

**CORK COUNTY COUNCIL**

**REVIEW OF  
BANDON SEWERAGE SCHEME  
AND  
BANDON FLOOD DEFENCE SCHEME  
TO ASSESS IMPLICATIONS OF SEPARATION OF THE TWO ELEMENTS**

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

**Job Nr. A9277**

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**May 2005**

**Revision Control Table****User Is Responsible for Checking the Revision Status of this Document**

Rev Nr.	Description of Changes	For & On Behalf of E.G. Pettit & Company			Date
		Prepared by	Checked by	Approved by	
A	Initial Issue	J. Hanley	JKJK.	FMcG <del>JKJK.</del>	May 2005

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## 1.0 INTRODUCTION

In 1993 E.G. Pettit & Company prepared a Preliminary Report for Stage 2 of the Bandon Sewerage Scheme. A subsequent Review Report was prepared in 1997 to take into consideration the contents of the 1996 County Development Plan and to investigate further options for the design of the collection system to prevent flooding in the town.

The recommendations contained in the aforementioned reports included for elements relating to the provision of sewerage infrastructure, ie pipelines and pumping stations and elements which relate to flood defence works, ie compound channels, flood defence walls and raised embankments.

Funding for flood defence works is typically the responsibility of the Office of Public Works (OPW) whereas funding for the collection of urban wastewater and storm water is provided by the Department of the Environment Heritage and Local Government (DOEHLG) and the Local Authority.

The advancement of Stage 2 of the Bandon Sewerage Scheme is included in the DEHLG Water Services Investment Programme 2004 – 2006. However, the funding provided under this programme will not be sufficient to carry out all of the recommendations contained in the 1993 Preliminary Report and 1997 Review Report. The OPW have indicated that funding will not be available from its resources during the period within which it is intended to advance the scheme. This report identifies the elements of the scheme which would normally be funded by the OPW and elements of the scheme which would be funded under water services budgets and also identifies the elements of the flood defence works which are considered necessary for the viability of the of the proposed new sewerage infrastructure.

## 2.0 BACKGROUND

The Preliminary Report prepared by E.G.Pettit in 1993 was based on a design flow in the Bandon River at Bandon Bridge of 300m<sup>3</sup>/s. This was considered to represent a flood flow with a 1 in 100 year return period. The PR included recommendations with regard to the needs of the sewerage system and also flood defences within the town to cater for these design conditions. These recommendations are reproduced in Appendix A and the main elements are summarised below. Some of the recommendations have been implemented as advance contracts and these are described in Section 3.

### *Recommendations for flood defences:*

- Compound channels of 10m width were recommended downstream of Bandon Bridge. These compound channels were to be installed on both the northern and southern banks of the river and were to have a total length of approximately 1,000m.
- The sealing of quay walls at McSweeney Quay, Market Quay and Pearse Street. This is intended to ensure that flood water cannot penetrate to the town centre through unprotected sewers and old watercourses and fissures.

- The raising of the banks of the streams at Ballylangley to a higher level. This will help alleviate flooding of the Glasslinn Rd.

Figure 1 illustrates the extent flood defence works recommended in the PR while Figure 2 shows details of typical river cross sections including the proposed compound channels.

*Recommendations for drainage infrastructure:*

- The recommendations included for a new stormwater collection systems to collect storm flows from the town centre below the 20m contour were recommended. This will require the provision of a storm collection system in the town centre on the southern side of the Bandon River (South Relief Sewer) and also a storm collection system in the town centre on the northern side of the Bandon River (North Relief Sewer). While the river is in flood it will be necessary to pump storm flows from these collection systems to either the Bandon River or the Bridewell River. Two storm water pump stations were recommended, at Watergate St. to cater for storm flows from the North Relief Sewer and also at Patrick's Hill to cater for storm flows from the South Relief Sewer.
- The elimination of storm overflow installations. This will provide protection against inundation by river flood waters to the existing sewerage system.
- The PR recommended that much of the existing combined collection system be replaced or extended. Again for clarity the sewerage scheme recommendations are detailed in Appendix A. The full extent of this combined collection system is shown in Figure 3 and is described in Appendix B. The PR also recommended that a full storm collection system be put in place within the town. The extent of this storm collection system is shown in Figure 4 and is described in Appendix C.

### 3.0 ADVANCE WORKS

A number of advance works contracts have been carried out since the PR was issued. All of these works were carried out broadly in line with the proposals of the PR.

The most substantial of these advance works was completed in 2002 and included the construction of storm and foul sewers in the vicinity of O'Mahony's avenue and Bank Place. These works also included the culverting of the towns park stream from the Cork Road onto Watergate Street and outfalling to the Bandon River downstream of Bandon Bridge.

Construction of the Bandon relief road commenced, on a phased basis, in the mid eighties and was completed in 1999. As part of its construction a storm drainage system was put in place. The storm sewer runs from the relief road under Parnell Street and Station Road and outfalls to the Bandon River to the north of Glasslinn Rd. This represents much of Storm Sewer 4, see Appendix A, as proposed in the PR.

The twin-inverted siphons, which traversed the river just downstream of Bandon Bridge, are no longer in operation. In 1993, following repeated blockages, Cork County Council installed a pumping arrangement at the pump station site proposed in the PR and converted both of the siphons to rising mains. The pump station consists of two pumps submersed in what was the header manhole of the Siphon System. As a temporary measure this pumping arrangement is working satisfactorily. However, the current arrangement is approaching capacity and is not sustainable into the future.

The PR recommended that two pumps would be utilised to pump foul flows through twin 150mm rising mains. Storm flows entering the combined system will be catered for by means of 4 Nr additional storm pumps through twin 400mm rising mains. The twin 400mm rising mains have yet to be installed. It is also not clear what condition the existing rising mains (previously siphons) are in and whether or not their use can be continued into the future.

The PR recommended the provision of an embankment upstream of the weir. This was recommended in order to provide protection to properties at the rear of Weir St. and Sealy's Lane. This work was carried out during the development of the Riverview Shopping Centre.

The PR also recommended that the banks of the streams at Ballylangley be raised. This was recommended in order to contain flood waters from the stream or waters backed up by flood waters in the Bandon River flooding the N71. Since the PR some works have been carried out in this area of the town. These include the culverting of the Ballylangley Streams under the N71 as well as the limited raising of the banks of the streams to the south of the N71. It is not clear whether these works are sufficient to meet the recommendations of the PR.

In recent years some dredging / cleaning out of the river bed has been carried out by Cork County Council. This has been carried out between the footbridge and just downstream of Bandon Bridge. This work is carried out on somewhat

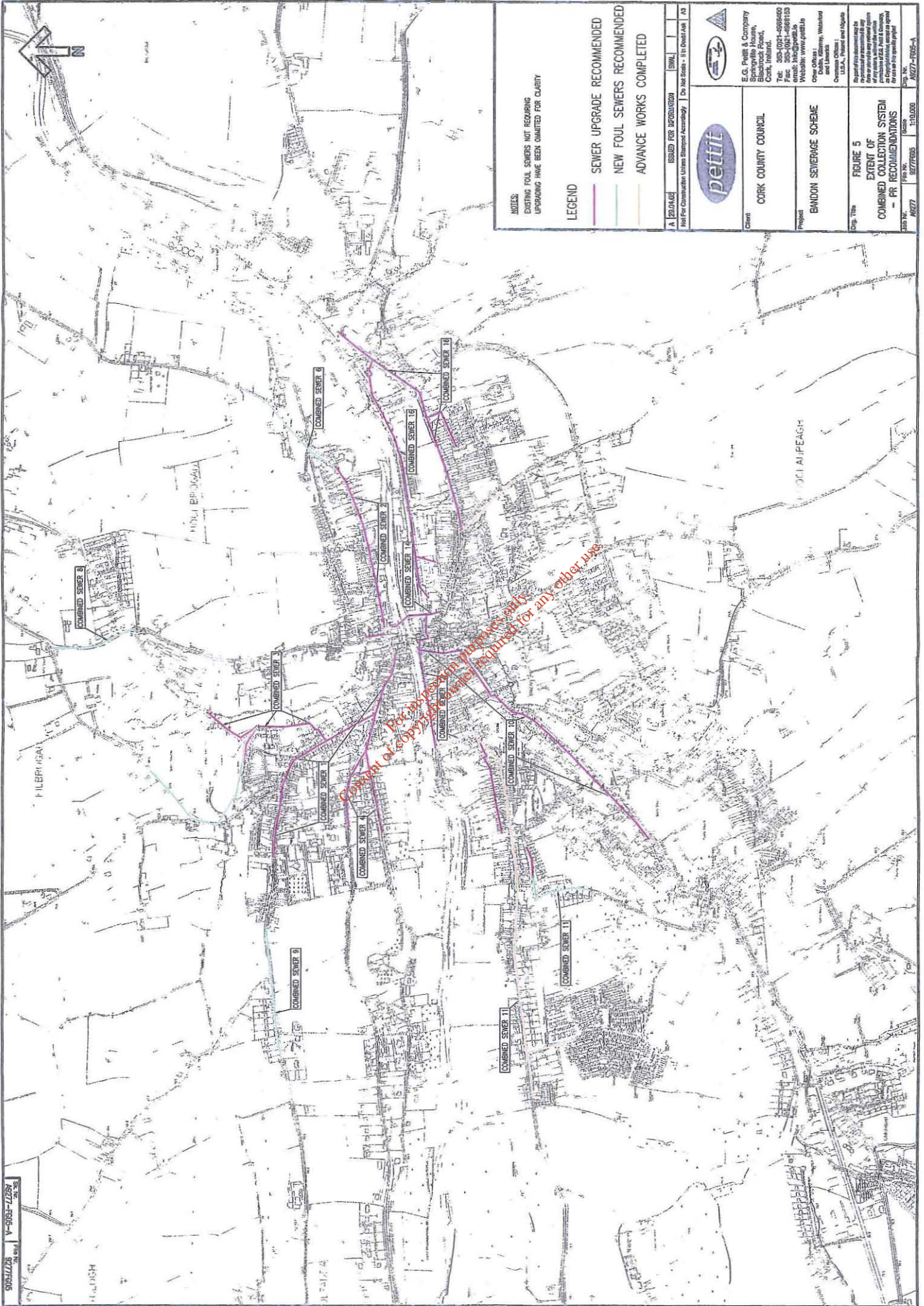
irregular basis and involves the clearing of gravel deposits from the river bed, most especially under the northern most arch of Bandon bridge. While it is felt that these works are of benefit to the hydraulic capacity the Bandon River these works are not considered adequate in the long term.

#### 4.0 REMAINING WORKS

The majority of the works proposed to be carried out in the PR still remain to be completed. This includes all of the flood defence works detailed in Appendix A.

Figure 5 illustrates the extent of advance works which have been carried out on the combined collection system since the PR. It also shows the extent of combined sewers, which remain to be replaced and also new foul sewers which have yet to be constructed. Figure 6 illustrates the extent of storm advance works, which have been carried out, and also the outstanding storm collection system works.

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**NOTES**  
EXISTING FOUL SEWERS NOT REQUIRING UPGRADING HAVE BEEN OMITTED FOR CLARITY

**LEGEND**

- SEWER UPGRADE RECOMMENDED
- NEW SEWERS RECOMMENDED
- ADVANCE WORKS COMPLETED

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**pettit**

**Client**  
CORK COUNTY COUNCIL

**Project**  
BANDON SEWERAGE SCHEME

**Company**  
E.G. Pettit & Company  
100 Main Street,  
Blackrock Road,  
Cork, Ireland.  
Tel: 353-021-496600  
Fax: 353-021-496613  
email: info@pettit.ie  
Website: www.pettit.ie

**Other Offices:** London, Birmingham, Wexford and Limerick  
**Commission Offices:** U.S.A., Poland and Portugal

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**Checked By:** [Name]  
**Approved By:** [Name]

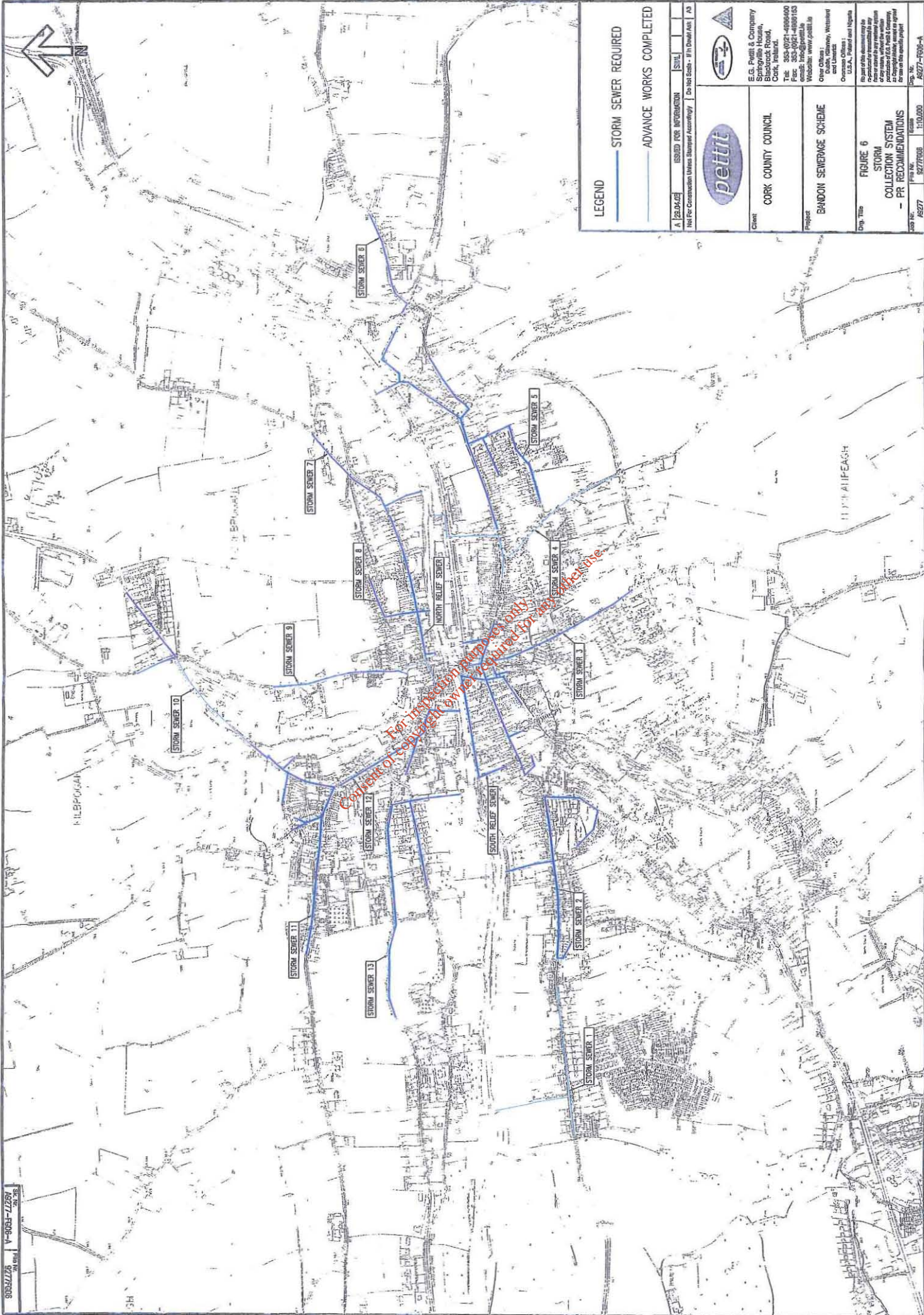
**Fig. Title**  
FIGURE 5  
EXTENT OF  
COMBINED COLLECTION SYSTEM  
- PR RECOMMENDATIONS

**Job No.** 9277905  
**Scale** 1:10,000  
**Fig. No.** 9277-FIG5-A

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Fig. No. 9277905  
Job No. 9277-FIG5-A

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LEGEND  
— STORM SEWER REQUIRED  
— ADVANCE WORKS COMPLETED

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Client  
CORK COUNTY COUNCIL

Project  
BANDON SEWERAGE SCHEME

Other Offices:  
Derry, Galway, Wickliffe  
London, U.K.

Overseas Offices:  
U.S.A., Pakistan and Nigeria

E.G. Pettit & Company  
Springville House,  
Blisscroft Road,  
Cork, Ireland.  
Tel: 00353 202 4006480  
Fax: 00353 202 4006183  
email: info@pettit.ie  
Website: www.pettit.ie

Fig. No.  
AS277-808-A

Scale  
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Proj. Title  
FIGURE 6  
STORM  
COLLECTION SYSTEM  
- PR RECOMMENDATIONS

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## 5.0 PROPOSED STAGE 2 WORKS

As mention previously in Section 1 above, funding for a flood defence works is unlikely to be available within the timescale planned for the execution of Stage 2 of the scheme. It is therefore necessary to identify the elements of the sewerage infrastructure which can proceed independently of the flood defence works, the elements of the flood defence works which are vital for the operation of the remaining sewerage works and the elements of the flood defence works which are independent of the sewerage infrastructure. The latter could be progress as part of a separate flood defence scheme.

### 5.1 Elements of the sewerage infrastructure which can proceed independently of the flood defence works:

Surface flows from above the 20.0m contour can discharge to the river in conditions representing the 1:100 year storm. The PR recommended the provision of new stormwater sewerage systems in the town to take surface water flows from streets below 20.0 m OD.

The PR recommends that North and South Storm Relief Sewers be constructed adjacent to existing combined sewers which are required to be upgraded. (See Figure 4 for extent of North and South Relief Sewers). Laying both the North and South Relief Sewers at the same time as upgrading the existing combined sewers will minimise both traffic disruption and excavations thus leading to considerable cost savings. For these reasons it is recommended that the North and South Relief Sewers be included in Stage 2 of the Bandon Sewerage Scheme.

The North and South Relief sewers are designed to collect storm runoff below the 20.0m contour. In storm flood conditions it will be necessary to pump storm flows to the river. It is therefore necessary to include for the construction of the pumping stations at Watergate St. and Patrick's Hill as part of the Stage 2 works. Failure to do this will leave the low-lying areas of the town liable to flooding during flood conditions in the Bandon River. This could be brought about by storm flows in the North and South Relief Sewers not being able to discharge against high river levels.

The provision of the North and South Storm Relief Sewers will reduce the volume of storm water entering the existing combined sewers. Notwithstanding the reduction in storm water entering the existing combined sewers, the PR recommends that the existing combined sewers be replace with larger diameter sewers to cater for the future design flows. These works need to proceed as part of Stage 2 of the scheme.

On the northern side of the river the foul flow is directed to the river crossing from a location of Watergate Street. The present arrangement includes for the use of the old siphon pipes as rising mains with a temporary pumping arrangement. The construction of the new pumping station and rising mains is essential for Stage 2 of the scheme. As the pumping station is intended to provide for foul and storm pumping it makes economic sense to progress the storm system the same time. Also due to the confined nature of the site it is considered prudent that both the foul and storm elements of the Watergate St

pumping station be constructed at the same time. The foregoing provide further reasons to include the Northern Storm Relief sewer as part of Stage 2 of the scheme.

The North and South Storm Relief sewers are intended to eliminate flooding in the low lying parts of the town. However it is known that infiltration through the quay walls is also a source of flooding. It is therefore necessary to carry out repairs to the existing walls. If this was not carried out the benefit of the installation of the relief sewers would not be fully realised. The PR recommended the closing off of certain sewers and sealing of quay walls at McSweeney Quay and Market Quay and Pearse Street. The sealing of these sewers can be carried out while the main sewers along McSweeney Quay, Market Quay and Pearse St. are upgraded. These works should be carried out under Stage 2 of the Scheme.

## **5.2 Elements of the Flood Defence Works Which Are Necessary For The Effective Operation of The Sewerage Infrastructure**

The sealing of McSweeney Quay and Market Quay will involve the pointing of the quay walls and installation of Grout Curtains behind the Quay Walls. This will ensure that the flood waters do not penetrate to the town centre through fissures, unprotected sewers and old watercourses.

The sealing of the quay walls and the installation of a grout curtain will substantially reduce the risk of infiltration into the combined and storm sewers. This will increase the capacity of, and reduce the risk of flooding in the collection system. It will also reduce operating costs of the collection system pumping stations and treatment works.

Backflow of river water through existing sewers has been identified as part of the cause of flooding at some locations. The PR recommends the elimination of storm overflow installations in the low lying areas of the town centre, at McSweeney Quay, Market Street and Brady's Lane

Much of the overflows, which are required to be eliminated, are operating along foul sewers, which need to be upgraded. In order to minimise traffic disruption and combined discharges to both the Bandon River and the Bridewell River it is considered prudent to eliminate these overflows while upgrading the combined sewers. It is thus considered that these works should be included in the Sewerage Scheme.

## **5.3 Elements of the flood defence works which are independent of the sewerage infrastructure and can be progressed as a separate Flood Defence Scheme.**

The PR recommends the construction of flood defence walls on either side of the river immediately upstream of the weir and on the northern bank of the river immediately downstream of the weir. Provision of storm pumping stations at Watergate St. and Patrick's Hill, before the Flood defence walls are erected as part of the Flood Defence Scheme is completed, may result in storm water being pumped into a river which is already in flood. While this arrangement is not desirable in the long term it will not lead to a greater risk of

flooding than there is at present. The flood defence walls can be progressed as part of a separate contract.

## 6.0

### FURTHER CONSIDERATION

The Development Envelope for Bandon as published in the 2003 Cork County Development Plan is substantially larger than that of the 1986 Development Envelope which was used to design both the foul and Storm collection systems. It is beyond the scope of this report to make recommendations based on this increase in available zoned land.

It should be noted that a number of planning applications have been refused due to poor capacity of the existing collection system within the town. It is understood that the waste water treatment plant however has capacity to meet the existing demands of the town.

The site proposed for the Patrick's Hill storm pumping station has, since the production of the PR, been developed and as such is no longer available. An alternative site will need to be established.

The Bandon River is an NHA upstream of a point approximately 2.5 km upstream of Bandon Bridge and downstream of a point 2.7km downstream of Bandon Bridge. The Bandon River is also designated as a salmonoid water body. These environmental factors were not considered when preparing the initial PR. The potential environmental impacts of the proposed works within the river will have to be considered as part of Stage 2 of the scheme.

It is thus recommended that, as part of the detailed design stage, an extensive review of the proposals of the 1993 PR be carried out.

## 7.0

## COST ESTIMATES

The cost estimates for the remaining outstanding works are summaries in table 6.1 and 6.2 below. Table 6.1 summarises the cost for the upgrades to the collection systems. Table 6.2 summarises the cost of the flood defensive measures to be carried out in the river.

**Table 6.1 Summary Cost Estimates – Collection System Works**

Item	Cost (€)
Combined Sewers	2,911,000
Surface Water Sewers	3,792,000
Pumping Stations & Rising Mains	1,695,000
Sealing Quay Walls	311,000
Standby Generator & Cable	250,000
Eliminating Storm Overflows	200,000
CCTV Survey and Cleaning	60,000
Sub Total	9,219,000
Contingency @10%	921,900
Sub Total	10,140,900
VAT @ 13.5%	1,369,022
Grand Total	11,509,922

**Table 6.2 Summary Cost Estimates - River Defence Works**

Item	Cost (€)
Compound Channels	320,000
Channel Improvements	250,000
Flood Retaining Walls	348,000
Gabions	193,000
Raising of Banks at Ballylangley	8,000
Sub Total	1,119,000
Contingency @15%	167,850
Sub Total	1,286,850
VAT @ 13.5%	173,725
Grand Total	1,460,575

The cost estimates for the Collection Systems Works have been taken from various Priced Bills of Quantities including the Dungarvan Sewerage Scheme. The cost estimates for the river defence works have been estimated based on the Priced Bill of Quantities for the Carrig-on-Suir Flood alleviation scheme and the Clonmel Flood alleviation scheme. Detailed cost breakdowns are included in Appendix D.

## 8.0 CONCLUSIONS

It is recommended that the proposed works of the 1993 Bandon Sewerage Scheme Preliminary Report be split between the Bandon Sewerage Scheme and a Bandon Flood Defence Scheme.

The main items of work to be included in the Bandon Sewerage Scheme are as follows: foul and storm sewers, pumping stations, grout curtains behind McSweeney Quay and Market Quay as well as the removal of storm overflows to the Bandon River through various Quay Walls within the town. The current cost estimate for all of these works is €11,509,922 including VAT and contingency.

The main items of work to be included in the Bandon Flood Defence Scheme are as follows provision of compound channels downstream of Bandon Bridge as well as the construction of flood defence walls along the banks of the Bandon River. The current cost estimate for all of these works is €1,460,575 including VAT and contingency.

It is recommended that a full and extensive review of the proposals of the 1993 Preliminary Report be carried out prior to the commencement of the Detailed Design.

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**APPENDIX A**  
**RECOMMENDATIONS OF THE 1993 PR**

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## Recommendations for Flood Alleviation

Extracts from Chapter 12 of 1993 PR.

To alleviate the occurrence of flooding at Bandon, the proposals in below are recommended. The proposals are based on design flood flows which are compatible with the extent of flooding that occurs at a regular frequency and flooding up to a frequency of a 100 year occurrence.

The proposals are based on the concept of containment and alleviation. The proposals are considered to be necessary and desirable. The proposals will provide a cost benefit to the town over a period of 30 years.

The following proposals are recommended to the Council for the alleviation of flooding at Bandon:

- a) Design Flood Flow of 300 cumecs;

This flow is considered to be a relevant flow to be contained at an economical cost and to design works for such a flow would provide Bandon with a protection to cater not only for floods of a scope that have occurred in the recent times but also to cope with greater floods, so that the town and its inhabitants can look forward to the future with confidence.

- b) The provision of compound channels and channel improvements in the Bandon River for a length of 1200 m.

This proposal will provide for a flood water level at Bandon Bridge such that the bridge will not be submerged.

A 10 m wide compound channel will be provided on the north bank over two sections, 100 m and 350 m in length.

A 10 m wide compound channel will be provided on the southern bank over a length of 550 m.

Channel improvements will be carried out over a length of 700 m.

- c) The provision of new stormwater sewerage systems in the town to take surface water flows from streets below 20.0 m OD.

This proposal will provide for a reliable disposal of storm water run-off from the general area below the 20.0 m OD contour independently of any flood flows in the Bandon and Bridewell Rivers.

- d) Closing off of certain sewers and sealing of quay walls at McSweeney Quay and Market Quay and Pearse Street;

This will ensure that flood waters do not penetrate to the town centre through unprotected sewers, old watercourses and fissures.

- e) The provision of an embankment upstream of the Weir;  
To provide protection to properties at the rear of Weir Street and Sealy's Lane.
- f) The provision of rider sewer(s) at the rear of Pearse Street;  
To connect local drains to the respective sewerage systems and to prevent penetration to the adjacent houses and Pearse Street by flood waters from the Bridewell River.
- g) The provision of an additional culvert for the Townpark Stream at Cork Road;  
To prevent the flooding of Bank Place by flood waters from the Town Park Stream.
- h) The installation of flap valves on the overflow pipes at the Glasslinn Road Pump house and the overflows at the existing siphon installation;  
To provide protection against flooding by the Bandon River of the existing sewerage system.
- i) The installation of flap valves on the culvert at Glasslinn Road;  
To augment the protection of the low lying area at Glasslinn Road.
- j) The elimination of storm overflow installations in the low lying areas of the town centre, at McSweeney Quay, Market Street and Brady's Lane;  
To provide protection against inundation by river flood waters of the existing sewerage system as well as to conform with the Directive 91/271/EEC.
- k) The raising of the banks to a higher level of the streams at Ballylanglely.  
To contain flood waters from the stream or waters backed up by flood waters in the Bandon River, thereby preventing flooding of the National Primary Road.



## Recommendations for Sewerage Scheme

Extracts from Chapter 27 of 1993 PR.

The existing sewerage system for Bandon Town is considered to be inadequate for the efficient sewerage of the town for the following reasons:-

- It is subject to inundation from flood waters of the Bandon and Bridewell Rivers;
  - It is a combined system incorporating the discharge of polluted storm water to water courses and is therefore a source of pollution to three rivers;
  - The Scheme is a cause of discharge of deleterious matter to an important salmonid river (River Bandon);
- The Scheme is a source of pollution upstream of an abstraction point for a water supply scheme;
- It is inadequate for the drainage of storm waters associated with a 1 year storm with storm overflows sealed off;
- The existing siphon crossing of the Bandon River is inadequate;
- The sewerage system is subject to severe siltation due to flooding inundation with consequent inefficient flow rates;
- Source of the existing sewers consists of old unsuitable box culverts and which are not in sound condition;
- Part of the main trunk sewer is inaccessible;
- The sewerage system is subject to some infiltration;
- The capacity of the existing sewerage system will not be adequate for the development of the town as envisaged by the Council;
- The existing system does not comply with the E.C. Directive on Urban Wastewater 91/271/EC;

Therefore, improvements to the system will be necessary and recommendations are set out below for the sewerage of Bandon for the next 50 years. These recommendations are considered to be in accordance with the requirements of the Terms of Reference.

The Main Recommendations will provide the following:

- The (partial) separation of foul and storm water run-off by the provision of separate systems to comply with Directive 91/271/EC and to reduce treatment costs;

- The elimination of existing storm overflow facilities to eliminate all foul sewer discharges to rivers and water courses for environmental reasons and to prevent the ingress of flood waters;
- The replacement of the siphon crossing with a pumping arrangement for reasons of reliability;
- The provision in the appropriate sewerage system for the next 50 years for ordered development;
- The provision of separate drainage for all new development;
- The reduction of surface water flows to the wastewater treatment plant;
- The reduction of surcharging and the prevention of resultant flooding from the existing system;
- The reduction in siltation from the ingress of flood waters;

To comply with the general principles as recommended in 26.2 above, the following steps are proposed and recommended:-

- The upgrading of the existing sewerage system to cater for predicted wastewater flows;
- The provision of separate surface water sewage systems for the drainage of roads and surfaced areas in the built-up areas of the town;
- The blocking off of all storm water overflow facilities and the conversion of these facilities to conventional through-flow manholes;
- The provision of new sections of trunk sewer for the existing system where access is not now available at the Glasslinn Road area;
- The drainage of light industries, general business areas, community facilities and residential areas, but excluding heavy water using industries;
- The provision for a new sewage pumping station at Watergate Street;
- The survey and cleaning of the existing sewerage system.

### **Upgrading of Existing Sewerage Network**

The existing sewerage system provides drainage to existing residential community, general business and industry facilities in the town. It will not be possible to separate some surface water drainage on grounds of feasibility and cost, e.g. back of roofs and back yards, where the separation of surface water would prove to be impracticable. Therefore, it is recommended that the main sewerage system be a partially separate system with the inclusion of roofs and back yards of premises in the town centre where separation would be impracticable. The proposed modified sewerage network is designed on the

basis of peak flows of 2.5 DWF and a rainfall intensity for a 30 year storm. To upgrade the network accordingly, certain sections of the network are proposed to be replaced with larger diameter pipes to cater for the design flows. The modified sewerage network, is shown on a 1:2500 plan (Drg No. 2-11) and schematically on Drg. No. 2-12), and in longitudinal sections on separate drawings. The upgraded sections will have revised gradients where appropriate rather than restrict the new pipelines to the previous gradient when it is not necessary.

### **New Sewer Route**

The section of the existing system between Brady's Lane (MH 223.7) and the existing pumping station is along a route that is now inaccessible in places, either due to infilling over the sewer or by the construction of buildings over the sewer itself. Therefore, it is recommended that this lower and final trunk sewer should be replaced by a new trunk sewer along the Glasslinn Road. This will allow for full access to the sewer along its route to the pumping station. It will be possible to incorporate new larger pipe diameters, that would not be possible along the existing route.

### **Storm Sewers**

For the drainage of storm water run-off, separate and independent storm sewers are proposed for the town and its immediate environs. These are shown on Drg No. 2-66.

These sewers are designed for 1 and 2 year storms as appropriate and checked subsequently for a 30 year storm.

### **Heavy Industry**

Due to the constraint of design flows to the new treatment facility, it is considered to be inappropriate to allow for the inclusion of any heavy industrial effluent using high volumes of water. It is recommended that any future such industry be required to provide its own treatment of effluent to the standard necessary for discharge to a water course.

### **Environmental Impact**

The proposals set out in this Report are considered to be generally beneficial to the environment of Bandon. This is discussed further in Chapter 28.

### **Supervision**

It is recommended that full time employment of an appropriate experienced tradesperson be adopted for the supervision of the sewerage network and pumping stations. The scope of the proposed sewage system will justify the full time supervision of the sewerage system, storm water system and related pumping stations.

## Utilities

It is recommended that consideration be given to implementing improvements to other utilities e.g. E.S.B., Telecom Eireann at the same time as the sewerage works. This will provide a long term benefit for the town.

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**APPENDIX B**  
**OUTSTANDING WORKS RECOMMENDED BY THE 1993 PR**

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### **Bandon Sewerage Scheme**

The upgrading of the existing sewerage system to cater for predicted wastewater flows

The provision of separate surface water sewage systems for the drainage of roads and surfaced areas in the built-up areas of the town. This includes for the provision of new stormwater sewerage systems in the town to take surface water flows from streets below 20.0 m OD.

The provision for new storm pumping stations at Watergate Street and also at Patrick's Hill.

The provision of standby generator at Patrick's Hill Stormwater Pumping Station and a power cable adjoining this pump station with the Watergate Street Pumping Station.

Closing off of certain sewers and sealing of quay walls at McSweeney Quay, Market Quay and Pearse Street;

The elimination of storm overflow installations within the town.

The survey and cleaning of the existing sewerage system.

### **Bandon Flood Defence Scheme**

The provision of compound channels and channel improvements in the Bandon River. Channel improvements will be carried out over a length of approximately 700m. The total length of the compound channels is approximately 1,000m.

The installation of flood defence walls for a length of approximately 410 m.

The installation of gabions or wire mesh retaining banks for a length of approximately 385 m.

The raising of the banks to a higher level of the streams at Ballylangley.

**APPENDIX C**  
**DESCRIPTION OF COMBINED AND STORM COLLECTION SYSTEMS**

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## Combined Sewers

To be read in conjunction with Figure 5

Combined Sewer 1 - The replacement of the existing sewer, mainly 225, from midway on Convent Hill down Kilbrogan Hill and along North Main St., Bank Place and Watergate St. to the new pump station. A new trunk main increasing in diameter from 300 mm on Convent Hill to 375mm on Kilbrogan Hill, 525 / 600 mm along North Main St. and 750 in Bank Place, Watergate St. and on the approach to the Pump Station (810m).

Combined Sewer 2 - Replacement of the lower part of the existing 225/300 sewer on Watergate St. with a new Trunk Sewer varying in diameter from 300 to 375 at its junction with the previous 750 dia trunk sewer (length = 526m)

Combined Sewer 3 - Upgrading of the lower end of the Macroom Rd sewer (225mm) to 300/375 mm diameter (length = 409m)

Combined Sewer 4 - Upgrading of the lower ends of the Dunmanway Rd and Allen Square sewers (225mm) to 300/375 mm diameter (length = 794m)

A package type pumping station and 80mm dia rising main at Church Lane North.

Connection of isolated houses at Bank Place and Watergate St to sewer system.

## Foul Only Extension

Foul Sewer 1 - Approx 360m of 225mm sewer on Lovell's Hill connecting to the existing MH 190.0 on Watergate St.

Foul Sewer 2 - A 225mm sewer approx. 150m in length on the Cork Rd., connecting to MH160.0

Foul Sewer 3 - A 225mm sewer running northwards from MH 60.5 at Kilbrogan Crossroads for Approximately 250m.

Foul Sewer 4 - 372m of 225mm sewer extension from the extension from the existing head manhole (MH10.0) at convent Hill extending to the Reservoir Site.

## South of the River

Combined Sewer 5 - Replacement of the existing 225mm sewer along New Road, St Patrick's Place, Market Quay, Bridge Lane and Bridge Street. With a new 300mm diameter sewer, increasing to 375mm on Bridge Lane and 450mm on Bridge St. (Length = 938m)

Combined Sewer 6 - Upgrading of the town end of the existing 225mm sewer along O'Mahony Ave., on Sealy's Lane and into Ballymodan Place to 300mm (Length = 392m)



Combined Sewer 7 - Replacement of the existing 225mm line from Ballymodan Place along Weir St. and the 400mm line along McSweeney Quay and St. Finbarr's Place with a 450mm trunk sewer increasing to 525mm at the end of McSweeney Quay and 600mm in St. Finbarr's Place (Length = 520m).

Combined Sewer 8 - Upgrading of the end of the existing 225mm sewer along Oliver Plunkett St. to 300mm (length = 77m).

Combined Sewer 9 - Replacement of the existing 225mm sewer on Brady's Lane with a 450mm trunk sewer (Length = 67m).

Combined Sewer 10 - Replacement of the existing 450mm trunk sewer from the town centre, running parallel with the Glasslinn Rd. to the preliminary Treatment Works, with a 900mm and 1050mm trunk main from the header manhole for the cross river flows along the Glasslinn Rd. to the site (length = 809m).

Combined Sewer 11 - Replacement of the existing 225mm sewer running along Connolly St. and Mill Road. To the preliminary treatment works with a 375mm line increasing to 450mm on Mill Rd. (Length = 809m).

#### **Foul Only Extension**

Foul Sewer 5 - A 225mm sewer approximately 240mm in length along Doherty's Rd. and connecting to existing MH 420.3

#### **Storm Sewers**

To be read in conjunction with Figure 6.

Storm Sewer No. 1 is proposed to drain the western part of O'Mahony Avenue/Castlebernard Road. The sewer is shown on Drawing No. 2-66 and manholes are designated S10.0 to S10.7 with a branch from S11.0. The outfall will be to the Bandon River near the eastern perimeter of the Castlebernard Estate.

Storm Sewer No. 2 is proposed to drain the eastern half of O'Mahony Ave. as well as Gallows Hill/Chapel Street. The sewer is shown on Drg. 2-66. Manholes are designated S20.0 at Doherty's Road to 20.6 on O'Mahony Ave. The Gallows Hill/Chapel St. will be drained by a branch sewer with manholes S21.0 to S21.4 to S20.6. The outfall will be to the Bandon River to where the sewer will be taken down a passageway to S20.7 and then to the river outfall at S20.8.

Storm Sewer No. 3 is proposed to drain Warner's Hill/Casement Road. The sewer will extend from north of the Bypass Road, MH S30.0 to outfall to the Bridewell River at S30.8 as shown on Drg. No. 2-66.

Storm Sewer No. 4 is proposed to drain Parnell Street from the By-pass Road at MH S40.0 to S40.6 at the junction with Oliver Plunkett Street, eastwards to the Link Road and then northwards to the Glasslinn Road, MH S40.4,

eastwards along the Glasslinn Road to MH S41.0 and then to the outfall at MH S41.2. At MH S40.8 it is proposed to connect in the drain which flows eastwards towards the Link Road and east of the Council offices to the River. At MH S40.8 it is intended to incorporate a flap valve on the drain connection to prevent backflow into the drain. The existing course of this drain is covered over east of the Link Road and no maintenance is possible. Branch sewers are proposed for short lengths along Oliver Plunkett St. and Connolly St. It is expected that the stormwater sewer will prevent future flooding at Oliver Plunkett St. opposite Parnell St. This proposal has already been submitted to the Council as a matter of urgency in November 1991. Priority for the construction of this sewer is recommended.

Storm Sewer No. 5 is proposed to drain the Connolly Street/Irishtown/Mill Road area as shown on Drg. No. 2-66. Ardnageesha is drained to Connolly Road to MH S50.3. Mill Road is drained to MH 550.4. The Mart Road is drained to MH S50.8. This sewer system will outfall to the Bandon River at MH 551.0.

Storm Sewer No. 6 is proposed to drain part of the road at Ballylengley from MH S60.0 to MH S60.7 where the sewer will discharge to the Mart Stream. This sewer will facilitate further development at Ballylengley.

Storm Sewer No. 7 is proposed to drain Lovell's Hill from MH 370.0 to 570.4 from where it will go southwards through private parkland to outfall to the Bandon River at MH 570.6. This sewer will facilitate further development north of Lovell's Hill Road.

Storm Sewer No. 8 is proposed to drain Knockbrogan Tce. directly to the Bandon River. The terrace is above Watergate Street and above the 20m contour. Therefore it is possible to drain directly to the river rather than to the North Relief sewer along Watergate Street. The sewer will be taken through the Creamery property to discharge to the River at MH 80.8.

Storm Sewer No. 9 is proposed for the Cork Road area. The sewer will discharge to the Townpark Stream at the head of the proposed culvert, MH S90.7.

Storm Sewer No. 10 is proposed to drain the Macroom Road area to facilitate development north of the road. The sewer will discharge to the Townpark Stream at MH S100.8.

Storm Sewer No. 11 is proposed to drain Convent Hill to its junction with the Macroom Road, MH S110.6 and then northwards along the Macroom Road to discharge to the Townpark Stream via MH S100.7. Kilbrogan Street will be drained by a branch sewer from MH S112.0. Two other branches will also drain houses on either side of the Macroom Road. There is a stone culvert in Convent Hill which drains to the Macroom Road, from where it flows northwards to the Townpark Stream along the Macroom Road. This is a 10" culvert. This size will be inadequate and accordingly it is recommended that it be replaced with Storm Sewer No. 11.

Storm Sewer No. 12 is proposed for Kilbrogan Hill to drain from the junction with Macroom Road at MH S120.0 to North Main Street at MH S120.7 from where it will discharge to the Bandon River at MH S120.9 along Watery Lane. This sewer will flow the route of the existing stone culvert. It is proposed that the storm culvert be replaced as it is understood to be severely blocked in places. The forthcoming sewer survey and cleaning contract will indicate the condition of this culvert. For the section along Watery Lane the 36 ins. culvert may be adequate for future use. If the survey shows this section to be in a satisfactory condition, then it will not be necessary to provide a new sewer at this section. The Square and Emmett Row will be drained by a branch sewer from MH S122.0.

Storm Sewer No. 13 is proposed for draining the Dunmanway Road from MH S130.0 to the Square at MH S130.8 and then southwards across the Square to be taken through private property to discharge to the Bandon River upstream of the Weir at MH S131.2. Allen Square will be served by a branch sewer from MH S132.0 at the school. There is an alternative route for Storm Sewer 13 whereby it is connected to Storm Sewer 12 at MH 120.4. The former route is recommended in order to keep the size of the storm sewer at North Main Street to a minimum where the street is narrow.

The low area of the northern side of the town below the 20.0m contour will be drained by a separate sewerage system, designated the "North Relief Sewer". This sewer will serve North Main Street, Bank Place and Watergate Street as shown on Drawing 2-66 and is part of the Flood Alleviation proposals (Chapter 12). This sewer will drain to a new storm water pumping station at Watergate Street which will be located at the same site on the wastewater pumping station (Chapter 25). The storm water will be pumped to the Bandon River, adjacent to the site. Manholes are designated NR 1, etc.

The town centre on the south side of the Bandon River will be served by a separate sewerage system, designated the "South Relief Sewer" and is part of the Flood Alleviation Proposals (Chapter 12). This system will serve Weir Street, McSweeney Quay, Bridge Street, South Main Street, Market St., Market Quay, Bridge Lane, Pearse Street, St. Finbarr's Place, Lower Oliver Plunkett St. and Brady's Lane (Drawing 2-66). The system will drain to a new pumping station at Patrick's Hill (Chapter 25). The storm water will be pumped to the adjacent Bridewell River. Manholes are designated SR 1 etc.

**APPENDIX D**  
**COST ESTIMATES**

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**Bandon**  
**Proposed Combined Sewers**

<u>Upstream</u> MH	<u>Downstream</u> MH	Length	Size	Rate	Cost	A5505	<u>Advance</u> Works	<u>Remaining</u> Works
Drg no.: 1687 2-13								
10.4	10.5	37.6	GM300R	288	10,829	-	-	10,829
10.5	10.6	35.2	GM300R	288	10,138	-	-	10,138
10.6	10.7	36.85	GM300R	288	10,613	-	-	10,613
10.7	10.8	43.95	GM300R	288	12,658	-	-	12,658
10.8	10.9	40.63	GM300R	288	11,701	-	-	11,701
10.9	11	10.92	GM300R	288	3,145	-	-	3,145
11	11.1	62.65	GM300R	288	18,043	-	-	18,043
11.1	11.2	17.8	GM300R	288	5,126	-	-	5,126
Drg no.: 1687 2-14								
Drg no.: 1687 2-15								
11.2	11.3	8.9	GM375R	400	3,554	-	-	3,554
11.3	11.4	105.2	GM375R	400	42,060	-	-	42,060
11.4	11.5	1.6	GM375R	400	652	-	-	652
11.5	11.6	66.3	GM375R	400	26,500	-	-	26,500
11.6	11.7	54.4	GM375R	400	21,752	-	-	21,752
11.7	11.8	39.4	GM375R	400	15,740	-	-	15,740
11.8	11.9	19.56	GM375R	400	7,824	-	-	7,824
Drg no.: 1687 2-16								
61.2	61.3	59	GM300R	288	16,992	-	-	16,992
61.3	61.4	82	GM300R	288	23,616	-	-	23,616
61.4	61.5	80	GM300R	288	23,040	-	-	23,040
61.5	11.5	67	GM375R	400	26,800	-	-	26,800
Drg no.: 1687 2-17								
60.9	61	153.15	GM225R	200	30,630	-	-	30,630
61	61.1	69.21	GM300R	288	19,932	-	-	19,932
61.1	61.2	51.73	GM300R	288	14,898	-	-	14,898
Drg no.: 1687 2-18								
70.2	61.3	113.5	GM225R	200	22,700	-	-	22,700
Drg no.: 1687 2-21								
91.2	91.3	64.12	GM300R	288	18,467	-	-	18,467
91.3	91.4	70.95	GM300R	288	20,434	-	-	20,434
91.4	91.5	24.9	GM300R	288	7,171	-	-	7,171
91.5	91.6	48.8	GM300R	288	14,054	-	-	14,054
Drg no.: 1687 2-22								
91.6	91.7	5.7	GM300R	288	1,630	-	-	1,630
91.7	91.8	86.5	GM300R	288	24,912	-	-	24,912
91.8	91.9	59.9	GM375R	400	23,960	-	-	23,960
91.9	92	47.7	GM375R	400	19,064	-	-	19,064
92	11.9	15.8	GM375R	400	6,320	-	-	6,320
Drg no.: 1687 2-23								
110.1	110.2	66.1	GM375R	400	26,440	-	-	26,440
110.2	110.3	120.9	GM375R	400	48,340	-	-	48,340
110.3	91.8	57.5	GM375R	400	23,000	-	-	23,000

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Upstream MH	Downstream MH	Length	Size	Rate	Cost	A5505	Advance Works	Remaining Works
Drg no.: 1687 2-24								
11.9	12	50.1	GM525R	544	27,254	-	-	27,254
12	12.1	23.43	GM525R	544	12,746	-	-	12,746
12.1	12.2	46.34	GM525R	544	25,209	-	-	25,209
12.2	12.3	49.75	GM600R	592	29,452	-	-	29,452
12.3	12.4	13.1	GM750R	680	8,874	-	-	8,874
12.4	12.5	53.12	GM750R	680	36,122	-	-	36,122
12.5	12.6	14.5	GM750R	680	9,860	-	-	9,860
12.6	12.7	21.0	GM750R	680	14,280	-	-	14,280
12.7	12.8	22.0	GM750R	680	14,960	14,960	-	-
12.8	PS	32.5	GM750R	680	22,100	-	-	22,100
550	223.7	51.0	GM750R	680	34,680	-	-	34,680
Drg no.: 1687 2-26								
160.1	160.2	88.6	GM225R	200	17,716	-	-	17,716
160.2	160.3	5.9	GM225R	200	1,176	-	-	1,176
160.3	160.4	74.6	GM225R	200	14,914	-	-	14,914
160.4	160.5	54.6	GM225R	200	10,910	-	-	10,910
160.5	12.6	3.3	GM225R	200	657	-	-	657
Drg no.: 1687 2-27								
190	190.1	60.5	GM300R	288	17,424	-	-	17,424
190.1	190.2	66.9	GM300R	288	19,253	-	-	19,253
190.2	190.3	62.9	GM300R	288	18,127	-	-	18,127
190.3	190.4	68.2	GM375R	400	27,288	-	-	27,288
190.4	190.5	54.5	GM375R	400	21,800	-	-	21,800
190.5	190.6	60.1	GM375R	400	24,052	-	-	24,052
190.6	190.7	23.1	GM450R	480	11,064	-	-	11,064
190.7	190.8	79.8	GM450R	480	38,294	-	-	38,294
190.8	12.7	24.1	GM450R	480	11,544	-	-	11,544
Drg no.: 1687 2-32								
221.3	221.4	55.4	GM300R	288	15,952	-	-	15,952
221.4	221.5	111.6	GM300R	288	32,141	-	-	32,141
221.5	221.6	87.8	GM300R	288	25,286	-	-	25,286
221.6	221.7	102.5	GM300R	288	29,520	-	-	29,520
221.7	221.8	62.7	GM300R	288	18,058	-	-	18,058
Drg no.: 1687 2-33								
221.8	221.9	77.0	GM300R	288	22,176	-	-	22,176
221.9	222	71.5	GM300R	288	20,592	-	-	20,592
222	222.1	88.5	GM300R	288	25,488	-	-	25,488
222.1	222.2	42.3	GM300R	288	12,182	-	-	12,182
222.2	222.3	32.0	GM300R	288	9,216	-	-	9,216
222.3	222.4	24.2	GM300R	288	6,970	-	-	6,970
222.4	222.5	31.5	GM300R	288	9,072	-	-	9,072
222.5	222.6	21.2	GM300R	288	6,091	-	-	6,091
222.6	222.7	12.6	GM300R	288	3,637	-	-	3,637
222.7	222.8	1.8	GM300R	288	530	-	-	530
Drg no.: 1687 2-34								
222.8	222.9	13.2	GM300R	288	3,790	-	-	3,790
222.9	223	146.0	GM300R	288	42,048	-	-	42,048
223	223.1	50.5	GM375R	400	20,200	-	-	20,200
223.1	223.2	71.5	GM450R	480	34,320	-	-	34,320
223.2	223.3	28.1	GM600R	592	16,635	-	-	16,635
223.3	223.4	25.0	GM600R	592	14,800	-	-	14,800
223.4	223.5	10.0	GM600R	592	5,920	-	-	5,920
223.5	223.6	34.0	GM375R	400	13,600	-	-	13,600
223.6	223.7	47.0	GM750R	680	31,960	-	-	31,960
223.7	560	13.4	GM900R	760	10,184	-	-	10,184

Upstream MH	Downstream MH	Length	Size	Rate	Cost	A5505	Advance Works	Remaining Works
Drg no.: 1687 2-37								
251.6	251.7	44.8	GM225R	200	8,966	-	-	8,966
Drg no.: 1687 2-41								
341	341.1	40.3	GM300R	288	11,606	11,606	-	-
341.1	341.2	56.5	GM300R	288	16,272	16,272	-	-
341.2	341.3	31.0	GM300R	288	8,928	8,928	-	-
341.3	341.4	101.5	GM300R	288	29,232	29,232	-	-
341.4	341.5	85.5	GM300R	288	24,624	24,624	-	-
Drg no.: 1687 2-42								
341.5	341.6	40.0	GM300R	288	11,520	11,520	-	-
341.6	341.7	8.6	GM300R	288	2,477	2,477	-	-
341.7	341.8	19.5	GM300R	288	5,616	5,616	-	-
341.8	341.9	14.1	GM300R	288	4,058	4,058	-	-
341.9	342	46.5	GM450R	480	22,320	22,320	-	-
342	342.1	53.5	GM450R	480	25,680	25,680	-	-
342.1	342.2	70.0	GM450R	480	33,600	33,600	-	-
342.2	342.3	94.0	GM450R	480	45,120	45,120	-	-
342.3	342.4	47.5	GM450R	480	22,800	-	-	22,800
342.4	342.5	58.0	GM450R	480	27,840	-	-	27,840
342.5	342.6	43.0	GM525R	544	23,392	-	-	23,392
342.6	223.2	54.0	GM525R	544	29,376	-	-	29,376
Drg no.: 1687 2-42								
420.3	420.4	50.3	GM225R	200	10,060	-	-	10,060
420.4	420.5	38.0	GM225R	200	7,600	-	-	7,600
420.5	420.6	23.0	GM225R	200	4,600	-	-	4,600
420.6	420.7	16.5	GM225R	200	3,300	-	-	3,300
430	420.5	33.0	GM225R	200	6,600	-	-	6,600
Drg no.: 1687 2-42								
460.8	460.9	42.0	GM300R	288	12,096	-	-	12,096
460.9	461	25.5	GM300R	288	7,344	-	-	7,344
461	461.1	16.7	GM300R	288	4,815	-	-	4,815
461.1	341.9	19.3	GM300R	288	5,553	-	-	5,553
Drg no.: 1687 2-49								
500.4	500.5	20.5	GM450R	480	9,840	-	-	9,840
500.5	500.6	39.4	GM450R	480	18,888	-	-	18,888
500.6	223.7	7.8	GM450R	480	3,744	-	-	3,744
550	223.7	51.0	GM750R	680	34,680	-	-	34,680
Drg no.: 1687 2-51								
531	531.1	26.5	GM300R	288	7,632	-	-	7,632
531.1	500.4	47.0	GM300R	288	13,536	-	-	13,536
Drg no.: 1687 2-52								
560	560.1	7.5	GM1200R	960	7,200	-	-	7,200
560.1	560.2	42.0	GM1200R	960	40,320	-	-	40,320
560.2	560.3	40.0	GM1200R	960	38,400	-	-	38,400
560.3	560.4	90.0	GM1200R	960	86,400	-	-	86,400
560.4	560.5	90.0	GM1200R	960	86,400	-	-	86,400
560.5	560.6	90.0	GM1200R	960	86,400	-	-	86,400
580	560.4	60.0	GM225R	200	12,000	-	-	12,000
570	560.2	16.0	GM225R	200	3,200	-	-	3,200

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Upstream MH	Downstream MH	Length	Size	Rate	Cost	A5505	Advance Works	Remaining Works
Drg no.: 1687 2-53								
560.6	560.7	90.0	GM900R	760	68,400	-	-	68,400
560.7	560.8	90.0	GM900R	760	68,400	-	-	68,400
560.8	560.9	90.0	GM900R	760	68,400	-	-	68,400
560.9	561	55.0	GM900R	760	41,800	-	-	41,800
561	561.1	40.0	GM900R	760	30,400	-	-	30,400
561.1	561.2	29.5	GM900R	760	22,420	-	-	22,420
Drg no.: 1687 2-54								
590.1	590.2	69.8	GM225R	200	13,950	-	-	13,950
Drg no.: 1687 2-55								
590.7	590.8	64.2	GM375R	400	25,688	-	-	25,688
590.8	590.9	112.5	GM375R	400	45,004	-	-	45,004
590.9	591	125.8	GM375R	400	50,316	-	-	50,316
591	591.1	32.7	GM375R	400	13,092	-	-	13,092
591.1	591.2	81.3	GM375R	400	32,512	-	32,512	-
591.2	591.3	29.0	GM450R	480	13,920	-	13,920	-
591.3	591.4	52.1	GM450R	480	24,984	-	24,984	-
591.4	591.5	87.0	GM450R	480	41,760	-	41,760	-
591.5	591.6	1.9	GM450R	480	898	-	898	-
Drg no.: 1687 2-56								
650.9	651	56.8	GM300R	288	16,358	-	-	16,358
651	591.6	75.2	GM300R	288	21,663	-	-	21,663
Drg no.: 1687 2-59								
901	901.1	55.0	GM225R	200	11,000	-	-	11,000
901.1	901.2	80	GM225R	200	16,000	-	-	16,000
901.2	901.3	79	GM225R	200	15,800	-	-	15,800
901.3	901.4	80	GM225R	200	16,000	-	-	16,000
901.4	10	80	GM225R	200	16,000	-	-	16,000
Drg no.: 1687 2-60								
902	902.1	53	GM225R	200	10,600	-	-	10,600
902.1	902.2	50	GM225R	200	10,000	-	-	10,000
902.2	902.3	70	GM225R	200	14,000	-	-	14,000
902.3	420.3	70	GM225R	200	14,000	-	-	14,000
Drg no.: 1687 2-61								
903	903.1	90	GM225R	200	18,000	-	-	18,000
903.1	903.2	90	GM225R	200	18,000	-	-	18,000
903.2	903.3	45	GM225R	200	9,000	-	-	9,000
903.3	903.4	40	GM225R	200	8,000	-	-	8,000
903.4	903.5	30	GM225R	200	6,000	-	-	6,000
903.5	903.6	59.6	GM225R	200	11,920	-	-	11,920
903.6	903.7	95	GM225R	200	19,000	-	-	19,000
903.7	903.8	45	GM225R	200	9,000	-	-	9,000
903.8	61.3	60	GM225R	200	12,000	-	-	12,000
Drg no.: 1687 2-62								
904	904.1	95	GM225R	200	19,000	-	-	19,000
904.1	160	55	GM225R	200	11,000	-	-	11,000
905	905.1	70	GM225R	200	14,000	-	-	14,000
905.1	905.2	95	GM225R	200	19,000	-	-	19,000
905.2	905.3	95	GM225R	200	19,000	-	-	19,000
905.3	905.4	75	GM225R	200	15,000	-	-	15,000
905.4	190	25	GM225R	200	5,000	-	-	5,000
Drg no.: 1687 2-63								
906	906.1	75	GM225R	200	15,000	-	-	15,000
906.1	906.2	60	GM225R	200	12,000	-	-	12,000
906.2	906.3	70	GM225R	200	14,000	-	-	14,000
906.3	906.4	40	GM225R	200	8,000	-	-	8,000
906.4	60.5	5	GM225R	200	1,000	-	-	1,000
<b>TOTAL</b>					<b>3,280,928</b>	<b>256,013</b>	<b>114,074</b>	<b>2,910,841</b>



**Bandon**  
**Proposed Storm Sewers**

Upstream MH	Downstream MH	Length	Size	Rate	Cost	A5505	Advance Works	Remaining Works
Drg no.: 1687 2-67								
SR1	SR2	45.0	GM375R	400	18,000	-	-	18,000
SR2	SR3	41.5	GM375R	400	16,600	-	-	16,600
SR3	SR4	53.0	GM450R	480	25,440	-	-	25,440
SR4	SR6	72.0	GM600R	592	42,624	-	-	42,624
SR6	SR7	117.0	GM600R	592	69,264	-	-	69,264
SR7	SR27	64.0	GM600R	592	37,888	-	-	37,888
SR27	SR30	29.0	GM750R	680	19,720	-	-	19,720
SR30	SR32	17.0	GM900R	760	12,920	-	-	12,920
SR32	SR33	22.0	GM900R	760	16,720	-	-	16,720
SR33	SR34	11.0	GM900R	760	8,360	-	-	8,360
SR34	PS	4.0	GM900R	760	3,040	-	-	3,040
Drg no.: 1687 2-68								
SR5	SR6	25.0	GM225R	200	5,000	-	-	5,000
SR8	SR9	55.0	GM375R	400	22,000	-	-	22,000
SR9	SR10	80.0	GM375R	400	32,000	-	-	32,000
SR10	SR11	82.0	GM450R	480	39,360	-	-	39,360
SR11	SR12	105.0	GM450R	480	50,400	-	-	50,400
SR12	SR13	29.0	GM450R	480	13,920	-	-	13,920
SR13	SR14	10.0	GM450R	480	4,800	-	-	4,800
SR14	SR15	58.0	GM450R	480	27,840	-	-	27,840
SR15	SR27	8.0	GM450R	480	3,840	-	-	3,840
Drg no.: 1687 2-69								
SR16	SR26	50.0	GM225R	200	10,000	-	-	10,000
SR26	SR27	54.0	GM600R	592	31,968	-	-	31,968
SR17	SR18	48.0	GM225R	200	9,600	-	-	9,600
SR18	SR19	34.0	GM225R	200	6,800	-	-	6,800
SR19	SR20	14.0	GM300R	288	4,032	-	-	4,032
SR20	SR23	45.0	GM300R	288	12,960	-	-	12,960
SR23	SR24	50.0	GM450R	480	24,000	-	-	24,000
SR24	SR25	11.0	GM450R	480	5,280	-	-	5,280
SR25	SR26	6.0	GM450R	480	2,880	-	-	2,880
SR21	SR22	38.0	GM300R	288	10,944	-	-	10,944
SR22	SR23	16.0	GM300R	288	4,608	-	-	4,608
SR28	SR29	105.0	GM300R	288	30,240	-	-	30,240
SR29	SR30	19.0	GM300R	288	5,472	-	-	5,472
SR31	SR32	35.0	GM225R	200	7,000	-	-	7,000
Drg no.: 1687 2-70								
NR1	NR2	42.0	GM300R	288	12,096	12,096	-	-
NR2	NR3	35.0	GM300R	288	10,080	10,080	-	-
NR3	NR4	10.0	GM450R	480	4,800	4,800	-	-
NR4	NR10	22.0	GM450R	480	10,560	10,560	-	-
NR10	NR11	12.0	GM750R	680	8,160	8,160	-	-
NR11	NR12	3.5	GM750R	680	2,380	2,380	-	-
NR5	NR6	110.0	GM450R	480	52,800	-	-	52,800
NR6	NR7	80.0	GM450R	480	38,400	-	-	38,400
NR7	NR8	73.0	GM450R	480	35,040	-	-	35,040
NR8	NR9	76.0	GM525R	544	41,344	-	-	41,344
NR9	NR10	80.0	GM525R	544	43,520	-	-	43,520

Upstream MH	Downstream MH	Length	Size	Rate	Cost	A5505	Advance Works	Remaining Works
Drg no.: 1687 2-71								
S10.0	S10.1	90.0	GM300R	288	25,920	25,920	-	-
S10.1	S10.2	100.0	GM375R	400	40,000	40,000	-	-
S10.2	S10.3	100.0	GM375R	400	40,000	40,000	-	-
S10.3	S10.4	39.0	GM750R	680	26,520	26,520	-	-
S11.0	S10.4	101.0	GM225R	200	20,200	-	-	20,200
S10.4	S10.5	62.0	GM750R	680	42,160	42,160	-	-
S10.5	S10.6	13.0	GM750R	680	8,840	8,840	-	-
S10.6	S10.7	7.0	GM750R	680	4,760	4,760	-	-
S10.7	S10.8	249.0	GM750R	680	169,320	169,320	-	-
S10.8	Out	195.0	GM750R	680	132,600	132,600	-	-
Drg no.: 1687 2-72								
S20.0	S20.1	30.0	GM225R	200	6,000	-	-	6,000
S20.1	S20.2	20.0	GM225R	200	4,000	-	-	4,000
S20.2	S20.3	90.0	GM225R	200	18,000	-	-	18,000
S20.3	S20.4	90.0	GM300R	288	25,920	-	-	25,920
S20.4	S20.5	60.0	GM300R	288	17,280	-	-	17,280
S20.5	S20.6	50.0	GM375R	400	20,000	-	-	20,000
S20.6	S20.7	64.0	GM450R	480	30,720	-	-	30,720
S20.7	S20.8	168.0	GM600R	592	99,456	-	-	99,456
Drg no.: 1687 2-74								
S21.0	S21.1	90.0	GM600R	592	53,280	-	-	53,280
S21.1	S21.2	45.0	GM600R	592	26,640	-	-	26,640
S21.2	S21.3	80.0	GM600R	592	47,360	-	-	47,360
S21.3	S21.4	80.0	GM600R	592	47,360	-	-	47,360
S21.4	S21.5	95.0	GM600R	592	56,240	-	-	56,240
S21.5	S21.6	90.0	GM600R	592	53,280	-	-	53,280
S30.0	S30.1	76.0	GM300R	288	21,888	-	-	21,888
S30.1	S30.2	32.0	GM375R	400	12,800	-	-	12,800
S30.2	S30.3	90.0	GM525R	544	48,960	-	-	48,960
S30.3	S30.4	85.0	GM525R	544	46,240	-	-	46,240
S30.4	S30.5	37.0	GM525R	544	20,128	-	-	20,128
S30.5	S30.6	76.0	GM525R	544	41,344	-	-	41,344
S30.6	S30.7	17.0	GM525R	544	9,248	-	-	9,248
S30.7	S30.8	44.0	GM525R	544	23,936	-	-	23,936
Drg no.: 1687 2-75								
S40.0	S40.1	70.0	GM225R	200	14,000	-	14,000	-
S40.1	S40.2	90.0	GM225R	200	18,000	-	18,000	-
S40.2	S40.3	85.0	GM450R	480	40,800	-	40,800	-
S40.3	S40.4	85.0	GM525R	544	46,240	-	46,240	-
S40.4	S40.5	60.0	GM525R	544	32,640	-	32,640	-
S40.5	S40.6	25.0	GM525R	544	13,600	-	13,600	-
Drg no.: 1687 2-76								
S40.6	S40.7	70.0	GM750R	680	47,600	-	-	47,600
S40.7	S40.8	70.0	GM750R	680	47,600	-	-	47,600
S40.8	S40.9	80.0	GM900R	760	60,800	-	-	60,800
S40.9	S41.0	70.0	GM900R	760	53,200	-	-	53,200
S41.0	S41.1	30.0	GM900R	760	22,800	-	-	22,800
S41.1	S41.2	6.0	GM900R	760	4,560	-	-	4,560
S42.0	S40.6	90.0	GM225R	200	18,000	-	-	18,000

<u>Upstream</u> MH	<u>Downstream</u> MH	<u>Length</u>	<u>Size</u>	<u>Rate</u>	<u>Cost</u>	<u>A5505</u>	<u>Advance</u> <u>Works</u>	<u>Remaining</u> <u>Works</u>
Drg no.: 1687 2-77								
S50.0	S50.1	95.0	GM225R	200	19,000	-	-	19,000
S50.1	S50.2	80.0	GM300R	288	23,040	-	-	23,040
S50.2	S50.3	80.0	GM300R	288	23,040	-	-	23,040
S50.3	S50.4	80.0	GM450R	480	38,400	-	-	38,400
S50.4	S50.5	80.0	GM525R	544	43,520	-	-	43,520
S50.5	S50.6	86.0	GM525R	544	46,784	-	-	46,784
S50.6	S50.7	30.0	GM525R	544	16,320	-	-	16,320
S50.7	S50.8	20.0	GM525R	544	10,880	-	-	10,880
S50.8	S50.9	42.0	GM600R	592	24,864	-	-	24,864
S50.9	S51.0	34.0	GM600R	592	20,128	-	-	20,128
Drg no.: 1687 2-78								
S52.0	S52.1	123.0	GM225R	200	24,600	-	-	24,600
S52.1	S52.2	57.0	GM300R	288	16,416	-	-	16,416
S52.2	S52.3	68.0	GM300R	288	19,584	-	-	19,584
S52.3	S52.4	80.0	GM300R	288	23,040	-	-	23,040
S53.0	S53.1	60.0	GM225R	200	12,000	-	-	12,000
S53.1	S53.4	55.0	GM225R	200	11,000	-	-	11,000
S55.0	S55.1	55.0	GM225R	200	11,000	-	-	11,000
S55.1	S55.2	55.0	GM225R	200	11,000	-	-	11,000
S55.2	S55.3	75.0	GM375R	400	30,000	-	-	30,000
S55.3	S50.8	20.0	GM375R	400	8,000	-	-	8,000
Drg no.: 1687 2-79								
S54.0	S54.1	60.0	GM225R	200	12,000	-	-	12,000
S54.1	S54.2	60.0	GM225R	200	12,000	-	-	12,000
S54.2	S54.3	45.0	GM225R	200	9,000	-	-	9,000
S54.3	S54.4	18.0	GM300R	288	5,184	-	-	5,184
S54.4	S50.4	45.0	GM300R	288	12,960	-	-	12,960
S52.4	S50.3	32.0	GM300R	288	9,216	-	-	9,216
Drg no.: 1687 2-80								
S60.0	S60.1	95.0	GM225R	200	19,000	-	-	19,000
S60.1	S60.2	40.0	GM225R	200	8,000	-	-	8,000
S60.2	S60.3	15.0	GM225R	200	3,000	-	-	3,000
S60.3	S60.4	59.0	GM225R	200	11,800	-	-	11,800
S60.4	S60.5	30.0	GM225R	200	6,000	-	-	6,000
S60.5	S60.6	40.0	GM225R	200	8,000	-	-	8,000
S60.6	S60.7	48.0	GM375R	400	19,200	-	-	19,200
Drg no.: 1687 2-81								
S70.0	S70.1	90.0	GM225R	200	18,000	-	-	18,000
S70.1	S70.2	90.0	GM300R	288	25,920	-	-	25,920
S71.0	S70.4	23.0	GM375R	400	9,200	-	-	9,200
S70.2	S70.3	90.0	GM375R	400	36,000	-	-	36,000
S70.3	S70.4	48.0	GM450R	480	23,040	-	-	23,040
S70.4	S70.5	54.0	GM525R	544	29,376	-	-	29,376
S70.5	S70.6	62.0	GM900R	760	47,120	-	-	47,120
Drg no.: 1687 2-82								
S80.0	S80.1	54.0	GM375R	400	21,600	-	-	21,600
S80.1	S80.2	58.0	GM375R	400	23,200	-	-	23,200
S80.2	S80.3	14.0	GM375R	400	5,600	-	-	5,600
S80.3	S80.4	10.0	GM375R	400	4,000	-	-	4,000
S80.4	S80.5	13.0	GM375R	400	5,200	-	-	5,200
S80.5	S80.6	30.0	GM375R	400	12,000	-	-	12,000
S80.6	S80.7	21.0	GM375R	400	8,400	-	-	8,400
S80.7	S80.8	31.0	GM450R	480	14,880	-	-	14,880

Upstream MH	Downstream MH	Length	Size	Rate	Cost	A5505	Advance Works	Remaining Works
Drg no.: 1687 2-83								
S90.0	S90.1	90.0	GM225R	200	18,000	-	-	18,000
S90.1	S90.2	90.0	GM225R	200	18,000	-	-	18,000
S90.2	S90.3	48.0	GM225R	200	9,600	-	-	9,600
S90.3	S90.4	85.0	GM225R	200	17,000	-	-	17,000
S90.4	S90.5	46.0	GM300R	288	13,248	-	-	13,248
S90.5	S90.6	26.0	GM300R	288	7,488	-	-	7,488
S90.6	S90.7	20.0	GM450R	480	9,600	-	-	9,600
Drg no.: 1687 2-84								
S100.0	S100.1	70.0	GM225R	200	14,000	-	-	14,000
S100.1	S100.2	48.0	GM225R	200	9,600	-	-	9,600
S100.2	S100.3	100.0	GM375R	400	40,000	-	40,000	-
S100.3	S100.4	100.0	GM375R	400	40,000	-	40,000	-
S100.4	S100.5	90.0	GM375R	400	36,000	-	36,000	-
S100.5	S100.6	63.0	GM525R	544	34,272	-	34,272	-
S100.6	S100.7	65.0	GM525R	544	35,360	-	-	35,360
S100.7	S100.8	25.0	GM525R	544	13,600	-	-	13,600
Drg no.: 1687 2-85								
S101.0	S101.1	90.0	GM225R	200	18,000	-	-	18,000
S101.1	S101.2	70.0	GM225R	200	14,000	-	-	14,000
S101.2	S100.2	75.0	GM225R	200	15,000	-	-	15,000
Drg no.: 1687 2-86								
S110.0	S110.1	70.0	GM300R	288	20,160	-	-	20,160
S110.1	S110.2	90.0	GM300R	288	25,920	-	-	25,920
S110.2	S110.3	85.0	GM375R	400	34,000	-	-	34,000
S112.0	S112.1	35.0	GM225R	200	7,000	-	-	7,000
S112.1	S110.5	65.0	GM300R	288	18,720	-	-	18,720
S113.0	S110.8	95.0	GM225R	200	19,000	-	-	19,000
S114.0	S110.9	55.0	GM225R	200	11,000	-	-	11,000
Drg no.: 1687 2-87								
S110.3	S110.4	70.0	GM375R	400	28,000	-	-	28,000
S110.4	S110.5	95.0	GM375R	400	38,000	-	-	38,000
S110.5	S110.6	85.0	GM525R	544	46,240	-	-	46,240
S110.6	S110.7	90.0	GM525R	544	48,960	-	-	48,960
S110.7	S110.8	60.0	GM525R	544	32,640	-	-	32,640
S110.8	S110.9	25.0	GM525R	544	13,600	-	-	13,600
S110.9	S111.0	45.0	GM525R	544	24,480	-	-	24,480
Drg no.: 1687 2-88								
S120.0	S120.1	90.0	GM225R	200	18,000	-	-	18,000
S120.1	S120.2	90.0	GM300R	288	25,920	-	-	25,920
S120.2	S120.3	48.0	GM300R	288	13,824	-	-	13,824
S120.3	S120.4	60.0	GM300R	288	17,280	-	-	17,280
S120.4	S120.5	23.0	GM375R	400	9,200	-	-	9,200
S120.5	S120.6	42.0	GM375R	400	16,800	-	-	16,800
S120.6	S120.7	30.0	GM375R	400	12,000	-	-	12,000
S120.7	S120.8	28.0	GM375R	400	11,200	-	-	11,200
S120.8	S120.9	50.0	GM375R	400	20,000	-	-	20,000
S122.0	S122.1	70.0	GM225R	200	14,000	-	-	14,000
S122.1	S120.4	60.0	GM225R	200	12,000	-	-	12,000

<u>Upstream</u> MH	<u>Downstream</u> MH	<u>Length</u>	<u>Size</u>	<u>Rate</u>	<u>Cost</u>	<u>A5505</u>	<u>Advance</u> <u>Works</u>	<u>Remaining</u> <u>Works</u>
Drg no.: 1687 2-89								
S130.0	S130.1	60.0	GM225R	200	12,000	-	-	12,000
S130.1	S130.2	70.0	GM225R	200	14,000	-	-	14,000
S130.2	S130.3	70.0	GM225R	200	14,000	-	-	14,000
S130.3	S130.4	80.0	GM225R	200	16,000	-	-	16,000
S132.0	S132.1	88.0	GM225R	200	17,600	-	-	17,600
S132.1	S132.2	90.0	GM225R	200	18,000	-	-	18,000
S132.2	S130.9	80.0	GM225R	200	16,000	-	-	16,000
Drg no.: 1687 2-89								
S130.4	S130.5	90.0	GM300R	288	25,920	-	-	25,920
S130.5	S130.6	90.0	GM300R	288	25,920	-	-	25,920
S130.6	S130.7	90.0	GM450R	480	43,200	-	-	43,200
S130.7	S130.8	77.0	GM450R	480	36,960	-	-	36,960
S130.8	S130.9	58.0	GM450R	480	27,840	-	-	27,840
S130.9	S131.0	38.0	GM450R	480	18,240	-	-	18,240
S131.0	S131.1	66.0	GM450R	480	31,680	-	-	31,680
S131.1	S131.2	45.0	GM450R	480	21,600	-	-	21,600
<b>TOTAL</b>					4,646,124	538,196	315,552	3,792,376

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## Summary Cost Estimates

### Sewerages Scheme

Item	Cost
Combined Sewers	2,911,000
Surface Water Sewers	3,792,000
Pumping Stations & Rising Mains	1,695,000
Sealing Quay Walls	311,000
Standby Generator & Cable	250,000
Eliminating Storm Overflows	200,000
CCTV Survey and Cleaning	60,000
Sub Total	9,219,000
Contingency @10%	921,900
Sub Total	10,140,900
VAT @ 13.5%	1,369,022
Grand Total	11,509,922

### Flood Defence Scheme

Item	Cost
Compound Channels	320,000
Channel Improvements	250,000
Flood Retaining Walls	348,000
Gabions	193,000
Raising of Banks at Ballyangley	8,000
Sub Total	1,119,000
Contingency @15%	167,850
Sub Total	1,286,850
VAT @ 13.5%	173,725
Grand Total	1,460,575