2 CONCLUSIONS & RECOMMENDATIONS

11.1 GENERAL

11.1.1 This Environmental Impact Statement has been prepared for the River Fergus (Ennis) Drainage Scheme. The Scheme involves the construction of new embankments and walls on the banks of the Fergus and channel improvements. The proposed works are designed to convey a 100 year flood safely through the town of Ennis to designated flood areas downstream of Ennis before discharging to the Fergus Estuary.

11.1.2 As part of the Environmental Impact Statement a number of topics were examined to assess if the proposed Scheme will have an effect on the immediate environment in Ennis and environs. A brief description follows of the main findings relating to each topic.

11.2 HUMAN BEINGS

11.2.1 Human Beings comprise the most significant element of the "environment" and any potential impact on the status of human beings by a development proposal must therefore be comprehensively addressed. The principal concern in this respect is that human beings experience no significant unacceptable diminution in any aspect or aspects of "quality of life" as a consequence of the construction and operation of the proposed development.

11.2.2 Four main elements of the Human Beings aspect of the assessment were considered as follows:

- Population;
- Employment;
- Amenities; and
- Health and Safety.

2.1.1.1 Population The proposed Scheme was reviewed in relation to the likely impacts it would have on population and it was concluded that the impacts would be positive. The Scheme will protect the town from flooding and facilitate future construction of residential, industrial and commercial developments in the area. No remedial or reductive measures were considered necessary.

2.1.1.2 Employment There are good employment opportunities within the area at present. It was considered likely that the Scheme would generate direct and indirect

employment over the estimated 3 to 4 year construction period. No remedial or reductive measures were considered necessary.

2.1.1.3 Amenities There is a wide range of tourist, sport and leisure facilities in Ennis at present. The River Fergus has significant amenity value, in particular relating to fishing and angling activities. The potential impacts of the Scheme were assessed at both construction stage and operational stage. During construction the main impacts will be increased traffic and increased generation of noise, dirt and dust. Once operational the Scheme will have a positive impact in that it will protect the town and the properties therein against flooding. Once the flooding risk is removed it is possible that businesses and tourism may develop further. No mitigation measures were considered necessary for the operational phase of the Scheme. It is expected that the increase in traffic will not have an affect on the amenities in the area and that no significant loss of land-based amenity will result from the development of the Scheme. Noise and dust are dealt with in a separate section of the Report.

2.1.1.4 Health and Safety During the construction phase of the Scheme the main risks were ascertained to be those risks associated with: excavation and construction of embankment walls and pumping stations; chemical or biological substances; working on or near the River; and construction traffic. In the operation stage of the Scheme the main risks identified were those associated with: electricity supply to the pumping stations; hazardous areas in the pumping stations; and increased water levels in the River Fergus.

2.1.1.5 All work during the construction phase will be undertaken in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2001, and it is proposed that a management system be put in place to address safe working procedures, monitoring and servicing for the operational stage of the Scheme. It is considered that if these measures are implemented there will be little or no impact on human beings in the area. Proper and regular maintenance will be carried out on all mechanical equipment on site to ensure that the equipment is in safe working order and does not pose a threat to the health and safety of either workers or members of the public. The Contractor will be required to develop a flood warning system and ensure that all parts of the site are protected against floods and that machinery can be removed from the River in the event of a flood risk.

11.3 FLORA AND FAUNA

11.3.1 A report was compiled by Natura Environmental Consultants addressing the Flora and Fauna aspect of the EIS. The methodology adopted for the preparation of the report included a desk study, consultations with the Fisheries Board, National Parks and Wildlife Service and field surveys carried out in November and December of

2004. The habitats were classified using "A Guide to Habitats of Ireland" (Fossitt, 2000). The fauna assessment was carried out using a combination of direct observation for tracks and signs, as well as determination of the suitability of the habitat for particular species. Trees and other structures were assessed for their suitability as potential bat roosting sites. The River channel was assessed for its suitability as a spawning, nursery and holding habitat for salmonid and lamprey species.

11.3.2 The recommendations for the works are summarised in the following paragraphs.

11.3.2.1 General recommendations on in-stream works: Work in-stream should be minimised as much as possible as the Fergus is a cSAC and a designated salmonid River. Water quality should be protected at all times. Proposed design of the works in the River and on the banks should be submitted to the SRFB and NPWS for comment. All in-stream works should be carried out by isolating the working area from the watercourse where appropriate, through the use of cofferdams, bunds or other approved methods in order to avoid risks of siltation. Where possible, in-stream works should be carried out outside the annual close season to protect spawning activities in the River. There should not be any weirs or obstructions installed such as to prohibit the free and unhindered movement of trout, salmon and other aquatic organisms.

11.3.2.2 Structures and trees with bat roost potential: A bat survey of all structures to be demolished and all trees to be felled should be carried out once these have been identified precisely in the work proposals. Bats and their roosting sites must be protected at all times and work on structures identified as actual or potential bat roosts must be undertaken outside of the breeding season. All new walls to be constructed along the Middle Fergus should have provision for bats in order to replace the potential roosting habitat lost.

11.3.2.3 Clearance of woody vegetation: The Wildlife (Amendment) Act (2000) affords protection to breeding birds by prohibiting the clearance of vegetation during the breeding season, i.e. between the months of March to August.

11.3.2.4 Upper Fergus: Impacting on habitats of significant ecological value identified along this stretch of the River Fergus should be avoided wherever possible. The construction of new embankments should take place along the boundaries of built-up areas where there is no sensitive habitat present.

11.3.2.5 Middle Fergus: Areas of sensitive vegetation were identified along the banks of the River Fergus and impacting on these should be avoided wherever possible. Generally, in order to minimise impacts on the aquatic habitat of the River Fergus,

walls and embankments should be accessed from inland wherever possible. The minor widening of the River Fergus should take place through widening the floodplain as opposed to the River bed proper, thereby leaving the current River bed intact. The creation of a stepped profile is recommended and the design of the new profile should be submitted to the SRFB for their approval. The New Road pumping station should be relocated so as to avoid the mature lime tree which occurs at this site.

11.3.2.6 Gaurus River: Widening of the Gaurus River should take place through widening the floodplain as opposed to the River bed proper, thereby leaving the current River bed intact. The creation of a stepped profile is recommended and the design of the new profile should be submitted to the SRFB for their approval. Design of the weir to be built in the Gaurus River should be submitted to the SRFB for approval to ensure that it allows for passage of fish, including lamprey. The weir should also be designed so that pools located upstream of the weir (i.e. a holding habitat for salmonids) are not drained.

11.4 SOILS AND GEOLOGY

11.4.1 An assessment on soils, geology and hydrogeology was made based on the Ennis Main Drainage and Flooding Study, which involved extensive desk studies and field investigations, augmented by more recent data collected during the course of the ground investigation carried out in December 2004/January 2005. Ennis is described as low lying, having a typical karst topography. Generally, the overburden in the area is thin or absent. Ennis and its environs are drained by the River Fergus and parts of the town have been constructed on the natural flood plain. A number of Swallow Holes and springs were identified during the course of the investigations. Groundwater flow is predominantly associated with these shallow karst conduits, which respond quickly to rainfall events (“flashy response”). Aquifer vulnerability across the area was found to be high to extreme. The absence of protective cover material and rapid travel time within the aquifer renders these aquifers highly vulnerable to contamination. Water quality in the regional Limestone aquifer is good at present.

11.4.2 The potential impacts and mitigation measures are outline briefly in the following paragraphs.

11.4.2.1 Alteration to the natural groundwater regime: The natural groundwater regime can be altered by changing the existing flow pattern or altering the recharge to the aquifer. No long-term groundwater abstraction is considered necessary to implement the drainage works. Construction of the watertight lining within the River bed in the Middle Fergus is likely to require dewatering during the construction works. This

would have a short term effect on the groundwater flow pattern by increasing the gradient close to the River boundary in the town centre. However, as the baseflow component is low, the overall regional effect on the groundwater pattern is considered to be insignificant. Overall there will also be a local change in the groundwater flow pattern around the lined area of the River.

11.4.2.2 Detrimental effect on groundwater and soil quality: To minimise the potential for accidental discharges of hydrocarbons during construction works, all oil filling operations should be undertaken away from any high risk sites, preferably within a contained area discharging to an interceptor. All construction method statements should include emergency procedures for accidental oil spills.

11.4.2.3 Damage of any geological national or local heritage sites: The proposed drainage works will not impact on any designated areas of local or national geological importance.

11.4.2.4 Impact on well yields or spring flows: Based on an assessment of the well survey undertaken in 1999/2000 and a review of the Geological Survey of Ireland well database, the proposed relief works will not impact on any water wells. Should any additional water wells be encountered during construction works then the following mitigation measures are proposed:

- Raising the well head in the flood plain, and/or
- Replacement of the well or providing mains supply.

11.4.2.5 Loss of soil/rock: Removal of some soil and rock will be required for most of the relief works. Construction and improvement of embankments on the Upper and Middle and Lower Fergus will require excavation and removal of soil. The soil and rock is not of any local or regional scientific significance. However, use of any excavated soil within the embankment developments is recommended. Some soils (e.g. peats and alluvium) may have local significance in terms of dependent ecology, disturbance of these should be minimised or avoided where feasible.

11.4.2.6 Impact on the engineering characteristics of the soil: The building of embankments on the Upper and Middle and Lower Fergus will result in compaction etc of soil. To mitigate for destabilisation of existing and proposed embankments, detailed geotechnical assessment and design will be required.

11.4.2.7 Impact on baseflow in the River: The River Fergus is a low baseflow River. The lining of the River bed will impact on local groundwater flow conditions within the urban area. Groundwater which naturally discharged to the River within the lined section will now migrate to lower down the River section. Following frequent and

heavy rainfall events migrating groundwater is likely to discharge to the stormwater interceptor sewers and be pumped to lower down the River section into the flood plain. This should not impact significantly on the overall baseflow of the River.

2.2 WATER

4.1 The biological quality rating of the River Fergus (1998) ranges from 2-3 to 4-5, averaging 4. This level relates to waters which are generally unpolluted and suitable for abstraction, with high amenity value and potential for good game fisheries. No long term impacts are expected from the proposed Scheme. At times of high flows in the River, discharges from the town will be intercepted and temporarily stored before being pumped back into the River. This will allow suspended sediment and other elements to be removed from the storm water. Storm water in the town will be of a higher quality, thus improving the water quality of the River Fergus. Illegal discharges to the River Fergus will also be eliminated, which will have a positive impact on the water quality in the River. It is expected that there may be a slight temporary impact from construction works due to an increase in suspended sediment. To minimise the potential of accidental fuel and oil spillages to the River, all refuelling should be done at a safe distance from areas of high risk. All machinery working near or in the River should be regularly checked for leaks and any other potential sources of pollution.

11.6 DUST

11.6.1 During the construction phase, the removal of the existing River walls and the excavation for new sewers and pumping stations may prove to be sources of dust and air pollution. If it is found that significant quantities of dust are being produced then remedial measures should be taken to reduce the dust generation to an acceptable level. The operational phase of the Scheme will not generate any additional dust in the locality.

11.7 NOISE

7.1 An assessment was undertaken by ANV Technology which involved measuring existing noise levels during the day and night, measurement of vibration levels from similar pumping stations, the prediction of noise levels at nearby houses and the assessment of the likely impacts against standard criteria. Both construction and operational phases were considered. The ambient noise in the area is mainly due to traffic. Existing vibration levels were found to be below the detection limit of the instrumentation. A noise limit of 70dB(A) is considered to be an acceptable limit for construction works, based on BS 5228.

7.2 Mitigation of construction noise: General guidelines for limiting disturbance are outlined below:

- Limit noisy construction works to 08.00 to 18.00 weekdays with Saturday working from 08.00 – 13.00 hours (relatively quiet construction activities could be carried out outside these hours, subject to strict controls);
- Ensure rock-breaking and piling activities are adequately screened from the adjacent sensitive locations;
- Use modern, silenced and well-maintained equipment conforming to EU directives;
- Shut down equipment when not in use, where practicable;
- Site semi-static equipment such as generators, mixers, and compressors as far away as possible from sensitive locations and ensure that the orientation is the optimum for low noise;
- Ensure that workers are given training with respect to minimising noise and disturbance;
- For works near particularly sensitive locations, such as the Christian Brothers schools, liaise with the management to agree a work schedule, which will result in least disruption. This may entail undertaking noisy activities during the summer months.

7.3 Noise Mitigation of Completed Development: The noise generated by the storm water pumping stations should be specified to be less than 30 dB(A) at 10m.

7.4 Vibration Isolation: Motors and pumps at the pumping stations should be adequately vibration isolated to ensure that they do not give rise to audible sound at the nearest houses.

7.5 Residual impact: By implementing the mitigation measures outlined, the residual noise impact is expected to be negligible.

11.8 CLIMATE

11.8.1 As part of the EIS, climate was assessed to ensure that the proposed development will not have an impact on the immediate climate within the area of Ennis. This study was carried out by obtaining Meteorological Data for the Ennis area from the Irish Meteorological Service Met Eireann. It is predicted that the proposed flood alleviation works will not adversely impact on climate.

11.9 LANDSCAPE

11.9.1 The purpose of this study was to appraise the existing landscape settings of the Scheme and to assess the likely impacts arising from the proposed developments, and to describe the proposed mitigation measures. The work was undertaken by Brady Shipman Martin. The assessment involved desk studies, site visits and reviewing the plans for the proposed works. Some of the works will take place within close proximity to some trees that have been identified for conservation.

11.9.2 Mitigation Measures

Rural – Ennis Environs

- New (native) tree planting and hedgerow replacement.
- Vegetated embankments to be visually similar to existing embankments.
- Screen planting locations to be selected at the detailed design stage.
- Riverwalks and public rights of way to be reinstated and upgraded where necessary with additional locally sourced native planting where possible.

Ennis Inner Urban Area

- Tree protection in advance of construction works, where possible.
- Tree replacement planting and native tree and shrub replanting where possible.
- Stone Facings to River walls – in character with surroundings.
- Improved/additional River walkways.
- Pumping stations – Final designs/materials to be sympathetic to local environment and urban context.

11.9.3 Residual Effects

Rural – Ennis Environs

11.9.3.1 The construction of drainage elements will be seen as extensions of familiar features in the landscape. Given time and with native, reinstatement planting, the likely arising impacts will be *slight* to *imperceptible* and *neutral* in the *long term*.

Ennis Inner Urban Area

11.9.3.2 There may be some loss of landscape character if significant tree planting does not occur. Overall, given good detailed design of a new/extended River wall and a

consistent detailed treatment which is sympathetic to the townscape, the resulting impact is likely to be *neutral* in the *long term.*

11.9.3.3 Any residual impact could be *slightly negative* or *neutral* in the *long term* depending on the subjectivity of the viewer.

11.10 MATERIAL ASSETS – ROADS AND TRAFFIC

11.10.1 The purpose of this study was to identify the existing environment in terms of traffic and transportation, quantify the likely development trip generation for each phase of the construction of the Scheme, to identify the likely impacts resulting from traffic due to the construction works and to identify suitable measures to mitigate traffic and transportation impacts, if any, occurring during the construction phase of the Scheme.

11.10.2 Impacts and remedial measures

11.10.2.1 The Scheme, during its operational phase, in essence is not traffic generating, although it may itself assist future growth and development of Ennis Town and hinterland. Such traffic generation will be subject to future traffic impact study and assessment in conjunction with developments as they occur.

11.10.2.2 Very few specific traffic movements will be generated by the Scheme itself, once it is constructed. Any traffic generated by the Scheme will be purely for maintenance / inspection purposes (of pumping stations for example) and will be negligible in comparison with the construction phase. Therefore, since traffic impact during the operational phase will be minimal, no further detailed investigation is warranted

11.10.2.3 It is estimated that the highest average level of HGV trip generation per hour is expected to be in the order of 1-2 vehicles. This level of trip generation is minimal and it is felt that detailed junction analyses is unwarranted as the impact of this increase in HGV traffic would have a negligible impact on the operational capacity in terms of queuing and delay of junctions within the study area network.

11.10.2.4 The level of two-way traffic generation by the Scheme in most cases will not exceed the 5% (in congested or sensitive areas) or 10% of the existing two-way flow on the adjoining highway, which according to the IHT guidelines implies that a full traffic impact assessment need not be undertaken.

11.10.2.5 It has been estimated that up to 14,000 vehicles a day will use the new Bypass route when it opens, rising to 35,000 vehicles a day in 2027. This will dramatically

reduce current congestion experienced in Ennis, due to the reduction of the traffic volumes along the N18.

11.10.2.6 A 7 km western relief road running from the N18 south of Ennis to the N85 to the west of Ennis will reduce traffic flows through Clarecastle and on the southern approach routes to the town, such as Limerick Road, Clare Road, Carmody Street, Cornmarket Street and Mill Road.

11.10.2.7 It is likely that highest traffic impact arising from the Scheme will arise from potential road / lane or footway closures, and the potential loss of parking from works, which will be quantified and mitigated against in a construction management plan.

11.10.2.8 A construction traffic management plan should be developed by the Contractor prior to the commencement of work on site, in consultation with Clare County Council, Ennis Town Council and An Garda Siochána in order to mitigate against potential impacts of the Scheme

11.11 CULTURAL HERITAGE/ARCHAEOLOGY

11.11.1 Margaret Gowen and Co. conducted this assessment which involved field inspections, desk studies and consultations with relevant parties. The field inspections sought to assess the proximity of the proposed works to recorded archaeological sites, structures of architectural/historical merit and features of cultural heritage interest. The likely impacts of the development, detailing mitigating measures necessary to ensure that there is minimum or no impact to the architectural, archaeological and cultural heritage features, were outlined in the report.

11.11.2 One of the main recommendations was that a suitably qualified archaeologist is engaged to monitor all topsoil stripping and work on embankments to ascertain if there are any unrecorded archaeological features. All proposals will be subject to consultation with the DoEHLG. Archaeological testing is also recommended in areas where there is archaeological potential. Any findings will have to be reviewed by the DoEHLG and proposals for mitigation strategies will then be decided upon. This may involve changing some of the planned works.

11.11.3 The proposed works will remove sections of the limestone retaining wall of the River Fergus. These river walls are protected structures. It is likely that ‘a record of the past’ will be required and that a full scaled photographic and measured survey of the elevations of the sections of the retaining walls that are to be removed be carried out with a detained written description.

11.12 INTERACTION OF THE FOREGOING

11.12.1 All environmental factors are inter-related to some extent. The combination of two impacts may have a greater adverse effect than the sum of the same two impacts. It is important to co-ordinate individual topics and examine the overall impact of the proposed development. Human Beings for example, while included in the EIS as an individual topic (S.I. No. 349 of 1989), is also impacted on, directly or indirectly by most other topics of the proposed development. Where there are impacts, satisfactory mitigation measures have been developed and are evident throughout the EIS.

11.13 SUMMARY

11.13.1 After a detailed EIS examination of the proposed flood alleviation works at Ennis a number of potential adverse affects were identified, and in each case remedial measures were recommended. It is important that all works be approved by the appropriate statutory body and that they are consulted at all stages of the proposed Scheme. It is also recommended that all mitigating measures identified be incorporated into the contract documents for the River Fergus (Ennis) Drainage Schemes, upper and lower.