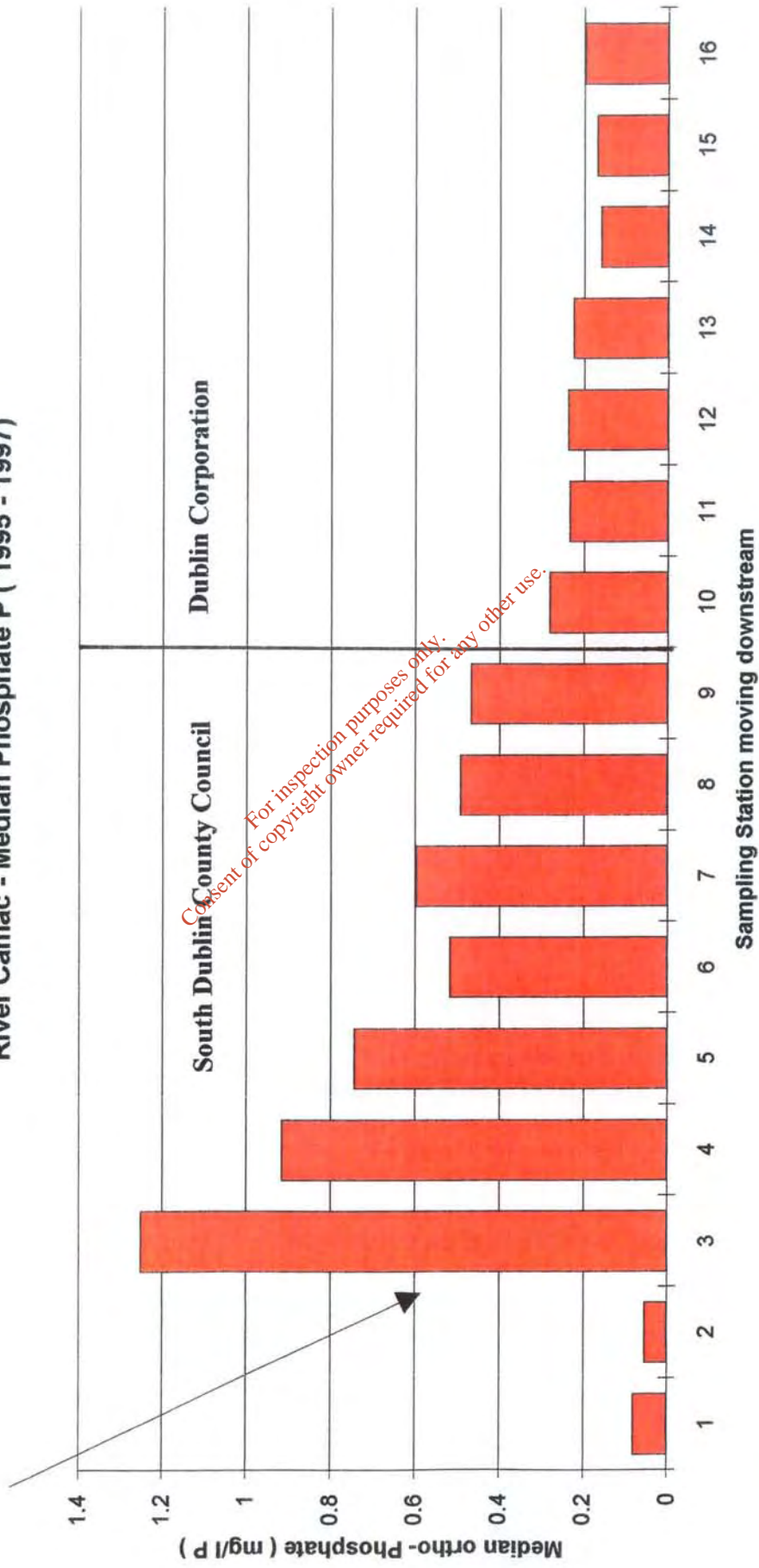
| Sampling Stations No. | Biological Quality Ratings (Q Values) | | | | | | | | | | | | | | |
|-----------------------|---------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 1971 | 1974 | 1977 | 1979 | 1981 | 1983 | 1984 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1994 | 1996 |
| 0040 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0100 | 5 | 5 | 5 | 4-5 | 4-5 | 3 | 4-5 | 3 | - | 4 | - | - | 4 | - | 4 |
| 0150 | - | - | - | - | - | - | - | - | - | 4 | - | - | 4-5 | - | - |
| 0160 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0180 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0200 | 3-4 | 3 | 3 | 3-4 | 3-4 | 3 | 3 | 2-3 | - | 2 | 2/0 | 2 | 2 | 2 | 2 |
| 0280 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0300 | 1 | - | 1/0 | 1/0 | 1/0 | 3 | 3 | 1/0 | 3 | - | - | - | - | - | - |
| 0310 | - | - | - | - | - | - | - | - | - | 2-3 | 2-3 | 3 | 3 | - | 2-3 |
| 0330 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0350 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0380 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0400 | - | - | - | - | 1/0 | 2/0 | 1 | 3 | 1 | 2-3 | 1 | 1 | 2 | 1 | 1 |
| 0440 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0450 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0455 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0500 | - | - | - | - | 1/0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2/0 | 1/0 | 1-2 |
| 0600 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0700 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| No. | Location | No. | Location |
|------|----------------------------------|------|--|
| 0040 | Just d/s Brittas Pond 41320 | 0350 | Western Ind Est off killeen Rd 41362 |
| 0100 | Br 1km SW (u/s) of Saggart 41330 | 0380 | 0.2 km d/s Kylemore Rd Br |
| 0150 | Br 1km NW (d/s) of Saggart 41334 | 0400 | Kylemore Rd Br 41365 |
| 0160 | D/s Saggart STW outfall 41338 | 0440 | 0.4 km d/s Kylemore Rd Br 41368 |
| 0180 | Br at Saggart STW | 0450 | Slieve Bloom Park (Mouth of Culvert) 41371 |
| 0200 | Br N of Brownsbarn | 0455 | Blackhorse Br Davitt Rd 41374 |
| 0280 | Nangor Rd Br 41353 | 0500 | Camac Close Emmet Rd 41377 |
| 0300 | Just d/s Clondalkin Br 41359 | 0600 | Bow Br Kilmainham 41380 |
| 0310 | Riversdale Estate Br | 0700 | Liffey Outfall 41383 |
| 0330 | 0.8 km d/s Riversdale Est Br | | |

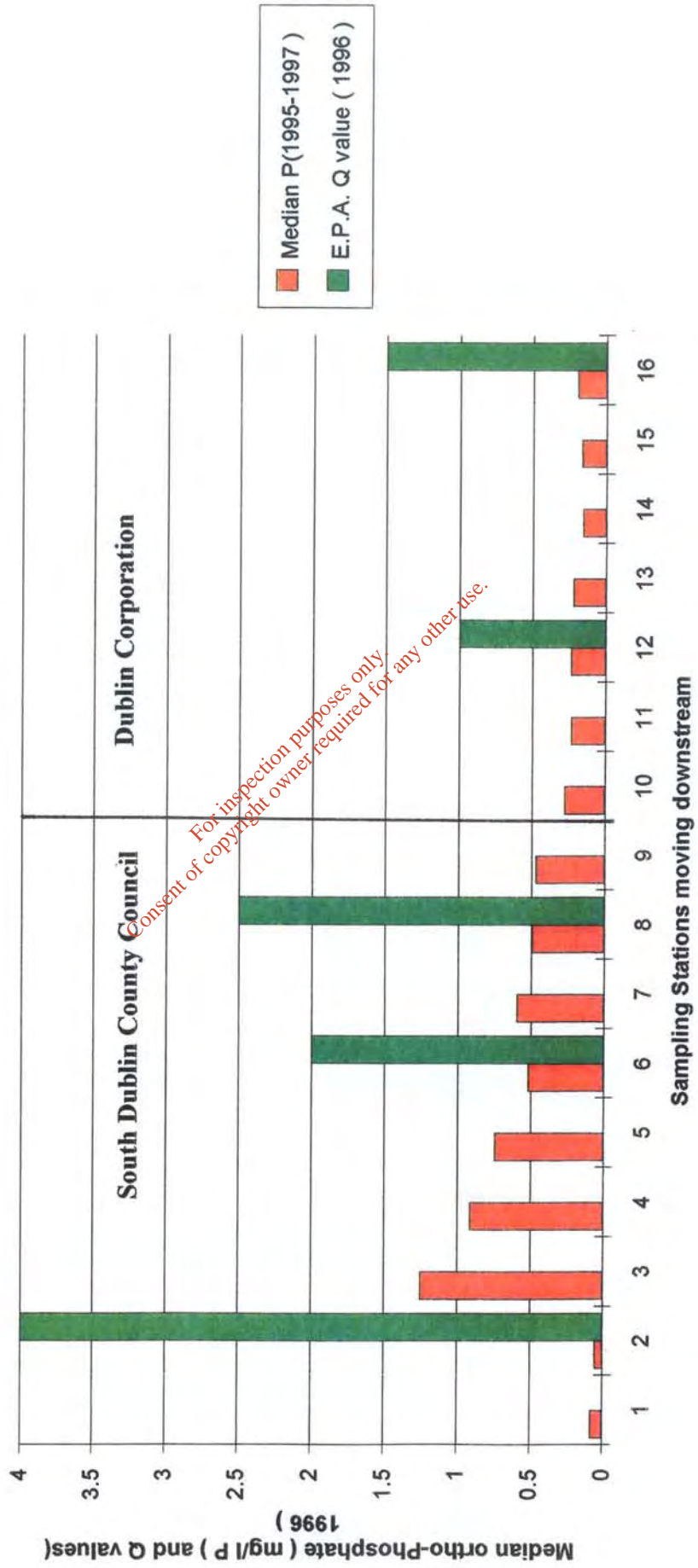
Results of Chemical Analyses 1995 to 1997:
 Data Set: 1 09C02 Dublin Corp

| Station No. | Ortho-Phosphate mg P l ⁻¹ | | | |
|-------------|---|-------|-------|-------|
| | No. | Min | Med | Max |
| 0040 | 16 | 0.003 | 0.082 | 0.447 |
| 0150 | 62 | 0.014 | 0.054 | 2.000 |
| 0160 | 48 | 0.239 | 1.252 | 3.300 |
| 0180 | 47 | 0.014 | 0.915 | 2.000 |
| 0200 | 15 | 0.285 | 0.744 | 1.974 |
| 0280 | 15 | 0.136 | 0.517 | 0.843 |
| 0300 | 14 | 0.141 | 0.597 | 0.919 |
| 0330 | 15 | 0.068 | 0.493 | 0.761 |
| 0350 | 15 | 0.136 | 0.468 | 0.711 |
| 0380 | 25 | 0.109 | 0.280 | 0.481 |
| 0440 | 10 | 0.107 | 0.234 | 0.354 |
| 0450 | 10 | 0.105 | 0.238 | 0.332 |
| 0455 | 10 | 0.125 | 0.224 | 0.332 |
| 0500 | 10 | 0.011 | 0.159 | 0.268 |
| 0600 | 10 | 0.093 | 0.168 | 0.271 |
| 0700 | 10 | 0.100 | 0.197 | 0.471 |

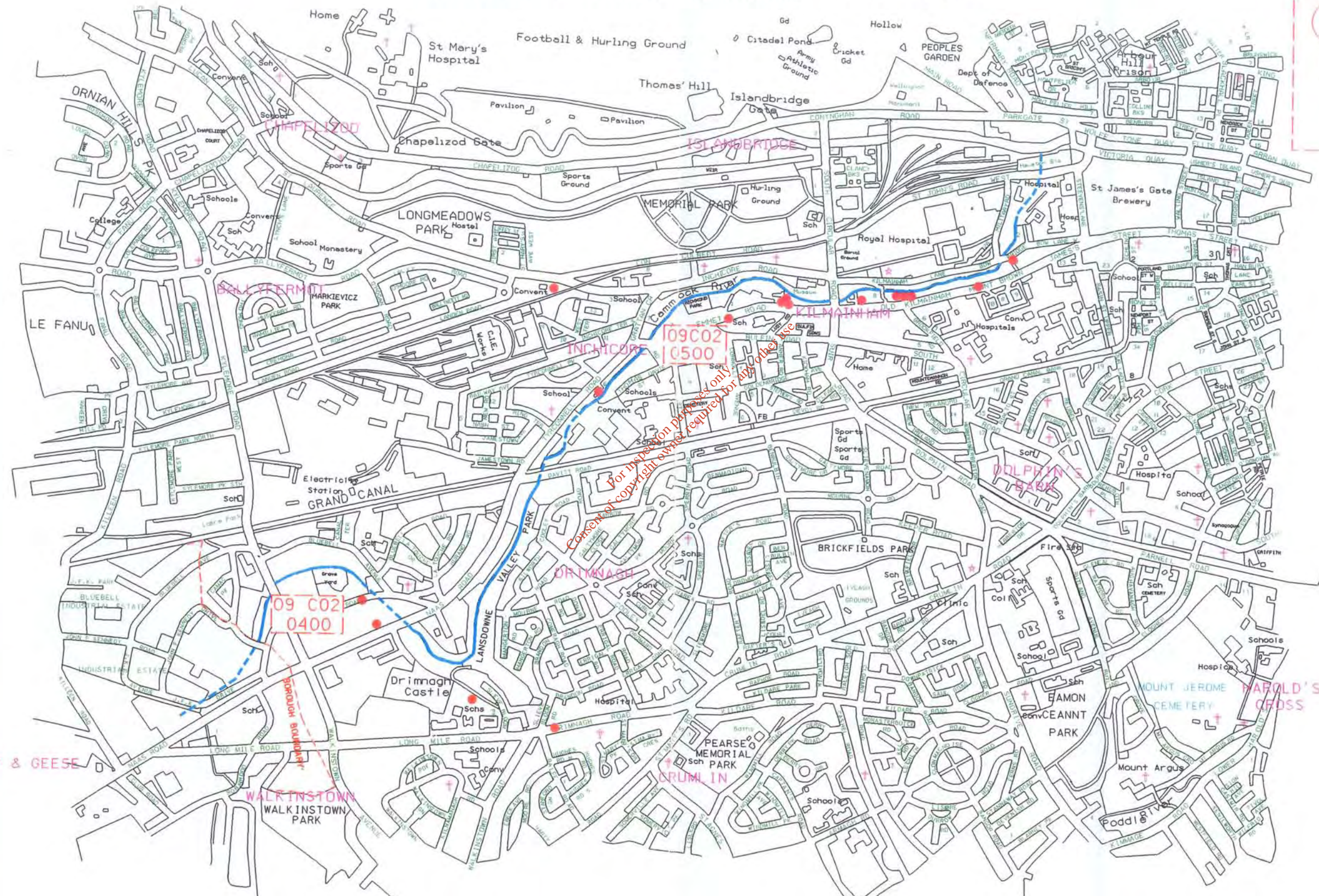
River Camac - Median Phosphate P (1995 - 1997)



River Camac - Median Phosphate P and E.P.A. Q values (1995 - 1997)



RIVER CAMAC 09C02 (0400, 0500)



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OVERFLOWS SHOWN THUS ●

River and Code : **DODDER**
 Tributary of : Liffey
 OS Grid Ref : O 178 343

09/D/01
 OS Catchment No: 168

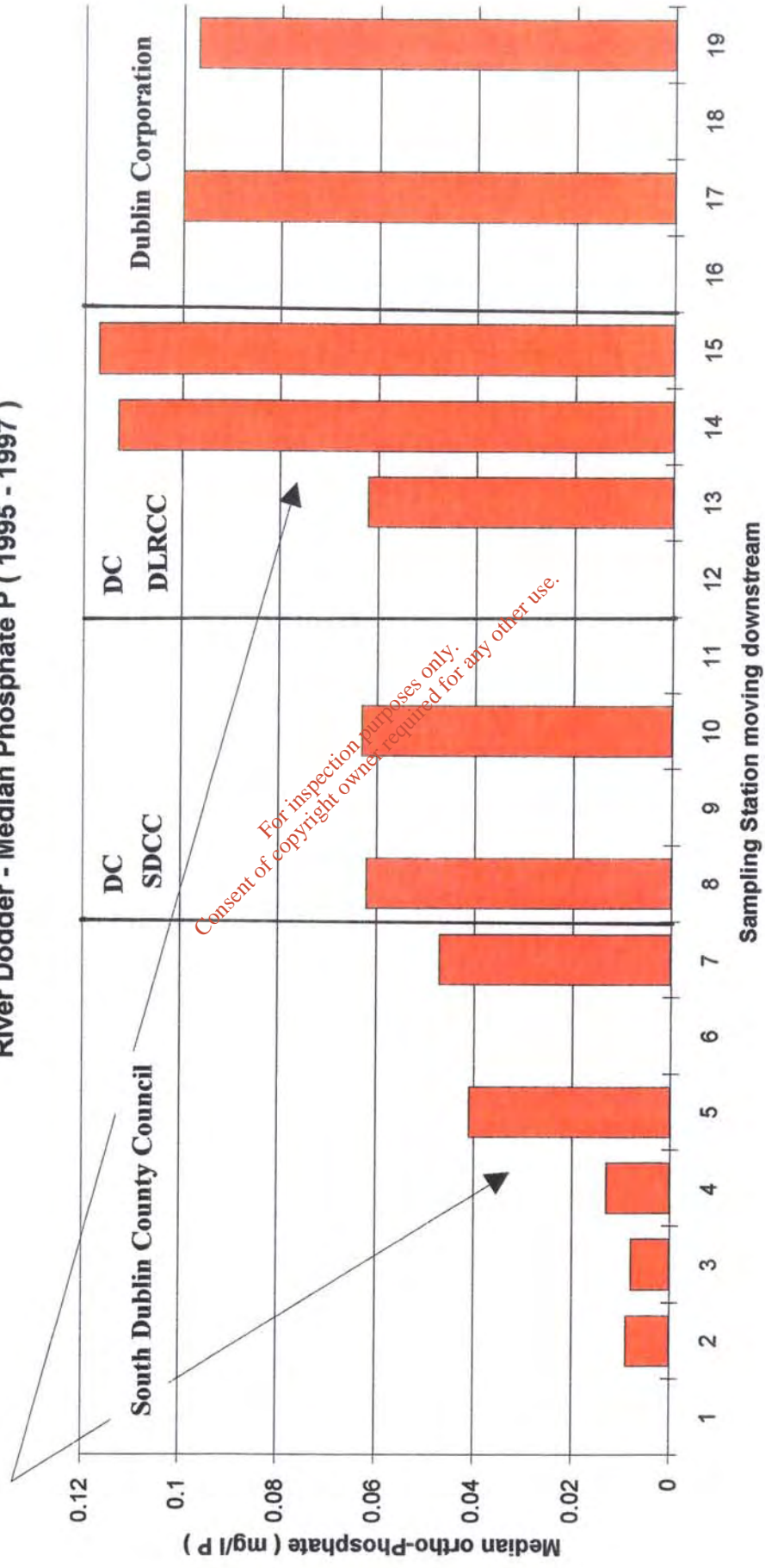
| Sampling Stations No. | Biological Quality Ratings (Q Values) | | | | | | | | | |
|--------------------------|---------------------------------------|------|------|------|------|------|------|------|------|------|
| | 1971 | 1973 | 1975 | 1977 | 1979 | 1981 | 1984 | 1988 | 1991 | 1996 |
| 0010 | - | - | - | - | - | - | - | 5 | 5 | 4 |
| 0100 | - | - | 5 | 4-5 | 5 | 5 | 5 | - | 4 | 4-5 |
| 0200 | - | 5 | 4 | 3-4 | 1/0 | 5 | 4-5 | 2 | 4-5 | - |
| 0300 | 3 | 3-4 | 1/0 | 2/0 | 3 | 3 | 3-4 | 4-5 | 3 | 4-5 |
| 0400 | 4 | 3-4 | 3-4 | 2-3 | 3 | 4 | 3-4 | - | - | - |
| 0420 | - | - | - | - | - | - | - | 4 | - | 4 |
| 0500 | 4 | 3-4 | 3 | 3 | 2 | 4 | 3-4 | - | 3 | - |
| 0600 | - | - | - | - | - | 3 | 4 | 2-3 | - | - |
| 0620 | - | - | - | - | - | - | - | - | 3 | 3 |
| 0650 | - | - | - | - | - | - | - | - | - | - |
| 0700 | 2-3 | 3 | 3-4 | 3 | 3-4 | 3 | 3 | 2-3 | 2-3 | - |
| 0750 | - | - | - | - | - | - | - | - | - | - |
| 0800 | 3-4 | 2-3 | 3 | 3 | 3 | 2-3 | 2-3 | 2-3 | 3 | 3 |
| 0850 | - | - | - | - | - | - | - | - | - | - |
| 0900 | 3-4 | 1-2 | 3 | 3 | 3 | 2-3 | 2-3 | 3 | 3 | - |
| 1000 | 2 | 1-2 | 1 | 2-3 | 2-3 | 2 | 2-3 | - | - | - |
| 1200 | - | - | - | - | - | - | - | - | - | - |

| No. | Location | No. | Location |
|------|------------------------------------|------|------------------------------|
| 0010 | 1.3 km u/s Reservoir 41025 | 0680 | Rathfarnham Road Bridge |
| 0100 | U/s Piperstown Stream 41038 | 0700 | Dodder Road d/s Weir |
| 0200 | Fort Bridge 41040 | 0750 | Orwell Rd Br 41062 |
| 0300 | Old Bawn Bridge 41045 | 0800 | Milltown Bridge 41065 ✓ |
| 0400 | Footbridge, Firhouse 41050 | 0850 | Clonskeagh Rd Br 41068 ✓ |
| 0420 | New Bridge, Firhouse 41053 | 0900 | Footbridge, Beaver Row 41071 |
| 0500 | Templeogue Bridge 41055 | 1000 | Ballsbridge 41074 |
| 0600 | Springfield Crescent <i>Managh</i> | 1100 | Lansdowne Road Bridge |
| 0620 | Bridge on Springfield Ave | 1200 | Londonbridge Rd Br 41077 |
| 0650 | Footbridge Bushy Park 41059 | | |

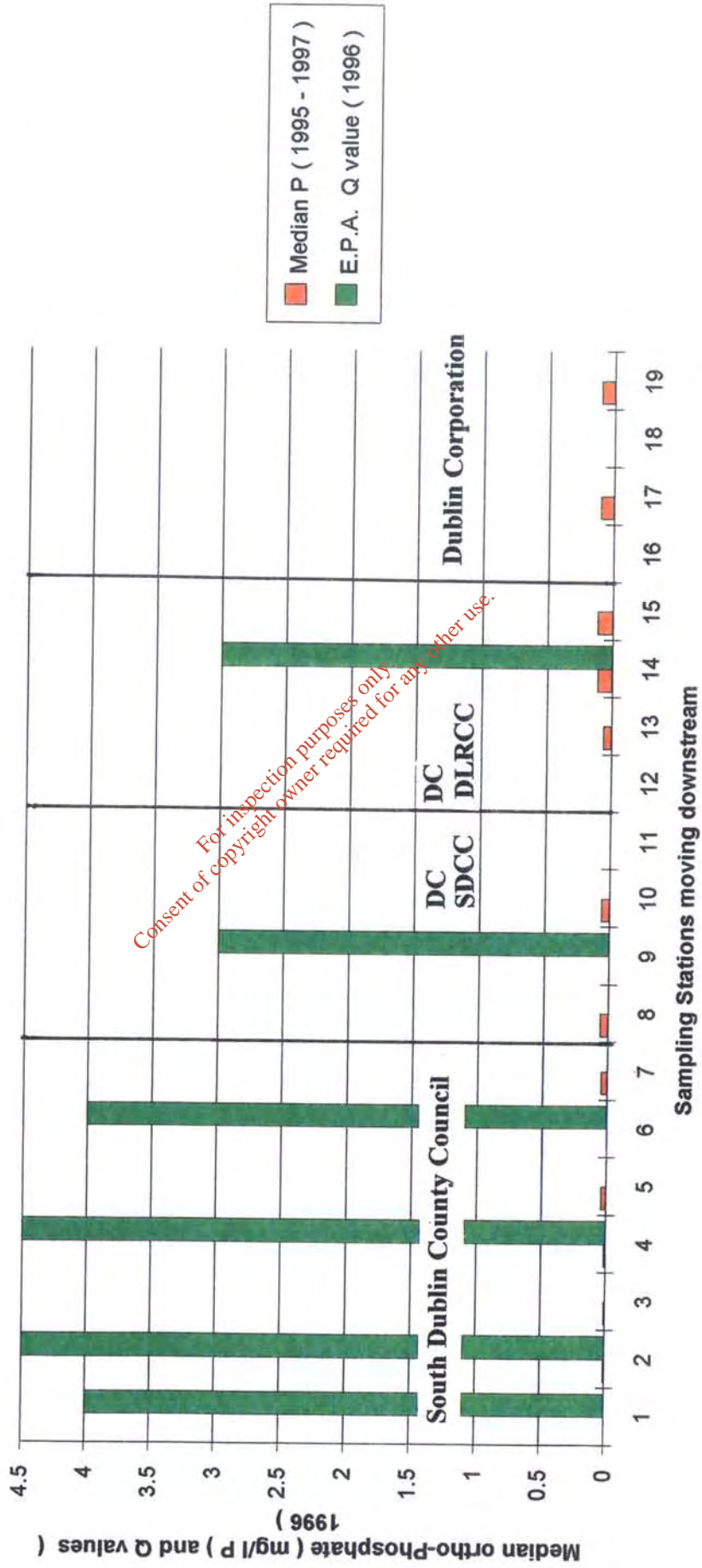
Results of Chemical Analyses 1995 to 1997:
 Data Set: 1 09D01 Dublin Corp

| Station No. | Ortho-Phosphate mg P l ⁻¹ | | | |
|----------------|---|--------------|--------------|--------------|
| | No. | Min | Med | Max |
| 0100 | 13 | 0.003 | 0.009 | 0.020 |
| 0200 | 13 | 0.003 | 0.008 | 0.020 |
| 0300 | 13 | 0.006 | 0.013 | 0.054 |
| 0400 | 13 | 0.015 | 0.041 | 0.175 |
| 0500 | 13 | 0.018 | 0.047 | 0.186 |
| 0600 | 24 | 0.018 | 0.062 | 0.178 |
| 0650 | 23 | 0.020 | 0.063 | 0.144 |
| 0750 | 24 | 0.014 | 0.062 | 0.168 |
| 0800 | 10 | 0.033 | 0.113 | 0.180 |
| 0850 | 10 | 0.033 | 0.117 | 0.175 |
| 1000 | 9 | 0.037 | 0.100 | 0.170 |
| 1200 | 9 | 0.041 | 0.097 | 0.179 |

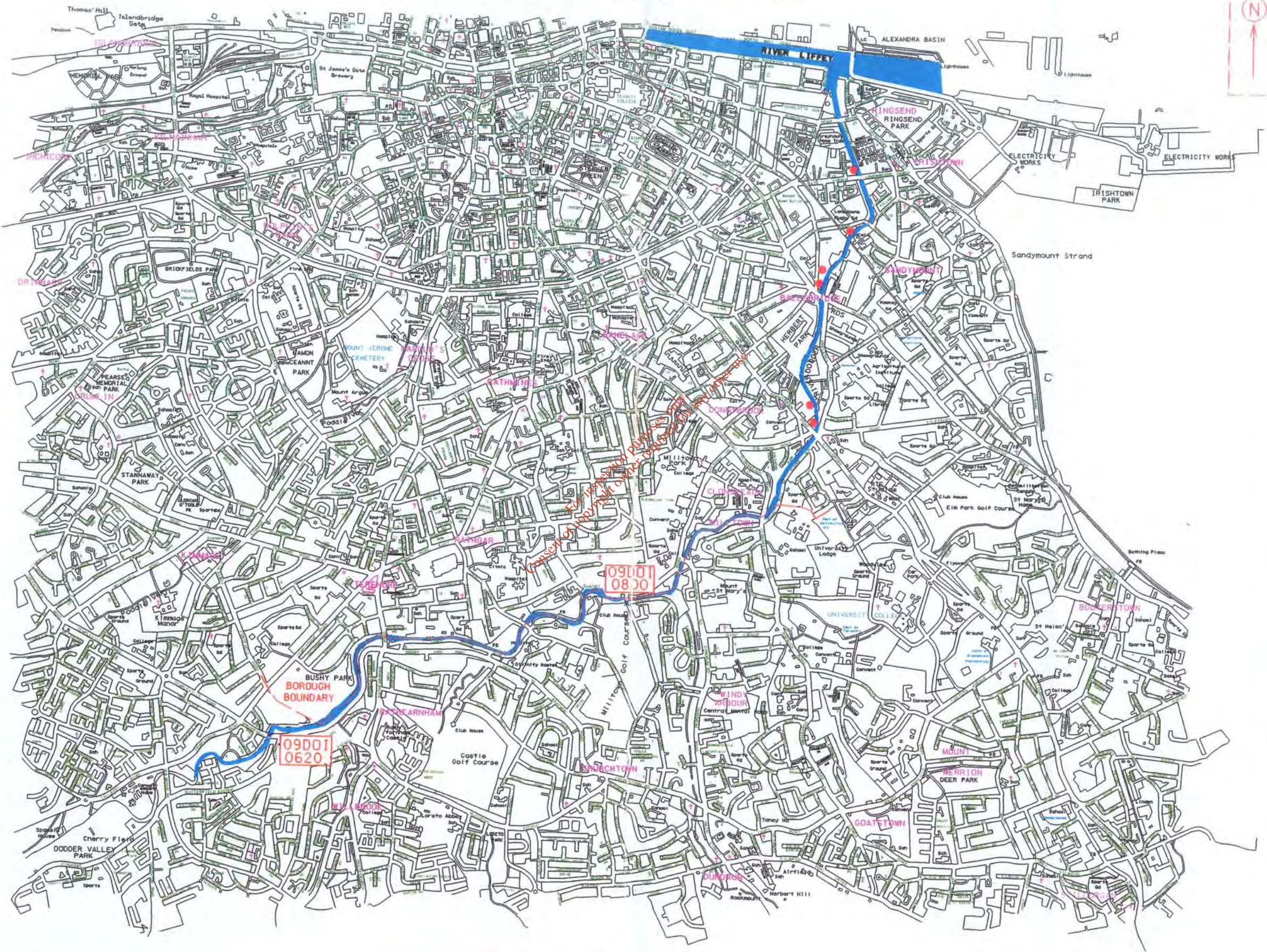
River Dodder - Median Phosphate P (1995 - 1997)



River Dodder - Median Phosphate P and E.P.A. Q values (1995 - 1997)



RIVER DODDER 09 DOI (0620 + 0800)



OVERFLOWS SHOWN THUS ●

River and Code : **SANTRY**
 Tributary of : Sea - at Dollymount
 OS Grid Ref : O 203 376

09/S/01
 OS Catchment No: 166

| Sampling Stations No. | Location | Biological Quality Ratings (Q Values) | | | | | |
|--------------------------|--|---------------------------------------|------|------|------|------|-------|
| | | 1988 | 1989 | 1990 | 1991 | 1994 | 1996 |
| 0050 | Sports Grounds 45330 | - | - | - | - | - | - |
| 0100 | Br nr Santry Lodge Ballymun Rd 45340 | - | - | - | - | - | - |
| 0200 | Br nr Santry Close swords Rd 45353 | - | - | - | - | - | - |
| 0220 | D/s Airways Ind Est 45354 | - | - | - | - | - | - |
| 0280 | D/s Br u/s Clonshaugh Rd Br | - | - | - | - | - | - |
| 0300 | Clonshaugh Rd Br 45360 | 1 | 1 | 1 | 2/0 | 1/0 | 2 |
| 0500 | Br on Coolock Drive 45362 | - | - | - | - | - | - |
| 0700 | Br on Tonlegee Rd 45365 | - | - | - | - | - | - |
| 0800 | Harmonstown Rd Br | 1 | - | - | - | - | - |
| 0880 | 0.2 km u/s Howth Rd Br Raheny (L Derg Pk 45368) | - | - | - | - | - | - |
| 1100 | Bettyglan 45375 | 1 | 1 | 1 | 2-3 | 1-2 | 2-3/0 |

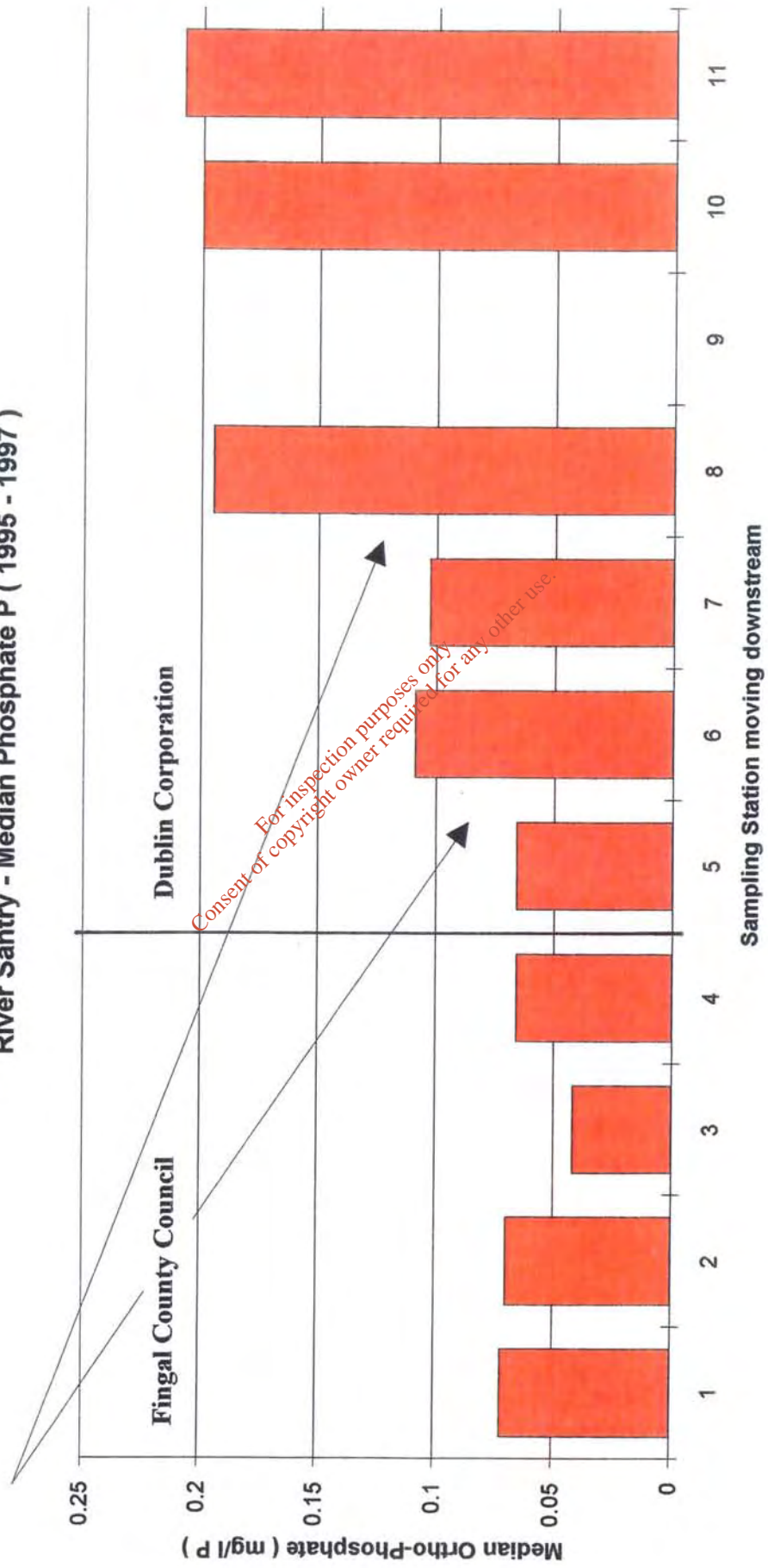
Results of Chemical Analyses 1995 to 1997:

Data Set: I 09S01 Dublin Corp

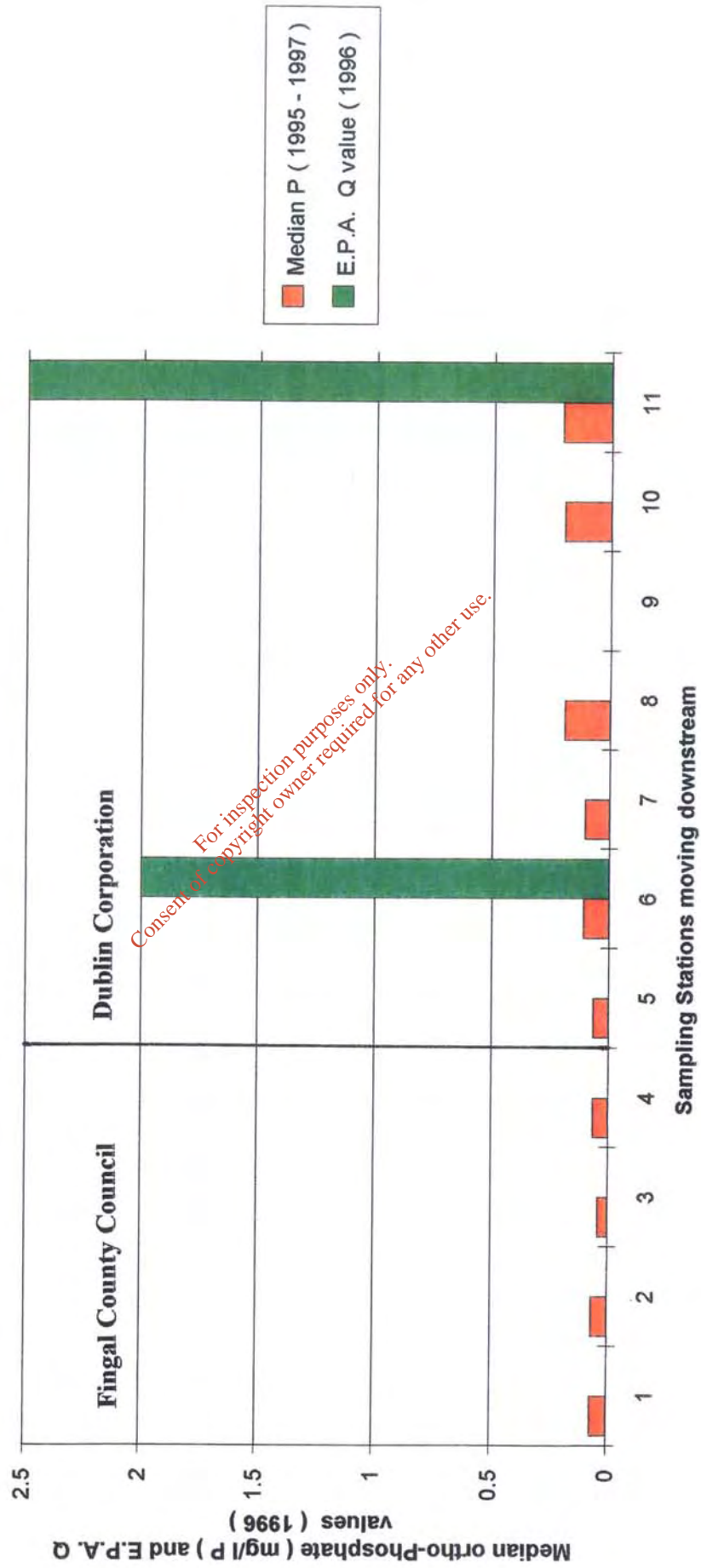
| Station No. | No. | Ortho-Phosphate mg P l ⁻¹ | | |
|----------------|-----|---|-------|-------|
| | | Min | Med | Max |
| 0050 | 6 | 0.044 | 0.072 | 0.142 |
| 0100 | 11 | 0.045 | 0.070 | 0.114 |
| 0200 | 24 | 0.003 | 0.042 | 0.195 |
| 0220 | 25 | 0.003 | 0.066 | 0.530 |
| 0280 | 22 | 0.032 | 0.066 | 0.282 |
| 0300 | 16 | 0.057 | 0.109 | 0.297 |
| 0500 | 13 | 0.069 | 0.103 | 0.273 |
| 0700 | 24 | 0.063 | 0.195 | 0.441 |
| 0880 | 11 | 0.080 | 0.200 | 0.630 |
| 1100 | 11 | 0.089 | 0.208 | 0.401 |

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River Santry - Median Phosphate P (1995 - 1997)

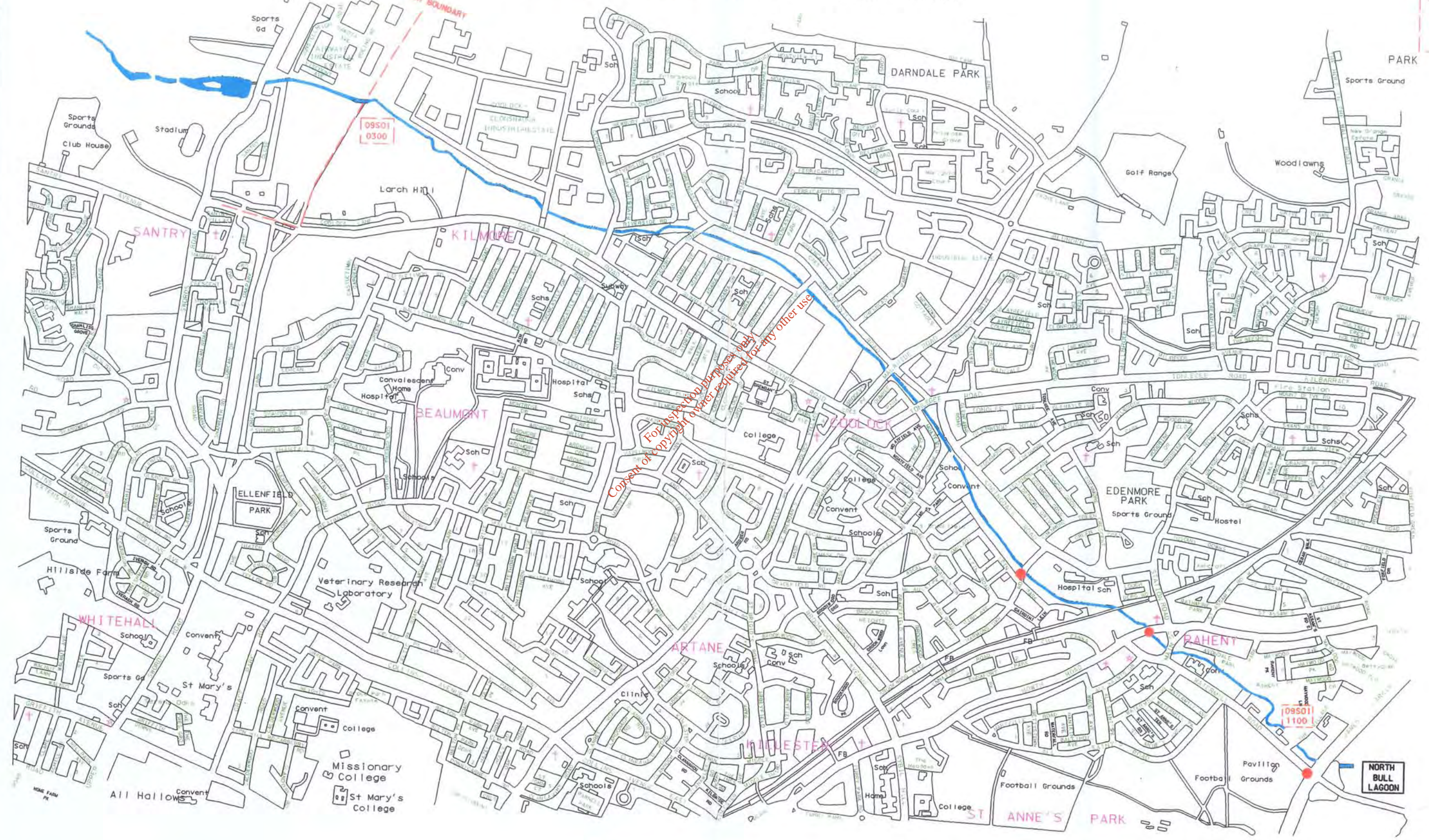


River Santry - Median Phosphate P and E.P.A. Q values (1995 - 1997)



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SANTRY RIVER 09501 (0300, 1100)



OVERFLOWS SHOWN THUS ●

River and Code : **TOLKA**
 Tributary of : Sea - Dublin Bay
 OS Grid Ref : O 176 358

09/T/01
 OS Catchment No: 167

| Sampling Stations No. | Biological Quality Ratings (Q Values) | | | | | | | | | | | | | | |
|--------------------------|---------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| | 1971 | 1973 | 1975 | 1977 | 1979 | 1981 | 1983 | 1985 | 1987 | 1988 | 1989 | 1990 | 1991 | 1994 | 1996 |
| 0100 | - | - | - | - | - | 4 | 3-4 | 3 | - | 3 | - | - | 3 | 3 | - |
| 0120 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0280 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0300 | - | - | - | - | - | - | - | 3 | - | 3 | - | - | 3 | 3 | 2 |
| 0400 | - | - | - | - | 3-4 | 3-4 | 3-4 | 3-4 | - | 3 | - | - | 3 | 3-4 | - |
| 0500 | - | 2 | 1-2 | 3 | - | 2-3 | - | - | - | 2 | 2 | 2 | - | 2 | 2 |
| 0600 | - | 4 | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 | - | 2 | 2 | 2 | 2-3 | 3 | 3 |
| 0700 | 3-4 | 3-4 | 2-3 | 3-4 | 2-3 | 3 | 2-3 | 2-3 | - | 2 | - | - | 2 | 2-3 | - |
| 0800 | 1 | 2 | 2-3 | 3-4 | 3 | 3 | 3 | 2 | 3 | 2 | 2-3 | - | 2-3 | 3 | 2-3 |
| 0890 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 0900 | 2-3 | 3-4 | 4 | 3-4 | 3 | 3-4 | 3-4 | 3 | - | 2 | 3 | - | 3 | 3 | - |
| 1000 | 4 | 4 | 2-3 | 3 | 2-3 | 2-3 | 2-3 | 2-3 | - | 2-3 | 3 | - | 2-3 | - | 3 |
| 1020 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1030 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1050 | 4-5 | - | - | - | - | 3 | 3 | 3 | - | 3 | 3 | - | 3 | 3 | - |
| 1070 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1080 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1100 | 1 | 1 | 1/0 | 1 | 1 | 3/0 | 1/0 | 2 | 2 | 1-2 | 1-2 | 1 | 1/0 | 2-3/0 | 3 |
| 1110 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1200 | 1 | 1 | - | 1 | 1 | 1-2 | 2 | 2 | 2 | 2 | 1/0 | 1-2 | 2 | 2-3 | - |
| 1300 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| No. | Location |
|------|---------------------------------|
| | <i>Portan Branch*</i> |
| 0100 | Portan Br |
| 0120 | 2nd Br d/s Portan Br |
| 0280 | Br ESE of Piper Hill |
| | <i>Main Channel</i> |
| 0300 | Br at Black Bull |
| 0400 | Br NNE of Dunboyne |
| | <i>Dunboyne Branch</i> |
| 0500 | Rusk Br |
| | <i>Main Channel (Continued)</i> |
| 0600 | Dunboyne Rd Br u/s Clonee |
| 0700 | Clonee Br 45010 |

| No. | Location |
|-------|---------------------------------|
| -0800 | Mulhuddart Br 45035? |
| -0890 | Shugborough Rd Br |
| 0900 | Br u/s Blanchardstown 450 |
| 1000 | Abbotstown Br 450 |
| 1020 | u/s Ashtown Br 450 |
| 1030 | Ashtown Br 45053? |
| -1050 | Cardiff's Br 45059? |
| -1070 | Tolka Lodge u/s Finglas R 45066 |
| 1080 | Royal Oak d/s Finglas R 45068 |
| -1100 | Violet Hill Drive Finglas 45069 |
| -1110 | Botanic Rd Br 450 |
| -1200 | Drumcondra Rd Br 45076 |
| -1300 | Annesley Rd Br 45082 |

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River and Code : **TOLKA**
 Tributary of : Sea - Dublin Bay
 OS Grid Ref : O 176 358

09/T/01
 OS Catchment No: 167

Results of Chemical Analyses 1995 to 1997:

Data Set: 2 09T01 Meath Co Co

| Station No. | No. | Ortho-Phosphate mg P l ⁻¹ | | |
|-------------|-----|---|-------|-------|
| | | Min | Med | Max |
| 0100 | - | - | - | - |
| 0120 | - | - | - | - |
| 0280 | 12 | 0.072 | 0.278 | 3.165 |
| 0300 | 14 | 0.111 | 0.277 | 3.540 |
| 0400 | 15 | 0.023 | 0.166 | 5.064 |
| 0500 | 13 | 0.095 | 0.192 | 3.458 |
| 0600 | 15 | 0.088 | 0.197 | 3.524 |
| 0700 | 15 | 0.144 | 0.232 | 5.243 |

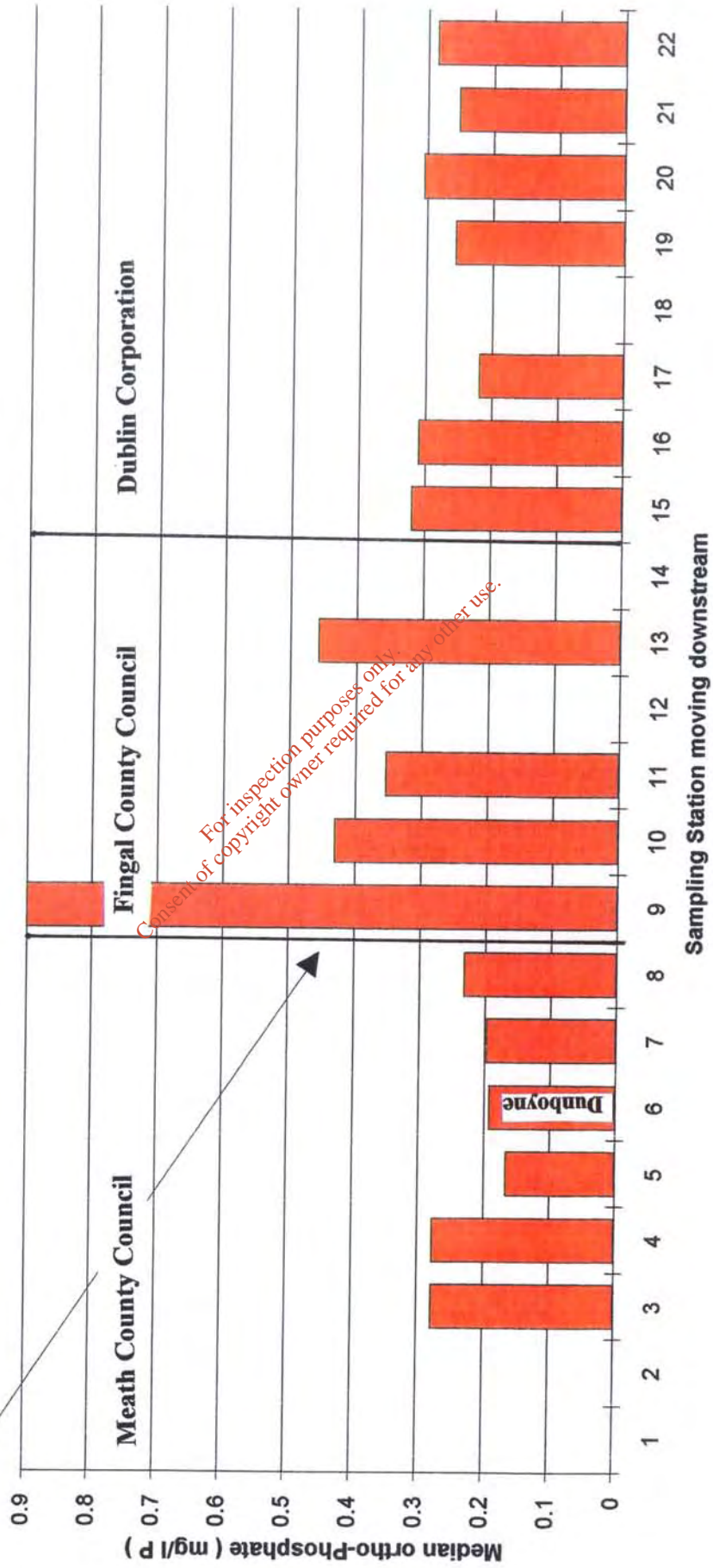
Results of Chemical Analyses 1995 to 1997:

Data Set: 1 09T01 Dublin Corp

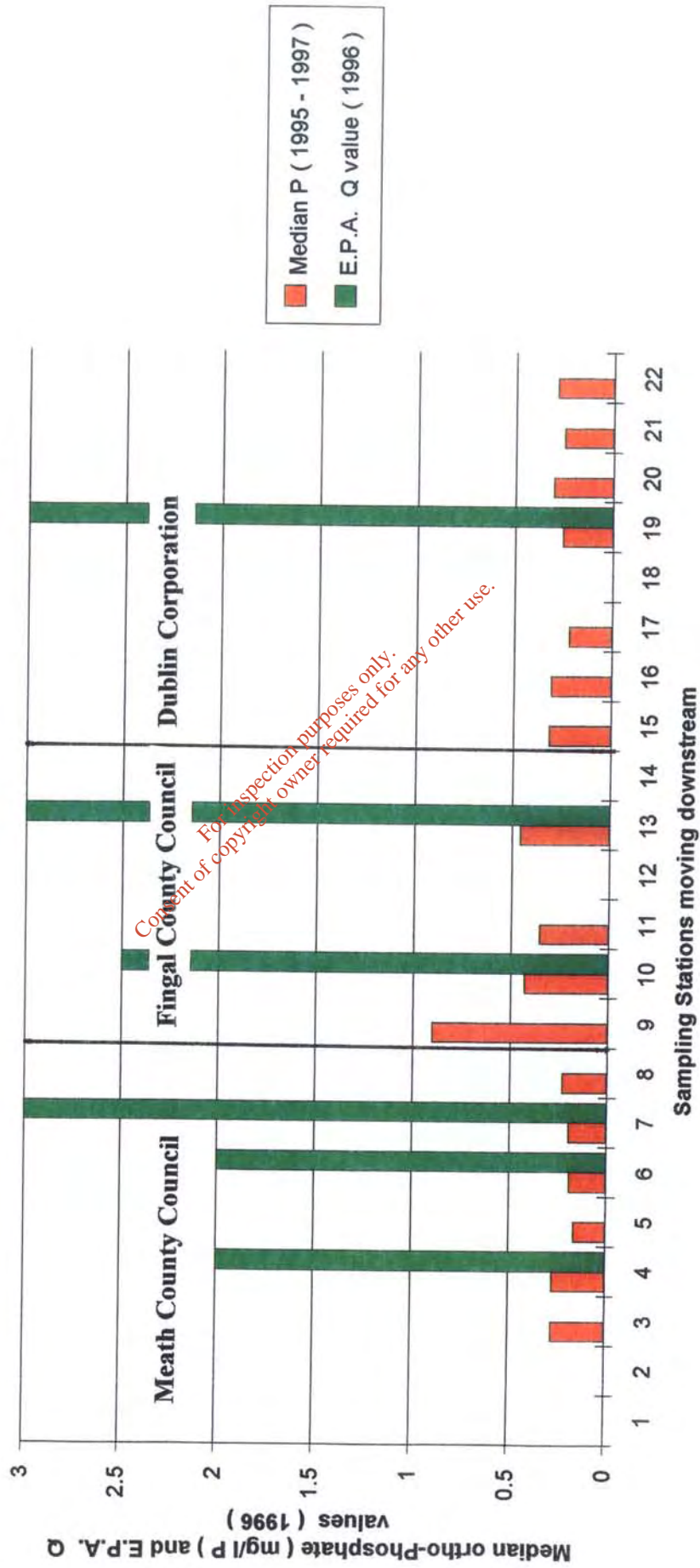
| Station No. | No. | Ortho-Phosphate mg P l ⁻¹ | | |
|-------------|-----|---|-------|-------|
| | | Min | Med | Max |
| 0700 | 10 | 0.116 | 0.900 | 2.000 |
| 0800 | 10 | 0.104 | 0.430 | 1.594 |
| 0890 | 10 | 0.106 | 0.354 | 1.690 |
| 1000 | 12 | 0.105 | 0.457 | 0.916 |
| 1030 | 23 | 0.097 | 0.319 | 0.925 |
| 1050 | 24 | 0.074 | 0.310 | 1.028 |
| 1070 | 13 | 0.079 | 0.219 | 0.530 |
| 1080 | - | - | - | - |
| 1100 | 12 | 0.086 | 0.256 | 0.479 |
| 1110 | 13 | 0.080 | 0.305 | 0.437 |
| 1200 | 11 | 0.099 | 0.252 | 0.435 |
| 1300 | 10 | 0.112 | 0.286 | 0.429 |

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River Tolka - Median Phosphate P (1995 - 1997)

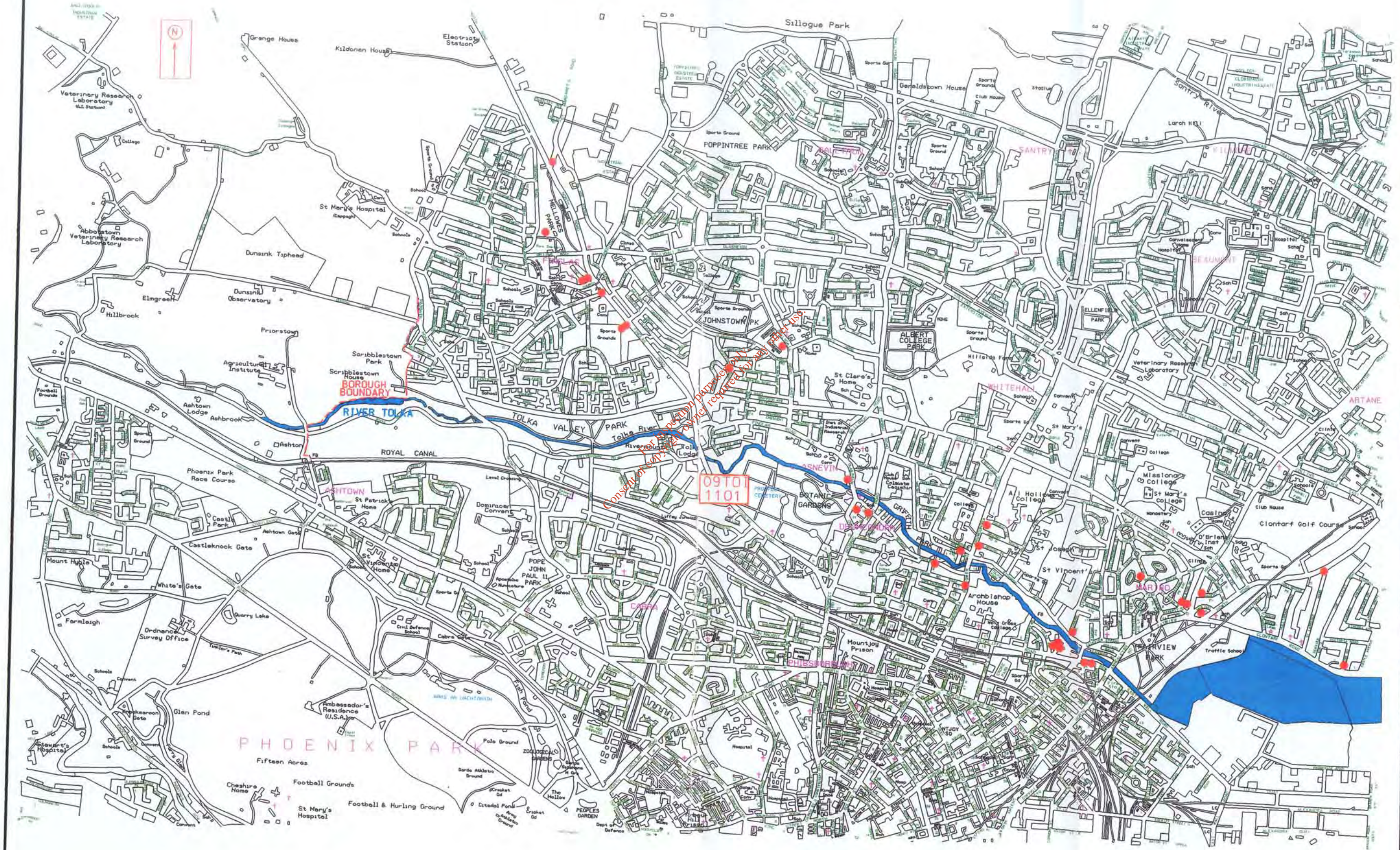


River Tolka - Median Phosphate P and E.P.A. Q values (1995 - 1997)



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RIVER TOLKA 09T01 (1100)



OVERFLOWS SHOWN THUS ●

Section 5 Appendices - Specific Catchment Measures :

Appendix 1A - River Camac

Appendix 2A - River Dodder

Appendix 3A - River Santry

Appendix 4A - River Tolka

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Table 5.2: Implementation Programme Summary Table - Dublin Corporation - River Camac - 09/C/02

| Standard | Measures | Targets | Actions | Timeframe | Responsible for Implementation |
|---|---|---|--|------------------------------|--|
| To improve the Camac to Q 3 and < 70 ug P/l by 2007 | Reduce the number, frequency, and duration of wastewater overflows to surface waters | Reduce P inputs within the Dublin Corporation area | Monitor overflows to surface waters Upgrade the foul sewerage system Remove surface water runoff from the foul sewerage system to minimise hydraulic overflows - Use separate drainage systems | 1999 to 2007 | Divisional Engineer Main Drainage Division Design, Maintenance Pollution Control Sections Central Laboratory |
| | Reduce the number of misconnections to surface waters | Reduce P inputs within the Dublin Corporation area | Survey all surface water systems in the Camac catchment for misconnections Divert all misconnections to the foul system Monitor surface waters | 1999 to 2007 | Pollution Control |
| | Set up a Camac flow database using EPA hydrometric data | Prepare P inputs / P loadings for the catchment | Request EPA hydrometric data Prepare river and surface water inflow P load data | 1999 to 2007 | Central Laboratory Drainage Design Pollution Control Central Laboratory |
| | Set up the Camac catchment on a G.I.S. system | Itemise P input locations graphically | Set up a River / Groundwater Quality GIS database with the Camac catchment as a specific module | 1999 to 2007 | Pollution Control Central Laboratory Information Systems Section |
| | Liaise with South Dublin County Council to reduce P at the border with Dublin Corporation | Reduce P input at the border with South Dublin County Council | Diversion of Saggart Works Effluent and Storm overflow to the foul sewer planned to be completed in 2 years | 1999 to 2002 | South Dublin County Council |
| | Commence New P monitoring programme | Return annual median P based on > 10 results | Supplement P monitoring at 2 EPA points on the Camac | 1999 to 2000 2000 to 2007 | Pollution Control Central Laboratory |

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| Standard | Measures | Targets | Actions | Timeframe | Responsible for Implementation |
|-------------------|--|--|--|------------------------------|---|
| River Camac cont. | Increase Q value monitoring frequency to 4 per year at 2 E.P.A. sampling points on Camac | To better represent Q status of Camac | Request E.P.A. to determine Q index more frequently at 2 sampling locations on the Camac | 1999 to 2000 2001 to 2007 | E.P.A. |
| | Monitor algal / weed growth in the Camac | Establish and monitor the impact of elevated phosphate P | Conduct regular biological surveys of the Camac to quantify algal / weed occurrences | 1999 to 2007 | Central Fisheries E.R.F. Board Central Laboratory |

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Table 5.2: Implementation Programme Summary Table - Dublin Corporation - River Dodder - 09/D/01

| Standard | Measures | Targets | Actions | Timeframe | Responsible for Implementation |
|--|---|---|--|------------------------------|--|
| To improve the Dodder to Q 3-4 and < 50 ug P/l by 2007 | Reduce the number, frequency, and duration of wastewater overflows to surface waters | Reduce P inputs within the Dublin Corporation area | Monitor overflows to surface waters Upgrade the foul sewerage system Remove surface water runoff from the foul sewerage system to minimise hydraulic overflows - Use separate drainage systems | 1999 to 2007 | Divisional Engineer Main Drainage Division Design, Maintenance Pollution Control Sections Central Laboratory |
| | Reduce the number of misconnections to surface waters | Reduce P inputs within the Dublin Corporation area | Survey all surface water systems in the Dodder catchment for misconnections Divert all misconnections to the foul system Monitor surface waters | 1999 to 2007 | Pollution Control |
| | Set up a Dodder flow database using EPA hydrometric data | Prepare P inputs / P loadings for the catchment | Request EPA hydrometric data Prepare river and surface water inflow P load data | 1999 to 2007 | Central Laboratory Drainage Design Pollution Control Central Laboratory |
| | Set up the Dodder catchment on a G.I.S. system | Itemise P input locations graphically | Set up a River / Groundwater Quality GIS database with the Dodder catchment as a specific module | 1999 to 2007 | Pollution Control Central Laboratory Information Systems Section |
| | Liaise with South Dublin and Dun Laoire Rathdown to reduce P at the borders with Dublin Corporation | Reduce P input at the borders with South Dublin and Dun Laoire Rathdown | Upgrade foul sewerage systems in South Dublin and Dun Laoire Rathdown to minimise overflows to surface waters. Identify misconnections to surface waters | 1999 to 2002 | South Dublin County Council Dun Laoire Rathdown County Council |
| | Commence New P monitoring programme | Return annual median P based on > 10 results | Supplement P monitoring at 2 EPA points on the Dodder | 1999 to 2000 2000 to 2007 | Pollution Control Central Laboratory |

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| Standard | Measures | Targets | Actions | Timeframe | Responsible for Implementation |
|--------------------|---|--|---|------------------------------|---|
| River Dodder cont. | Increase Q value monitoring frequency to 4 per year at 2 E.P.A. sampling points on Dodder | To better represent status of the Dodder | Request E.P.A. to determine Q index more frequently at 2 sampling locations on the Dodder | 1999 to 2000 2001 to 2007 | E.P.A. |
| | Monitor algal / weed growth in the Dodder | Establish and monitor the impact of elevated phosphate P | Conduct regular biological surveys of the Dodder to quantify algal / weed occurrences | 1999 to 2007 | Central Fisheries E.R.F. Board Central Laboratory |

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Table 5.2: Implementation Programme Summary Table - Dublin Corporation - River Santry - 09/S/01

| Standard | Measures | Targets | Actions | Timeframe | Responsible for Implementation |
|--|--|--|--|--------------|--|
| To improve the Santry to Q 3 and < 70 ug P/l by 2007 | Reduce the number, frequency, and duration of wastewater overflows to surface waters | Reduce P inputs within the Dublin Corporation area | Monitor overflows to surface waters Upgrade the foul sewerage system Remove surface water runoff from the foul sewerage system to minimise hydraulic overflows - Use separate drainage systems | 1999 to 2007 | Divisional Engineer Main Drainage Division Design, Maintenance Pollution Control Sections Central Laboratory |
| | Reduce the number of misconnections to surface waters | Reduce P inputs within the Dublin Corporation area | Survey all surface water systems in the Santry catchment for misconnections Divert all misconnections to the foul system Monitor surface waters | 1999 to 2007 | Pollution Control |
| | Set up a Santry flow database using EPA hydrometric data | Prepare P inputs / P loadings for the catchment | Request EPA hydrometric data Prepare river and surface water inflow P load data | 1999 to 2007 | Central Laboratory Drainage Design Pollution Control Central Laboratory |
| | Set up the Santry catchment on a G.I.S. system | Itemise P input locations graphically | Set up a River / Groundwater Quality GIS database with the Santry catchment as a specific module | 1999 to 2007 | Pollution Control Central Laboratory Information Systems Section |
| | Liaise with Fingal County Council to reduce P at the borders with Dublin Corporation | Reduce P input at the borders with Fingal County Council | Upgrade foul sewerage systems in Fingal County Council to minimise overflows to surface waters. Identify misconnections to surface waters | 1999 to 2002 | Fingal County Council |

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| Standard | Measures | Targets | Actions | Timeframe | Responsible for Implementation |
|--------------------|--|--|--|--|---|
| River Santry cont. | Commence New P monitoring programme Increase Q value monitoring frequency to 4 per year at 2 E.P.A. sampling points on Santry | Return annual median P based on > 10 results To better represent Q status of the Santry | Supplement P monitoring at 2 EPA points on the Santry Request E.P.A. to determine Q index more frequently at 2 sampling locations on the Santry | 1999 to 2000 2000 to 2007 1999 to 2000 2001 to 2007 | Pollution Control Central Laboratory E.P.A. |
| | Monitor algal / weed growth in the Santry | Establish and monitor the impact of elevated phosphate P | Conduct regular biological surveys of the Santry to quantify algal / weed occurrences | 1999 to 2007 | Central Fisheries E.R.F. Board Central Laboratory |

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Table 5.2: Implementation Programme Summary Table - Dublin Corporation - River Tolka - 09/T/01

| Standard | Measures | Targets | Actions | Timeframe | Responsible for Implementation |
|---|--|--|--|--------------|--|
| To improve the Tolka to Q 3-4 and < 50 ug P/l by 2007 | Reduce the number, frequency, and duration of wastewater overflows to surface waters | Reduce P inputs within the Dublin Corporation area | Monitor overflows to surface waters Upgrade the foul sewerage system Remove surface water runoff from the foul sewerage system to minimise hydraulic overflows - Use separate drainage systems | 1999 to 2007 | Divisional Engineer Main Drainage Division Design, Maintenance Pollution Control Sections Central Laboratory |
| | Reduce the number of misconnections to surface waters | Reduce P inputs within the Dublin Corporation area | Survey all surface water systems in the Tolka catchment for misconnections Divert all misconnections to the foul system Monitor surface waters | 1999 to 2007 | Pollution Control Central Laboratory |
| | Set up a Tolka flow database using EPA hydrometric data | Prepare P inputs / P loadings for the catchment | Request EPA hydrometric data Prepare river and surface water inflow P load data | 1999 to 2007 | Drainage Design Pollution Control Central Laboratory |
| | Set up the Tolka catchment on a G.I.S. system | Itemise P input locations graphically | Set up a River / Groundwater Quality GIS database with the Tolka catchment as a specific module | 1999 to 2007 | Pollution Control Central Laboratory Information Systems Section |
| | Liaise with Fingal and Meath County Councils to reduce P at the border with Dublin Corporation | Reduce P input at the borders with Fingal County Council | Upgrade foul sewerage systems in Fingal County Council to minimise overflows to surface waters. Identify misconnections to surface waters | 1999 to 2002 | Fingal County Council |

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| Standard | Measures | Targets | Actions | Timeframe | Responsible for implementation |
|-------------------|--|--|--|--|---|
| River Tolka cont. | Commence New P monitoring programme Increase Q value monitoring frequency to 4 per year at 1 E.P.A. sampling point on Tolka | Return annual median P based on > 10 results To better represent Q status of the Santry | Supplement P monitoring at 1 EPA point on the Tolka Request E.P.A. to determine Q index more frequently at the sampling location on the Tolka | 1999 to 2000 2000 to 2007 1999 to 2000 2001 to 2007 | Pollution Control Central Laboratory E.P.A. |
| | Monitor algal / weed growth in the Tolka | Establish and monitor the impact of elevated phosphate P | Conduct regular biological surveys of the Tolka to quantify algal / weed occurrences | 1999 to 2007 | Central Fisheries E.R.F. Board Central Laboratory |

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