



Mayo County Council

Derrinnumera Sludge Hub Centre & Leachate Treatment Facility

**ENVIRONMENTAL IMPACT STATEMENT
(PREPARED FOR REVIEW OF WASTE LICENCE W0021-02)**

VOLUME I : NON-TECHNICAL SUMMARY

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TOBIN CONSULTING ENGINEERS



Volume I : Non-Technical Summary

PROJECT:

**Derrinnumera Sludge Hub Centre
& Leachate Treatment Facility –
Environmental Impact Statement**

CLIENT:

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1 INTRODUCTION

TOBIN and TES Consulting Engineers were requested by Mayo County Council to undertake an Environmental Impact Statement (EIS) as part of the review of their existing Environmental Protection Agency (EPA) Waste Licence (Ref. No. W0021-02) for Derrinnumera Landfill. The review is required for the inclusion of: a Sludge Hub-Centre (SHC) for the collection, drying, temporary storage and sustainable re-use or disposal of treated municipal sludge collected from wastewater and water treatment plants throughout County Mayo; and for the inclusion of a Leachate Treatment Facility (LTF) at the existing landfill site with the provision of a pumped rising main to convey treated leachate from the treatment site to the outfall of the proposed Newport Waste Water Treatment Plant (WWTP). This EIS has been prepared according to the 'Guidelines on the information to be contained in Environmental Impact Statements' (EPA, 2002) and 'Advice Notes on Current Practice in the preparation of Environmental Impact Statements' (EPA, 2003).

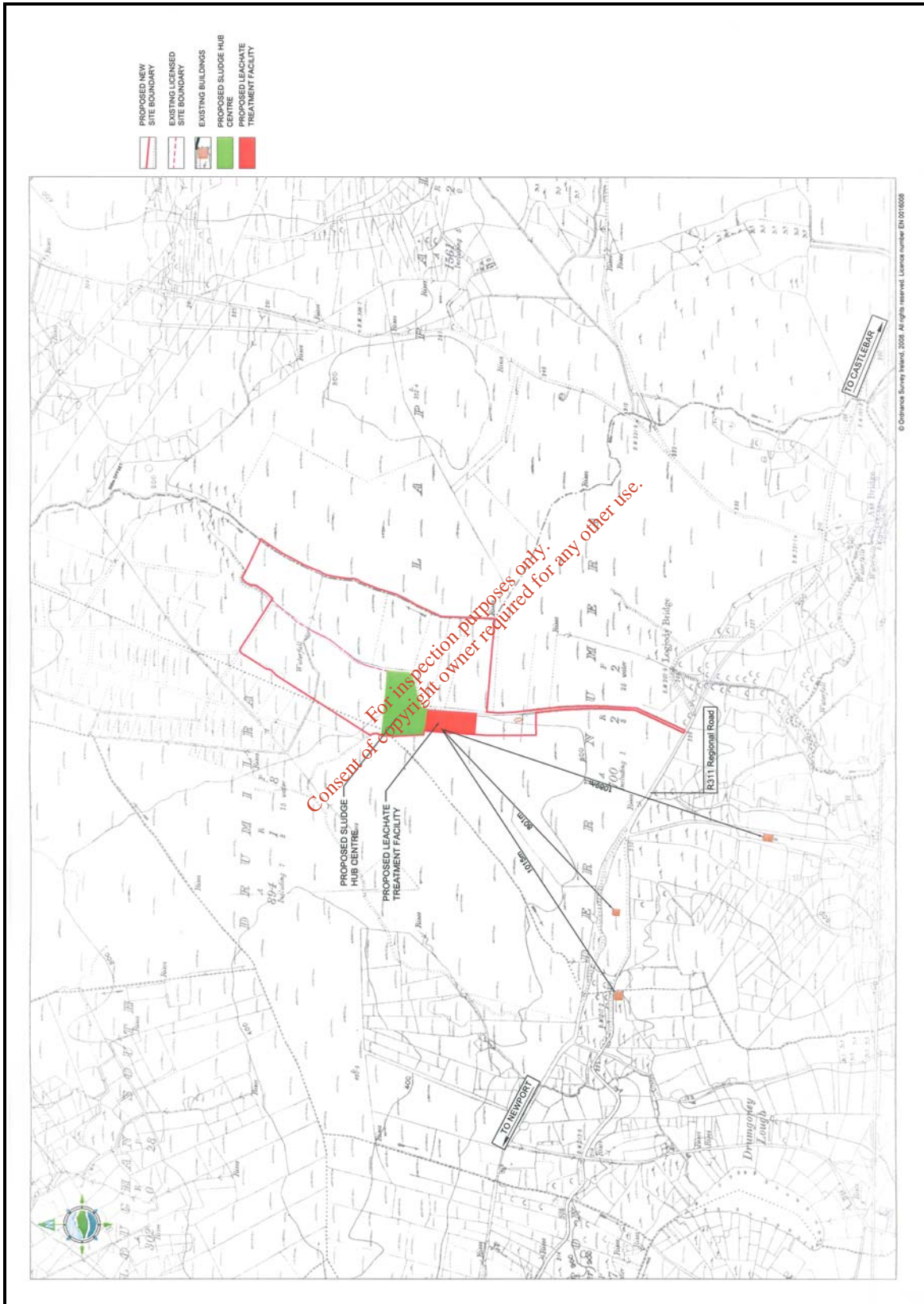
Derrinnumera Landfill, which is operated by Mayo County Council, has been receiving waste since 1974 (Refer to Figure 1-1). Up until 1998 this landfill was best described as an un-engineered, attenuated site. Due to the unlined nature of the waste, leachate could not be captured for treatment; however, the surrounding peat did offer a significant degree of attenuation to leachate migrating from the site.

The introduction of the Waste Management Act, 1996 brought about the need to meet emission standards. In 1998 Mayo County Council sought an Environmental Protection Agency (EPA) licence to develop an engineered landfill site at Derrinnumera, incorporating two lined cells for the disposal of non-hazardous waste on top of the existing waste body. This licence (Ref. No. W0021-01) was issued in December 1999. (The current licence for this facility is W0021-02, granted by the EPA in December 2009.)

Following licensing of Derrinnumera Landfill by the EPA, as per the requirements of the Waste Management Act, 1996 and associated regulations, a bentonite cut-off wall was constructed at Derrinnumera in Summer 2001, with the main objective being to retain any leachate flowing from the permeable deposits in the enclosed area surrounding the wastebody, and to prevent it from escaping into the surrounding lands.

With the installation of the cut-off wall, leachate captured within the enclosed area was then diverted to a balancing lagoon, and pumped from there to three on-site storage tanks. As a condition of the Waste Licence issued by the EPA for Derrinnumera, leachate (collected from both the lined cells and the balancing lagoon) is transported by tanker from Derrinnumera to Castlebar WWTP for treatment and subsequent co-disposal with treated effluent to the Castlebar River system.

Figure 1-1 Site Location Map



Derrinnumera Landfill has been developed in 2 phases. The present landfill is now accepting waste for placement into the engineered lined Cell No. 2 and permanent capping of Cell No. 1 is now complete. The quantities of waste accepted at Derrinnumera have declined in recent years. During 2000, 38,630 tonnes of non-hazardous waste was accepted at the landfill facility, however waste quantities have seen a considerable decline since then. The waste acceptance figures for 2000 to present are as follows:

Year	Waste Acceptance ¹ (tonnes per annum)
2000	38,630
2001	38,252
2002	35,931
2003	30,280
2004	29,280
2005	29,915
2006	26,713
2007	19,887
2008	15,715
2009	0*
2010	24,594**

*Derrinnumera waste was diverted to Rathroeen Landfill during 2009.

**Waste was diverted from Rathroeen to Derrinnumera Landfill during 2010. 24,594 tonnes accepted at Derrinnumera from January 2010 to beginning of October 2010.

Other activities occurring at the landfill include the collection and storage of leachate for removal by tanker to Castlebar Wastewater Treatment Plant (WWTP), gas flaring at the landfill gas management system on site, and the recycling and reclamation of materials at the Civic Amenity Centre, opened at the site in July 2001.

The Connaught Waste Management Plan, adopted in September 2001, covers the jurisdictions of Galway, Mayo, Sligo, Leitrim and Roscommon County Councils. The plan includes a Sludge Management Plan (SMP) for County Mayo (2000) aimed at identifying sludge management facilities to facilitate treatment and reuse of non-hazardous sludges and to give recommendations to further the sustainable management of all non-hazardous sludges arising in County Mayo. A recommendation of the SMP at that time included the provision of a sludge hub centre at Castlebar Wastewater Treatment Plant.

Previously, Mayo County Council prepared an EIS for the expansion and upgrading of the wastewater treatment plant at Castlebar, and for the development of the sludge treatment hub centre. An Bord Pleanála certified the EIS in November 2001, however the following condition was attached: -

“No sewage sludge or landfill leachate from outside the expanded Castlebar Wastewater Treatment Plant shall be transported onto the site for processing at this location having regard to the limited assimilative capacity of the river system relative to the likely demands arising from within the Castlebar area.”

¹ Sourced from Derrinnumera Landfill On-site Records

This meant that a sludge hub centre could not be developed at Castlebar WWTP.

An Bord Pleanála, in their certification for the expansion and upgrading of the Castlebar WWTP, have effectively prohibited treating municipal sludge and landfill leachate at the wastewater treatment plant (WWTP) in Castlebar. The An Bord Pleanála condition implied that, once the upgrading and expansion of Castlebar WWTP had occurred, alternative arrangements were required for the treatment of Derrinnumera Landfill leachate. Since July 2010, leachate is being tankered to Westport WWTP for treatment and discharge. This activity is licensed (until December 31st 2012 pending the provision of a leachate treatment facility at Derrinnumera) under Waste Water Discharge Licence No. D0055-01, issued by the Agency during June 2009.

The An Bord Pleanála decision also prohibits the importation and treatment of sewage sludge arising from outside of the expanded Castlebar WWTP, once the upgrading Castlebar Plant is commissioned. Therefore alternative arrangements must also be made for treatment of this sludge in lieu of the original plans to treat this sludge at the formerly envisaged Castlebar WWTP Sludge Hub Centre. The upcoming commissioning of the upgraded Castlebar WWTP therefore imposes a tight limit on the allowable timescale for the development of the Sludge Hub Centre at Derrinnumera Landfill Site.

Following An Bord Pleanála's decision, Mayo County Council commissioned Fehily Timoney and Co. to review the recommendations and conclusions of the Mayo Sludge Management Plan. The Elected Members subsequently adopted the Review of Mayo Sludge Management Plan in 2003. In the Review of Mayo Sludge Management Plan (2002), attempts were made to identify an alternative site for a hub-centre in the vicinity of the Castlebar WWTP, but no suitable sites were available. Other WWTPs throughout the county were also examined but these were located on the periphery of the county and hence were found to be unsuitable in terms of transport cost and proximity of residential development. The 'Review of Mayo Sludge Management Plan', prepared by Fehily Timoney and Company in November 2002, identified Derrinnumera Landfill as being the most suitable site, due to its close proximity with Castlebar, the centre of gravity of sludge production in County Mayo. The site is approximately 14 km from Castlebar WWTP, thus minimising transportation costs in the county as a whole.

Other favourable attributes of Derrinnumera include: -

- The remote nature of the site, with the nearest inhabited dwelling being approximately 800m from the proposed facilities (Refer to Figure 1-1 above).
- A good road network services the site.
- The existing facility is an established waste recovery and disposal site, in operation under a Waste Licence issued by the EPA.
- There is a sufficient footprint available on site to accommodate the Sludge Hub Centre as well as the Leachate Treatment Facility.
- Biosolids produced from the sludge treatment process can be utilised as either daily cover or incorporated with soil and subsoil and used as final capping for the landfill site.

The Sludge Hub Centre and Leachate Treatment Plant will accordingly be co-located at the licensed Derrinnumera Landfill Site, with the treated leachate pumped from the treatment plant to the outlet of

Newport WWTP site (to receive UV treatment at Newport WWTP). The Hub Centre, Leachate Treatment Plant, treated leachate pumping station and treated leachate pipeline will be constructed and maintained by a Design –Build –Operate (DBO) Contractor.

2 THE PROPOSED DEVELOPMENT

Mayo County Council are now seeking a review of the EPA Waste Licence (Ref No. W0021-02) on the following broad grounds:

1. To include a County Mayo Sludge Hub Centre (SHC) at the existing landfill facility, in order to fulfil the Review of Mayo Sludge Management Plan 2002, adopted by the Elected Members in 2003.
2. To facilitate the future compliance with an instruction issued by An Bord Pleanála to cease leachate imports to Castlebar WWTP, and following best environmental practice, the Council wish to implement leachate treatment at source at Derrinnumera. It is proposed that the treated leachate will be pumped to the outfall of the proposed Newport WWTP, via a pumped rising main laid along the R311 from Derrinnumera Landfill to Newport.

It is the aim of Mayo County Council to employ 'Best Available Technology' (BAT), in all aspects of the management of the site.

The proposed development consists of the setting up of a Sludge Hub Centre (SHC) and Leachate Treatment Facility at the existing landfill site in Derrinnumera. It is proposed to have a sludge-drying unit, with a composting unit envisaged to supplement this, as the permanent sludge treatment process in the proposed Sludge Hub Centre. It is proposed to use a Sequencing Batch Reactor (SBR), or equivalent BAT, to treat the leachate on-site.

2.1 THE SLUDGE HUB CENTRE (SHC):

The Sludge Hub Centre will be constructed and operated under a Design, Build and Operate (DBO) contract for the collection, drying, temporary storage and sustainable re-use or disposal of treated municipal sludge collected from wastewater and water treatment plants throughout County Mayo. The method of production of bio solids will be subject to assessment of tenders, however the most probable option will be thermal drying, with sludge composting as a supplementary facility. It is proposed that the Sludge Hub Centre will be fenced off at the existing Derrinnumera Landfill Site, and it is envisaged that the Sludge Hub Centre will accept an estimated 27,844 tonnes per annum on start-up. This figure has been estimated to rise to 32,580 tonnes per annum (sewage sludge and waterworks sludge) by 2020.

The Council propose to construct a Sludge Hub Centre to treat all sewage and water treatment sludges in the county, at Derrinnumera, achieving a dried pelletised final product, or alternatively a composted consistency, as the end use option requires.

Schedule of Tanks, Plant & Equipment:

The following facilities will comprise the Sludge Drying Centre: -

- Sludge Acceptance Area

- Screenings removal including purpose-made skips
- Sludge tanker reception facility
- Electrical sub-stations
- Inlet hoppers or bunkers
- Supplementary Dewatering Treatment for liquid sludges
- Sludge Drying Plant
- Pipelines and Interconnecting Pipework
- Ancillary plant and structures
- Sludge plant residues and condensates treatment
- Biosolids Storage Silos
- Biosolids Bagging and product storage facilities
- Odour extraction and scrubbing facilities

It is expected that 80% of the sludge intake will be treated by the Sludge Drier and 20% will be treated in a composting facility. Dust and odour control facilities will also be an integral part of the drying process.

Tunnel Composting System:

Tunnel composting is considered to be the best suited, most efficient and reliable amongst composting treatment options for the treatment of municipal sludge. A typical tunnel composting facility will comprise the following:

- Tunnel Composting Area
- Compost Refinement/Storage Area
- Process Control System (temperature sensors and moisture control)
- Air Management
- Water Management

Tunnel composting is generally a four-week process. With this treatment technology there is usually an approximate 40% mass reduction of the input sludge, with up to 90% evaporation of the moisture initially contained in the sludge. As with the conventional sludge-drying plant, dust and odour control facilities will be incorporated in the design of the tunnel composting system, with the composting buildings being maintained at a slight negative pressure to prevent air escape. A biofilter would be installed, through which all collected process air would be emitted.

2.2 INTERIM SLUDGE DRYING SOLUTION:

At present, Mayo County Council currently export wastewater sludge (as a dewatered sludge cake) outside of the county for landspreading. Should this practice be prohibited in the near future, prior to the commissioning of the sludge drying permanent plant at Derrinnumera, a short-term fallback would be required with regard to sludge drying. Furthermore, An Bord Pleanála have prohibited importation of sludges to Castlebar WWTP once expansion and upgrading of the WWTP occurs.

Permission was originally sought by Mayo County Council to temporarily relocate an existing sludge drying and lime stabilisation plant (currently located at Ballina WWTP), to the existing machinery building located within the licensed site boundary at Derrinnumera Landfill Site. At the An Bord Pleanála

Oral Hearing for the development, held during February 2008, the proposal regarding the existing sludge plant as a potential interim measure was not favoured.

It is Mayo County Council's intention to continue the current arrangement of dewatering of sludge arising from Castlebar WWTP at Castlebar. It is also intended that the present arrangement of exportation of dewatered sludge from County Mayo wastewater treatment plants to licensed and permitted sites, located outside of the county will continue insofar as this disposal route is available to the Council or until the permanent sludge drying facility has been completed at Derrinnumera, whichever is sooner.

Mayo County Council have now provided an undertaking to continue the current sludge handling arrangements as outlined above in the short-term, but in the event that this existing arrangement becomes unavailable before the permanent sludge drier is commissioned, proposals for alternative interim sludge handling arrangement will be put forward to the EPA.

2.3 LEACHATE TREATMENT FACILITY:

Derrinnumera Landfill up until 1998 was best described as an un-engineered, dilute and attenuating landfill site. Due to the unlined nature of the waste, leachate could not be captured for treatment; however, the surrounding peat did offer a significant degree of attenuation to leachate migrating from the site. Groundwater piezometric monitoring undertaken in 2003² at Derrinnumera Landfill indicated that groundwater flow in the bedrock is from west to east under the western half of the site. Under the eastern half of the site the flow turns more toward the northeast. The results of the monitoring suggested that the Glaishty River is a discharge zone for groundwater moving under the landfill, therefore, any leachate that may have migrated from the landfill in the past would have percolated down to the underlying bedrock water table and would have eventually made its way to the Glaishty River.

Following licensing of Derrinnumera Landfill and following the construction of the bentonite cut-off wall and the lined cells (refer to Section 1), leachate has been tankered away from Derrinnumera Landfill site for treatment, and this remains to be the case at present. This operation is costing Mayo County Council in excess of €0.5 million per annum in direct costs. In addition, the transportation of leachate has adverse environmental impacts, as well as tying up 1,800 population equivalent of valuable wastewater treatment capacity at Westport WWTP. (It should be noted however that the volume of leachate going on for treatment will reduce over time as waste dries with aging and reductions should be seen shortly due to the completion of the permanent capping of lined cells, thus preventing rainfall ingress.) As mentioned above, leachate importation to the Castlebar WWTP was prohibited by an An Bord Pleanála condition pertaining to the upgraded plant. Mayo County Council therefore wish to include leachate treatment within the scope of the DBO contract at the proposed Sludge Hub Centre.

Leachate, having received treatment at the landfill, will be pumped to the proposed marine outfall for treated municipal wastewater at Newport, where it will receive UV disinfection before discharge. This outfall location has the benefit of providing a greater assimilative capacity than that which could be provided at the Glaishty River, and of that, which would have been provided by the Castlebar River. The Council nonetheless propose to use BAT (Best Available Technology) in the processes involved in

² Refer to Appendix 11, Volume IV of EIS for results of groundwater piezometric monitoring undertaken in 2003

leachate treatment, which would be guided by the EPA as to the required leachate standards, having regard to the known consistent performance of current technology in treating leachate.

The treated leachate will be delivered to the outfall of the proposed Newport WWTP (downstream of the Newport secondary sewage treatment process) via a pumped pipeline. This treated leachate pipeline is expected to be 200mm in diameter and will be designed and constructed by the DBO Contractor who builds and operates the Sludge Hub Centre. The pipeline will be laid in the road margin over most of its length, and it will be maintained as part of the contract responsibilities.

As a result of the above arrangement to pump treated leachate a distance of some 8km to Newport, the provision of a Treated Leachate Pumping Station at Derrinnumera will be necessary. The DBO Contractor appointed for the Sludge Hub Centre, will design and construct this station, including the provision and maintenance of standby pumping plant and telemetry to monitor the pumps. Once the station has been commissioned, it will be operated by the DBO Contractor, who will be required to assume full responsibility for its operation.

The Contractor will be obliged to maintain this pumping station so that it remains in proper working order on a 24hr/7 day week basis. In order to provide for breakdown situations and subsequent resumption of process plant, key spares necessary for the operation of the leachate treatment plant and pumping station must be held on site by the Contractor.

Surplus sludge arising from the leachate treatment process will be dried batchwise to the extent required to permit them to be landfilled as the Landfill Licence (W0021-02) and Waste Management Plan may require.

3 THE EXISTING ENVIRONMENT

3.1 HUMAN BEINGS:

3.1.1 Existing Environment: Landscape and Landuse

Derrinnumera Landfill is located between two hills, and is approximately 6.5km east of Newport and 3km south of Lough Beltra, 500m north of the main Castlebar to Newport Road (R311). The proposed development (Sludge Hub Centre and Leachate Treatment Facility) will be located at the existing landfill site. An area of blanket bog, much of which is afforested, surrounds the landfill site, much of which is privately owned, and some of which is open common. The current land use in the surrounding area is predominantly that of small-scale agriculture, mainly in pasture. Much of the land is fallow, with some old fields, or marginal agricultural land.

3.1.2 Settlement Patterns

The landfill site is located in a sparsely populated rural area, with the extent of the residential development being confined to a number of “one-off” dwellings. The nearest habited dwelling is situated approximately 800m in a linear direction away from the proposed developments (refer to Figure

1-1). All of the existing settlements in the vicinity are a considerable distance from the subject site, the nearest being Newport 6.5 km to the west and Westport 9km to the southwest.

3.1.3 Socio-Economic Profile of the Locality

Commercial forestry represents the primary economic activity in the immediate surrounds of the site. As the principal soil type in the area is a low-level blanket peat, the range of uses of this soil in agriculture is very limited. Most farms in the area are smallholdings of sheep and cattle. The landfill site and its associated works have generated employment in the area with 13 staff employed at the present time (August 2006).

3.1.4 Amenities and Tourism

Tourism in Mayo is of major importance to employment. The main tourist attractions that have been identified in the county are Ballintubber Abbey, The Ceide Fields, Croagh Patrick, Foxford Woollen Mills, Pontoon, Westport House and the Museum of Country Life, none of which are located within 9km of the proposed development site. There are no amenity facilities within the immediate study area. The land surrounding the site is quite unremarkable in nature comprising mainly of land under forestry and blanket peat land.

There are a number of walking trails located in the proximities of Newport and Castlebar. The 'Bangor walking trail' comes to within 6.5km east of the proposed development site, and the 'Western Way' walking trail comes to within 3km southwest of the site. The International four-day walking tour, which takes place each summer, incurs a series of road walking routes near the town of Castlebar. The nearest route to the proposed development passes 1km east of the site on day two of the tour.

A major source of tourism in the area is linked to angling. The Glaishty River passes alongside the eastern boundary of the site, although at this point in its course the river is little more than a stream. The river flows on into Beltra Lough located 3.5km north of the site. Beltra Lough is a quite substantial lake being 3.8km wide. It provides fishing for spring salmon and grilse from June and sea trout from July, and therefore is important to angling in the area.

3.1.5 Traffic

Access to the site is off the Castlebar to Newport Road (R311). Traffic flow to and from the landfill site is controlled by a number of measures. As access to the proposed development shall be via the existing landfill access road, traffic flow from the development shall also be controlled by these existing measures. From the most recent traffic counts it is estimated that on average 26 HGV's and 215 cars and light commercials enter the landfill access road per day. Leachate transport accounts for a significant fraction of the HGV traffic at the Landfill at present.

3.1.6 Health and Safety

Health and safety measures are currently in place at the Landfill facility. Existing health and safety issues relate primarily to concerns about individuals either straying or trespassing into the landfill facility, alongside the health and safety of every worker or visitor to the site.

In the case of workers and visitors to the site, the day to day operation of this facility, including any activities associated with site machinery and on-site vehicles, and additionally how visitors are to present and conduct themselves when on site is all undertaken in compliance with the current health and safety legislation pertaining to such.

Fencing is in place around the Landfill facility so as to maximise safety and security at the site. Only people using the Civic Amenity Area or involved in monitoring or otherwise authorised by Mayo County Council will be permitted to enter the site. Access to the site outside of normal operational hours is not permitted unless specifically authorised and supervised by Mayo County Council.

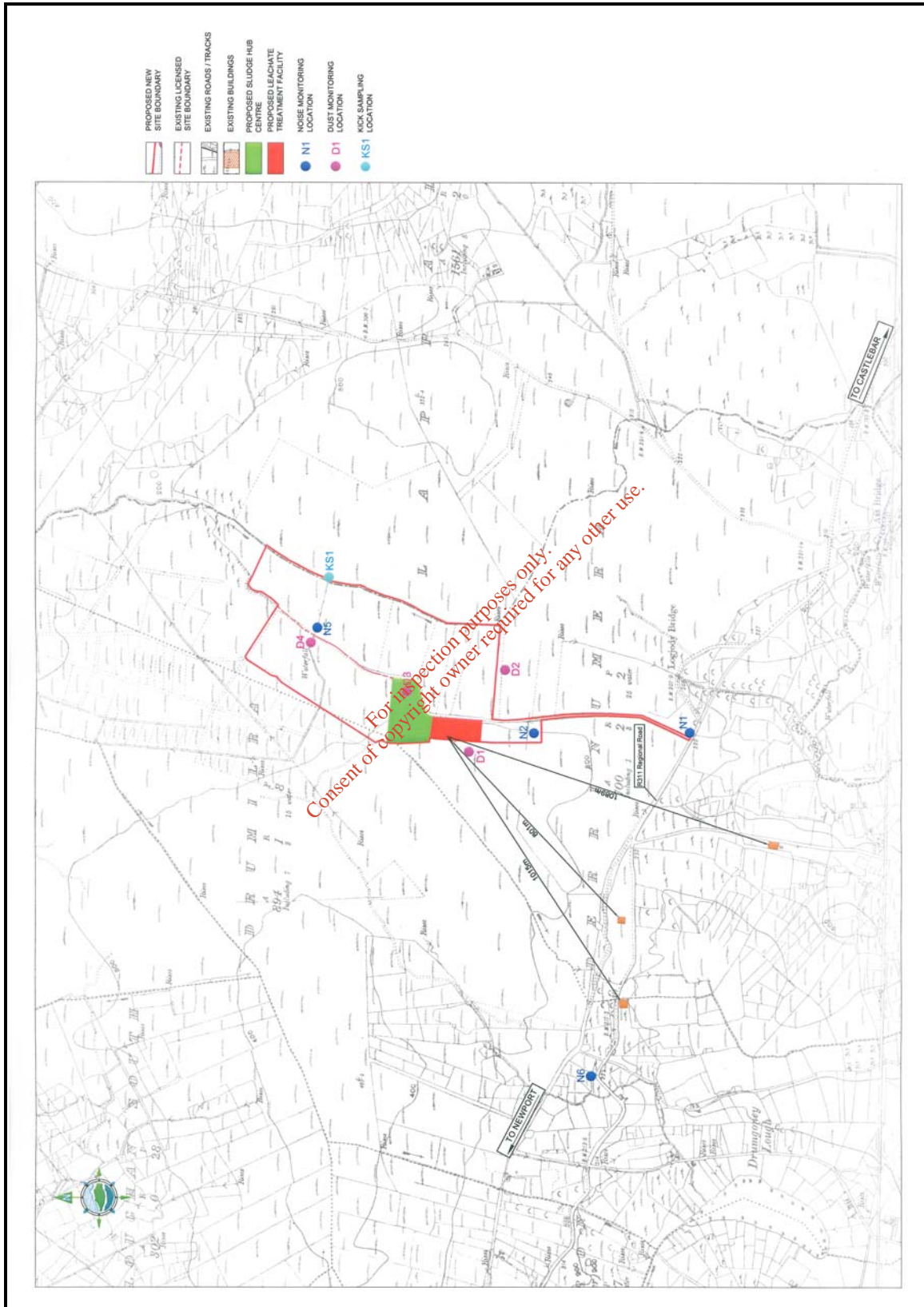
3.2 ECOLOGY OF THE DEVELOPMENT SITE:

3.2.1 *Baseline Ecology of Development Site*

An ecological assessment of lands at Derrinnumera Landfill was conducted and a vegetation classification was carried out. In addition, a water quality evaluation was conducted by means of aquatic invertebrate sampling in accordance with EPA methodology. The sampling location (KS1) in the stream was adjacent to that of an existing water sampling point used by Mayo County Council for the existing Waste Licence monitoring programme, and samples were subsequently analysed at the Zoology Department of Trinity College, Dublin. (Refer to Figure 3-1 below for location of Sample KS1).

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Figure 3-1 Monitoring Map



3.2.2 Site and Area Description

The site is situated approximately eleven kilometres west of Castlebar, Co Mayo. The site for the SHC & LTF currently comprises a settlement lagoon and bare ground and buildings, however the land fenced in for the landfill was also surveyed and a habitat classification carried out. Additional habitats in the study area therefore include amenity grassland, wet grassland, recolonising bare ground, the landfill waste body, spoil, bare ground and lowland blanket bog.

3.2.3 Designated Areas of Nature Conservation

The Newport River, located north of the proposed development, flows from its source at Lough Beltra on into Clew Bay. Newport House owns the fishing rights to this river and to west Lough Beltra. This river is noted for its salmon and sea trout fishing. Freshwater pearl mussels, a protected species listed in both the 1976 Wildlife Act and the European Union Habitats Directive, are known to occur in the Newport River. Due to the significant presence of the pearl mussel here, the Newport River is designated a candidate Special Area of Conservation (cSAC) [code 002144]. The water quality of the river is good and the site supports populations of mussels along with several other protected species including Otter and Kingfisher. The rare Irish Heath is also known from the site. Figure 3-2 below sets out the location of the nearest cSAC (Newport River) in relation to the development site.

Clew Bay is designated a candidate Special Area of Conservation [code 01482] under the Habitats Directive, as many of the habitats and species in Clew Bay are listed under Annex I of the Directive.

Clew Bay comprises a complex series of islands and interlocking bays containing a wide variety of marine and terrestrial habitats, with seven habitats present which form part of Annex I of Council Directive 92/43/EEC. Important populations of two mammal species listed under Annex II of Council Directive 92/43/EEC are known to be present within the SAC. The SAC also includes one Red Data Book plant. Thus the site is considered to be of national and international importance, and has been reported as such in the Site Synopsis.

The seven habitats listed under Annex I of EU Habitats Directive 92/43/EEC are as follows:

- Large Shallow Bay
- Lagoon
- Atlantic Salt-meadows
- Drift Lines
- Perennial Vegetation of Stony Banks
- Embryonic Shifting Dunes
- Marram Dunes and Dune Slacks

Important populations of Annex II species that are found in Clew Bay are the:

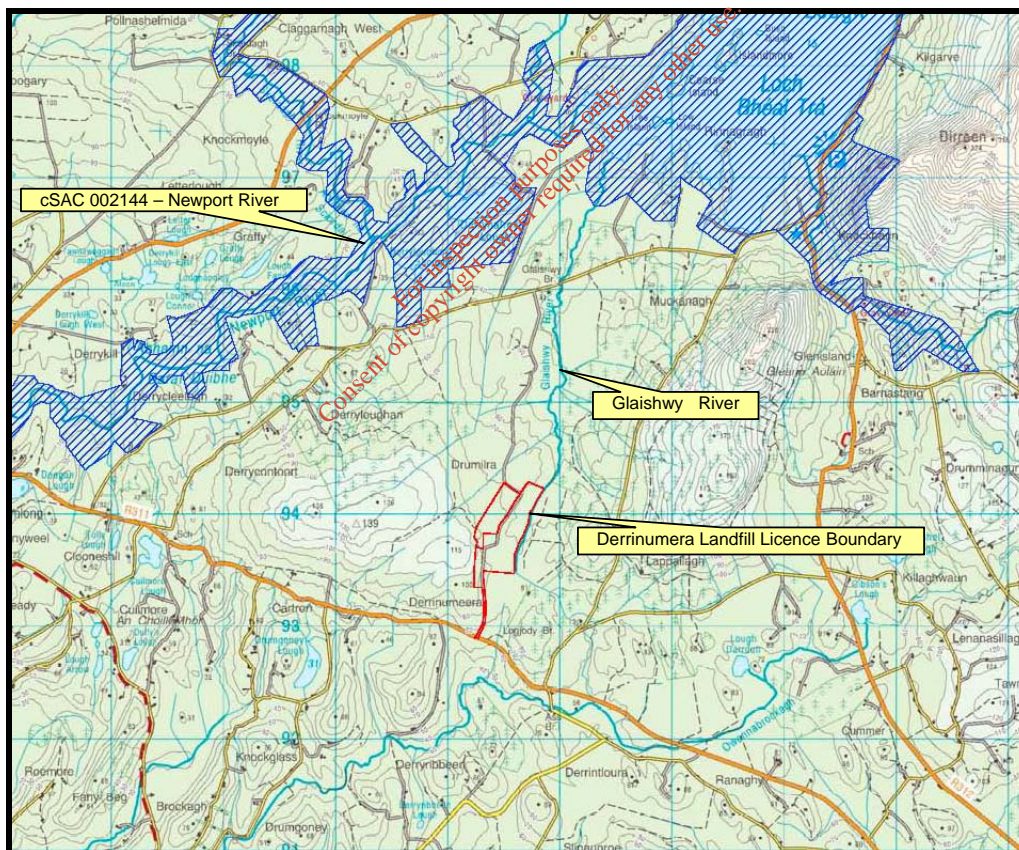
- Otter; and
- the Common Seal.

Lough Furnace, one of the few permanently stratified lagoon lakes in Ireland and UK, is located to the north east of Clew Bay, forms part of the Clew Bay SAC Complex. This body of water has been

defined in the Site Synopsis as a “deep, stratified, saline lake lagoon”. The proposed outfall location from Newport Waste Water Treatment Plant will be located to the north of Rosmore Peninsula. The outfall location is adjacent to the Burrishoole Channel, which links Lough Furnace with Clew Bay. Bog Orchid (*Hammarbya paludosa*), a species included in the Irish Red Data Book, is found in Lough Furnace.

In addition, Clew Bay Complex supports a diverse range of wintering waterfowl, including some species listed on Annex I of the EU Birds Directive (2009/147/EC), i.e. the Common Tern, Artic Tern, Little Tern, Barnacle Goose, Great Northern Diver and the Bartailed Godwit.

The Burrishoole catchment is a scientific area of conservation and local salmon stocks are protected under the EU Habitats Directive. The Burrishoole system is regarded as a world index site for Atlantic salmon and feeds into international assessments conducted by the International Council for Exploration of the Seas (ICES), the European Inland Fisheries Advisory Council (EIFAC) and the North Atlantic Salmon Conservation Organisation (NASCO). It should also be noted that eels are also a key species studied in the Lough Furnace/Burrishoole System. The natural and flat oyster beds in Clew Bay are of both national and international importance.



Source map: OS Discovery Series Map 31

Figure 3-2 Map Showing the Location of the nearest cSAC, Newport River

In addition, Clew Bay is a designated shellfish water (under the European Communities [Quality of Shellfish Waters] Regulations, 2006) and forms part of the ‘transitional and coastal waters’ as designated by the Water Framework Directive. The site includes the entire estuarine habitat in Newport

Bay, extending to the road bridge in the town. Clew Bay is also protected under an Oyster Fishery Order that was granted to the Clew Bay Oyster Co-operative in 1979.

A Shellfish Pollution Reduction Plan (PRP), Pollution Reduction Programme and Characterisation Report are now published for Clew Bay. The Characterisation Report provides an indication of current point source pressures within the catchment, i.e. arising from abstractions and industry. The Derrinnumera Landfill has been designated under “Landfills – not at risk” (of potentially impacting upon the shellfish area). Section 5.2.1 of the report states that monitoring of the shellfish area does not indicate any water quality issues likely to be associated with the existing operations at Derrinnumera Landfill; hence the facility is unlikely to be affecting shellfish water quality in the shellfish area.

The current overall status of the Clew Bay Shellfish Area has been reported in the PRP as follows:

- Monitoring undertaken for the purposes of the **Directive 2006/113/EC (Shellfish Waters Directive)** and **S.I. 268 of 2006 (Quality of Shellfish Water Regulations, 2006)** – does not indicate shellfish water quality issues in the area
- Monitoring for **Directive 2000/60/EC (Water Framework Directive)** – does not indicate any water quality issues in the area
- Monitoring of shellfish flesh for **food hygiene purposes** – indicates low levels of faecal contamination in the shellfish area (the bivalve mollusc production area are classified as ‘Class A’ and ‘Class B’ for the purposes of **EC Regulation 854/2004**). However, the shellfish are in compliance with the shellfish guideline value for faecal coliforms.

In terms of current conditions in the Clew Bay Shellfish Area Catchment, the PRP concludes that analysis of the Characterisation Report suggests that there are no “key pressures” or “secondary pressures” currently impacting on the shellfish water quality.

3.2.4 Surface Water Quality

Derrinnumera Landfill Site is located near the head of the Glaishty River Catchment. The Glaishty River flows north outside the easterly boundary of the landfill site, but at this point on its course the river is little more than a stream. From there it flows into Beltra Lough, which has a total catchment area of 98km². The outflow from the lake is the Newport River, which flows to the sea at Newport Bay. The Newport River has a total catchment area of 143km². Official lab results from aquatic invertebrate sampling at the stream adjacent to the subject site brought about a Q-value of 2-3 being assigned, which indicates moderate levels of pollution. Additionally the EPA have a monitoring point at Glaishty Bridge, approximately 2km north of Derrinnumera Landfill site (downstream). The EPA Report on biological surveys of the Glaishty River indicates Q value ratings of 3-4 for December 2003 and 4 for Dec 2004 and June 2005, indicating slight pollution in 2003 with recent improvements to unpolluted levels of water quality in December 2004 and June 2005.

A river also feeds Beltra Lough from the north and another from the southeast, as well as a number of smaller streams from both east and west of the lake. The ridge to the south of the landfill site represents a catchment divide. Any surface runoff or through flow from precipitation south of this ridge

will enter the Owennabrockagh River to the south, which flows into the sea at Clew Bay. There are no other watercourses or areas of standing water entering or leaving the subject site.

3.2.5 Flora and Fauna

3.2.5.1 Flora

A study of flora in the vicinity found areas of amenity grassland to the south of the site, wet grassland to the north of the site, recolonising bare ground (present as a large portion of land surrounding the existing landfill), and lowland blanket bog (located to the northern and southern edges of the site).

3.2.5.2 Fauna – Birds

During the survey birds typical of this habitat were observed such as the blackbird, meadow pipit, wood pigeon, magpie, blue tit, starling, chaffinch, hooded crow and robin. These are all common and widespread species typical of the habitat types present.

3.2.5.3 Fauna – Mammals

There were no signs of specific mammals noted during the field study, though it is probable that a range of species utilise the site and surroundings; including hedgehog, pygmy shrew, bank vole, rat and wood mouse. No evidence of badgers or foxes was noted during the survey, although they may utilise the area for foraging. No evidence of bats was observed within the proposed site. No mature deciduous trees were found, nor any ruined or old buildings suitable as summer roosts for bats, therefore it is unlikely that bats roost in the area.

3.2.5.4 Fauna – Other Vertebrates

There were no records of other vertebrates from this site; however, vertebrates likely to utilise the area are frogs, which in general are commonly found across cutover bog that has re-vegetated.

3.2.5.5 Fauna - Invertebrates

No invertebrates were recorded at the site but it is likely that marginal vegetated areas are home to common butterflies such as small heath, dragonflies such as common hawker and common darter, and damselflies such as blue-tailed damselfly and large red damselfly. A range of small beetles, spiders and ants would also be found along the vegetated margins of the cutover bog and bog remnant fringes.

3.2.6 Evaluation of Local Ecology

After evaluation of the proposed development site, carried out in accordance with the Regini (2000) guidelines for ecological evaluation, it was found that the site is considered to have a 'low local value F'. This assignment is justified for several reasons including:

- There are no records or sighting of rare plants or animals within the proposed development site.

- The proposed development does not include any areas designated, or that will be potentially designated for their ecological value.
- The only habitat of ecological significance listed within the land fringing the proposed development site is lowland blanket bog, which is, however, disturbed/fragmentary and considered to be of low ecological value.

3.3 ECOLOGY OF THE RISING MAIN ROUTE:

3.3.1 *Evaluation of the Ecological Importance of the Survey Area*

It is proposed that the treated leachate will be pumped to the outfall of the proposed Newport WWTP, from the treated leachate pumping station via a pumped rising main laid along the R311 from Derrinnumera Landfill to Newport. Ecological interest within the survey area centres on the Newport River, which, as well as aquatic/fishery interests, supports otter and kingfisher as mentioned above. The woodland and scrub alongside the river is considered an integral part of the riparian habitat. As noted previously, this river has been designated as a candidate Special Area of Conservation (cSAC) under the Wildlife Act (1976) and Habitats Directive. The interest of this cSAC site lies primarily in the presence of a significant population of the Freshwater Pearl-mussel, a species that is listed on Annex II of the EU Habitats Directive, protected under the 1976 Wildlife Act.

3.3.2 *Terrestrial Assessment of Pumped Rising Main Route*

A terrestrial assessment was undertaken during March 2005, involving a survey of the surrounding habitat, flora and fauna of the proposed treated leachate pipeline route. The study area extended from the existing landfill site at Derrinnumera to Newport harbour, a distance of approximately 6.5 km from east to west.

3.3.2.1 **Flora**

Along the proposed pipeline route, between the Landfill and Cartron Townland, the principal adjoining habitats in this area are wet heath and wet grassland, the latter improved to varying degrees. The wet heath has been heavily grazed.

It is proposed that the pipeline be laid in the already disturbed ground from Cartron to Cuilmore, where a section of road of c.1 km has been recently re-aligned and upgraded.

The pipeline route will run close to Cuilmore Lough and Doogan Lough, but will in both cases be separated by a strip of ground that includes a building and some scrub. Moving west of Cuilmore, the land is more improved with improved grassland pasture being dominant.

The pipeline route will be located along the R311, which follows the Newport River from Drumlong to the town. The eastern section of this length, as far as the bridge, runs south of the river. The southern side of the road is skirted by a low grassy bank on which there is a low, well-maintained hawthorn hedge. Beyond the hedge there is steeply sloped ground that supports a strip of deciduous woodland, mostly birch. On the riverside, there is a grass verge of 1-2 m width. Between the verge and the riverbank, there is mostly woodland and scrub, which consists of ash, sycamore, hawthorn and willow.

The section of the pipeline, which will run through the town, is entirely within a built environment. The final section of pipeline leading to the proposed sewerage plant at Caulicaun would pass along a hedge-lined track that is partly overgrown. Hawthorn is the principal species. The treated leachate rising main will terminate at the proposed Newport WWTP outfall sump, just upstream of a combined UV treatment step, which will be located within the site boundaries of the WWTP.

In general, the survey area does not appear to support any rare or protected plant species (as listed in Flora Protection Order 1999 or in Curtis & McGough 1988).

3.3.2.2 Fauna

3.3.2.2.1 Fauna – Birds

The majority of the bird species, which occur within the survey area, are common and widespread species of the open countryside. Meadow pipits were widespread in the grassland fields and open areas of heath alongside the R311. Skylark is also present in the area. Snipe are probably widespread, as several were flushed from one of the wet fields near Derrinnumera. A further species of the wet grassland habitat is reed bunting.

Common birds of the scrub and woodland habitats include such species as blackbird, song thrush, wren and various tit and finch species. The wintering thrush, redwing, was recorded at several locations.

The Newport River provides good habitat for kingfisher, which is known to breed locally on the river³. Other wetland species, which use the river, include mallard, grey heron and cormorant. Grey wagtail is widespread on the river.

3.3.2.2.2 Fauna - Mammals, Amphibians and Reptiles

The mammal species of most conservation interest, which occurs in the study area, is otter. This species is known from the Newport River and is also widespread in Clew Bay⁴. A range of common species of the countryside was recorded in the area, including brown rat, fox and rabbit. Other ubiquitous species such as long-tailed field mouse and pygmy shrew would be expected, as well as less common though widespread species such as the Irish stoat and badger (it should be noted however, that no badger setts were recorded along the proposed pipe route during this survey). The Newport River corridor has good potential for bat species though elsewhere in the survey area the potential is low due to the scarcity of tall trees.

The common frog is present in the area; however, there are no ponds in the survey area, which could support newts. The habitats along the route could support the common lizard.

³ B. Madden, previous observations

⁴ NPWS data, B. Madden previous observations.

In summary, ecological interest within the survey area centres on the Newport River as discussed above. Apart from the riparian fauna already referred to, the various fauna species, which occur in the survey corridor, are common species of the countryside and none are threatened or of particular conservation importance.

3.3.3 *Margaritifera* Survey of Pumped Rising Main Route (from Derrinnumera Leachate Treatment Facility to Newport WWTP)

Given the proximity of the treated leachate pipeline route to the Newport River and its tributaries, a Molluscan (*Margaritifera margaritifera*) survey was undertaken during February 2005, in order to assess whether the streams which would intersect the route of the pipeline along the R311 support the pearl mussel. As stated above, the interest of the Newport River cSAC site lies primarily in the presence of a significant population of the Freshwater Pearl-Mussel (*Margaritifera margaritifera*). A survey in 1995 estimated the population of the Pearl-Mussel within the site at approximately 5,000 individuals. As the water quality of the river is good, the mussels were found throughout the river system in both gravel and rocky bed areas.

3.3.3.1 Findings of 2005 *Margaritifera* Survey

The purpose of the survey was to establish the presence or absence of adult freshwater pearl mussel. Ten streams were surveyed along the proposed pipeline route, of which no mussels were encountered. Due to visibility conditions and weather constraints, it was not possible to survey the Newport River, however living mussels could commonly be seen from the bank through a bathyscope, downstream of the bridge (i.e. road bridge east of Newport Town) and along the pipeline route.

3.4 SOIL AND GEOLOGY:

3.4.1 *Development Site*

3.4.1.1 Existing Environment - Soils

The GSI map for the region underlying Derrinnumera Landfill shows that the principal soil type is a low-level blanket peat. Site investigations concluded that sandy glacial till and fluvioglacial sands, which consist of clast sizes up to and including cobbles and boulders, are the predominant subsoil types underlying the peat in the subject area. The GSI map indicates that the area is underlain by rocks belonging to the Croaghmoyle Formation.

Site investigations suggested that the area surrounding the landfill is covered with blanket peat. In places this peat directly overlies bedrock. Glacial deposits underlie the peat where the bedrock is deeper. Unconsolidated deposits that varied from sandy clay to clay rich sand were found in boreholes. The thickness of peat identified during the survey was found to range from 0.3m to 3.35m. Bedrock encountered in drilling of monitoring boreholes was described as a series of interbedded medium to coarse-grained red to purple/brown sandstones and fine to medium grained conglomerates. The conglomerates are composed of clasts of quartz, quartzite and sandstone with minor black/green volcanics in a sandstone matrix. There are also thin bands (<10cm thick) of red/brown mudstone.

3.5 WATER AND HYDROGEOLOGY:

3.5.1 Surface Water Hydrology at Development Site

Surface water samples were collected from 7 No. surface water monitoring stations, initially on the 6th November 1997 as part of the study for the original Waste Licence application, prior to the lining of Cell No. 1 and the construction of the cut-off wall, and again during October 2003 post construction of the cut off wall and lining of Cell No. 1. From the 1997 samples the effect of leachate discharge could be seen in the chemistry of the samples taken from the 5 No. monitoring points on the Glaishty River/Beltra Lough/Newport River system, though it should be remembered that these samples were taken prior to construction of the cut-off wall.

Results of October 2003 analysis indicated that the surface water quality was acceptable at all of the monitoring stations for that month, however, evidence of slight surface water contamination was detected in the sample taken immediately down-gradient of the landfill site on the Glaishty River, in the form of elevated ammoniacal nitrogen and Total Organic Nitrogen (TON) values. It is not considered that these reported values indicate significant groundwater contamination at this point due to the effect of leachate, and the overall results of October 2003 furthermore illustrate a higher water quality in comparison to the results reported for this sampling point undertaken in November 1997 (prior to construction of the cut-off wall and lining of Cell No. 1).

The EPA also have a monitoring point at Glaishty Bridge, approximately 2km north of Derrinnumera Landfill Site (downstream) and the following table gives the recent biological quality ratings for the monitoring point, showing steady improvements in the overall quality of the stream.

Table 3-1 Recent Biological Quality Ratings

Sampling Station		Biological Quality Ratings (Q Values)				
No.	Location	Jun 2000	May 2001	Dec 2001	Jun 2002	Dec 2002
0100	Glaishty Bridge	3	3	3	3	3-4
		Jun 2003	Dec 2003	Jun 2004	Dec 2004	June 2005
		3-4	3-4	4	4	4

The results above are illustrated by using the EPA scheme of Biotic Indices or Quality (Q) Values. The evaluation of a water quality rating is based on the relative abundance of groups of indicator organisms. The relationship of Q-Values to water quality is set out in Table 3.2 below.

**Table 3-2 The Biological River Quality Classification System
 (McGarrigle *et al.*, 2002)**

Q Value	Community Diversity	Water Quality
Q5	High	Good
Q4	Reduced	Fair
Q3	Much Reduced	Doubtful
Q2	Low	Poor
Q1	Very Low	Bad

3.5.2 Ground Water Hydrology at Development Site

Overburden and bedrock hydrogeology were also addressed in the original Waste Licence Application submitted by Mayo County Council to the EPA in 1998. This document was prepared prior to lining of Cell No. 1 and the construction of a cut-off wall around the perimeter of Derrinnumera Landfill. The main findings from the 1998 report are included in Appendix No. 11 together with results from recent hydrogeological investigations undertaken post-lining of Cell No. 1 and cut-off wall installation.

3.5.2.1 Groundwater Quality

Groundwater samples were taken from six bedrock groundwater monitoring wells on the 5th January 1998 as part of the study for the original Waste Licence Application (Ref No. W0021-01). Analysis of the chemistry reported for these wells, indicated elevated concentrations for a number of parameters for both up-gradient and down-gradient boreholes. It was concluded that the up-gradient monitoring boreholes were being polluted by a source up-gradient of the landfill. The source of this up-gradient pollution had not been identified at the time of drafting the original Waste Licence Application (Ref No. W0021-01). Of the 4 No. down-gradient boreholes, one displayed a similar chemistry to the up-gradient boreholes, whilst the other three displayed slightly elevated levels of various parameters, but generally were less polluted than the up-gradient boreholes. It was concluded that the landfill may be contributing contaminants to the bedrock (before lining of Cell No. 1 and construction of the cut-off wall) but the impact is less than pollution from a source up-gradient of the landfill.

Additional groundwater monitoring boreholes were subsequently installed at four locations on either side of the cut-off wall (to the north, northeast, east and southeast of the landfill). Groundwater samples were taken from these boreholes for analysis in October 2003. On analysis of samples elevated levels of contamination were detected in boreholes located both inside and outside of the cut-off wall. Based on known groundwater flow patterns in that area, it is possible that contaminated groundwater may have travelled through fractures / gaps in the bedrock, below the base level of the cut-off wall (but not through the cut-off wall) but adverse impact on the Glaishty River has not been detected.

In conclusion, it is considered that the cut-off wall is functioning as designed, as the wall is preventing the passage of contaminated groundwater from moving through the cut-off wall, with the groundwater retained by the wall being diverted to a balancing lagoon located to the north of the site. The cut-off wall is keyed into the bedrock, however, as the upper bedrock zone is weathered, there appears to be some movement of contaminated groundwater through the fissured bedrock itself. Since construction of the cut-off wall however, improvements in general water quality around the landfill site have been reflected in the recent EPA reports on biological surveys of the nearby Glaishty River.

3.5.2.2 Groundwater – Well Audit and Springs (Rises)

A formal search of the GSI Well database has revealed that no abstraction wells are located within a 2km radius of the subject area. A total of 6 No. rises⁵ have been identified west of the proposed

⁵ Rises: Rises generally indicate springs or stream sources

development on the Ordnance Survey 1:10,560 scale map of the area. None of these rises interact with the hydrogeological regime at the landfill site, as they are not situated in the local catchment area for the site.

3.5.2.3 Groundwater Vulnerability and Protection – Aquifer Classification

The GSI map indicates that the area is underlain by rocks belonging to the Croaghmoyle Formation. A provisional aquifer classification by the GSI describes the Croaghmoyle Formation as a Locally Important Aquifer that is moderately productive only in local zones (L1). Most groundwater circulation in these rocks is in the upper weathered zone, along more permeable beds of limited extent and along fracture and fault zones. The flow is generally in localized zones with little or no continuity between them.

3.5.2.4 Groundwater Vulnerability and Protection – Vulnerability Assessment

On the basis of GSI recommendations and site investigation data, a high vulnerability rating is assigned across the majority of the area surrounding the existing landfill with the exception of occasional small pockets of extreme vulnerability, such as areas to the south and southwest of the waste body as well as an area on the opposite side of the Glaishwy River. This assessment is based on the depth to bedrock information and the nature of the overburden material. The groundwater resource assigned to the area surrounding the landfill, which is derived by combining aquifer classification together with the groundwater vulnerability, is L1/H (locally important aquifer with high vulnerability). A resource classification of L1/E (locally important aquifer which is moderately productive only in local zones with extreme vulnerability) is assigned to the local areas of extreme vulnerability described above. It should be noted however, that there are no local groundwater abstractions in the area or downgradient of the proposed development site.

3.5.3 Water (Proposed Outfall from Leachate Treatment Facility):

3.5.3.1 Marine Environment of Proposed Newport WWTP/ Derrinnumera Leachate Treatment Facility Outfall Location

In light of the proposal to discharge treated leachate, in combination with final effluent from Newport Waste Water Treatment Plant, to the marine environment via a common outfall, the baseline dataset of the aquatic ecology and water quality for the receiving environment has been developed in the Newport Sewerage Scheme EIS, which has been published in parallel with this EIS. The area covered by this research includes the Burrishoole/Lough Furnace system and the Newport Channel in general. Refer to Section 3.3 of the Newport Sewerage Scheme Environmental Impact Statement for baseline data on the existing marine environment of the proposed Newport WWTP/ Derrinnumera Leachate Treatment Facility outfall and surrounding area.

3.6 AIR (NOISE & VIBRATION)

In fulfilment of certain obligations of the facility's Waste Licence (Ref No. W0021-02), an annual noise-monitoring programme is carried out at four sampling positions. These sampling locations are

positioned around the extremities of the site with the exception of one, which is positioned approximately 1150 metres to the southwest of the site, along the R311 and in the general proximity of the nearest dwellings. The surrounding area is extremely remote in nature and there are no habited dwelling houses within 800m of the proposed development (refer to Figure 1-1). Overall the noise survey, carried out in December 2004 (and revised emission calculations carried out in January 2008), confirms that facility noise emission levels comply with the noise emission limits that are currently imposed under the terms of the existing Waste Licence, and also indicate that the landfill operation causes negligible noise impact at the nearest residential property.

3.7 AIR (DUST)

Because of the potential dust emissions that can arise from landfill sites and also from the construction of the proposed development, a baseline dust profile was carried out. At the present time Ireland does not have statutory limits for dust deposition, however the limit set under Derrinnumera Landfill Waste Licence (No. W0021-02) is 350mg/m²/day.

Results of analyses of dust samples from 2005, taken as part of an existing dust monitoring programme at Derrinnumera indicate that the total dust levels in gauges were below the 350mg/m²/day limit. Overall the total dust levels at three of the dust monitoring locations were low. The remaining dust sampling location showed slightly elevated dust levels, which is probably attributable to works which took place in the borrow area adjacent to this monitoring location, during landfill cell 2 construction (now complete).

3.8 AIR (ODOUR)

The current landfill consists of two lined waste deposition cells on top of an old unlined landfill body. Lined Cell No. 1 permanent capping is now complete, while Lined Cell No. 2 is the current active waste deposition zone. Cell 2 has not yet been sealed with respect to emissions to air. The existing Waste Licence (Ref. No. W0021-02) requires that a complaints register be maintained at the landfill. The landfill has received a number of odour related complaints in the past, with the largest number of complaints received during 2007 (fifteen odour complaints from individuals residing in the locality⁶). One complaint has been received in 2006.

Permanent capping of Cell 1 is now complete, which comprised of the sealing off of the cell with an impermeable liner. The possibility of noxious odour emanating from the waste contained in this cell has therefore been eliminated, and all landfill gas generated in this capped cell is currently taken to the gas flare.

Housekeeping of the waste face in current deposition area (Cell 2) is carried out in accordance with best practice techniques, such as covering of the fresh waste each evening after operations cease. Cell 2 is now been filled on a phased basis and approximately 50% of this cell will receive permanent capping in the near future. The permanent capping of Cell 1 and Phase 1 Cell 2, combined with the continued proper waste housekeeping techniques will be expected to remedy current landfill related odour problems in the future.

⁶ Sourced from Derrinnumera Landfill On-site Records in 2008

An odour impact assessment was carried out on the current landfill site and proposed development at Derrinnumera. The purpose of this assessment was to determine the potential for the generation of odour impact on the surrounding vicinity. Potential odour sources were identified and were used to construct the basis of the odour modelling assessment. Odour emission rates were calculated using the Olfactometry technique. In order to illustrate the overall emission rate from the proposed Derrinnumera integrated waste management site, five scenarios were chosen to estimate the worst-case potential odour impact from the current/proposed Derrinnumera site. Modelling scenarios, representing different proposed operations within the site, were performed to assess the phase development of the site for the most significant odour emission rate periods.

Odour annoyance criteria, which are commonly used for odour impact assessments in Ireland, the UK and Netherlands, were used for odour dispersion modelling. The odour impact found during the modelling was approximately 10 to 30 times lower than the proposed limit criterion. In accordance with odour annoyance criterion, and in keeping with current recommended odour annoyance criterion in this country, the model (which was again reviewed during January 2008) has predicted that the existing landfill will not lead to odour related nuisance for the nearest residents, provided that best practice techniques are used during the operation of the landfill.

3.9 CLIMATE

The long term weather patterns at the Derrinnumera Landfill site reflect regional conditions affecting the west Connaught area, i.e. dominated by low fronts from the west and southwest in winter months and more settled conditions during summer months. Monthly rainfall data from the landfill shows that the total rainfall at this location in 2005 was 1344.2mm, which falls in line with the average for the area. A 10m mast complete with an anemometer was established on site. From this the temperatures recorded at the site were found to range between -2.61 to 25.19 °c. Wind speed and direction at Derrinnumera are strongly influenced by local topography. The prevailing wind direction at the site is southwesterly and the mean annual wind speed for 2005 was 4.01 knots.

The effects of climate change as they may impact on rainfall patterns are not considered relevant with regard to existing and future landfill operations at Derrinnumera. Although leachate generation at the landfill is, to a considerable degree, influenced by rainfall patterns at present, capping of filled cells means the generation of leachate will be independent of future climate change when considering the relatively short lifespan of the last remaining waste cell (Cell 2). It can be reasonably assumed that permanent capping of all currently licensed landfill cells will be complete within the next 3 years. This permanent capping will involve covering the entire waste-body with an impermeable layer followed by up to 1 metre depth of natural soil, which will, in effect, return the landfill body to an almost 'green-field' state. Precipitation falling on these sealed off cells will either flow away towards natural surface water drainage routes of the area or be absorbed back to the atmosphere. Therefore, as the noticeable effects of climate change on precipitation begin to occur, landfill cells will already have been sealed off from the atmosphere, and leachate generation will no longer be dependent upon rainfall patterns.

3.10 LANDSCAPE:

Derrinnumera Landfill is located approximately 6.5km east of Newport town, just off the Castlebar to Newport Road (R311). The general character of the terrain is small gently sloping hillocks, containing low areas of poorly drained land. The existing landfill is located at maximum elevation of approximately 96 m O.D (Malin Head), between a small hill immediately to the west and a small valley running in a north-south direction, towards the R311.

The principal ground cover in the area is blanket bog, with its associated plant species - mainly heathers and wild grasses. There are some commercial conifer plantations in the area along with pockets of deciduous wood planted along the R311 and adjacent to farm buildings in the locality. The principal species are Hazel, Ash, Sycamore, Silver Birch and Alder.

In visual terms, the siting of the existing landfill facility, on a ridgeline parallel to the Castlebar to Newport Road, makes it relatively obtrusive. Currently at the site, Cell 1 has been filled to a level of 96m O.D. and the average level of the road in the vicinity of the landfill is 70m O.D. However, the distance from Cell 1 to the R311, approximately half a mile, reduces the visual significance of the site. The main views into the site are from the south and southeast. The absence of inhabited dwellings in the area means that there are no views from houses directly into the landfill site. The surrounding empty landscape acts as an effective buffer against views into the landfill.

The general landscape quality is relatively poor in the area, compared to the high amenity landscape in the hinterland of Newport town. Short-distance views into the site from the access road are poor; the disturbed nature of the landfill being visually dominant and obtrusive. The prominent position of the south end of the landfill on a ridge means that the profile is seen against a backdrop of sky, rendering any change in profile more visually obtrusive.

3.11 MATERIAL ASSETS (ROAD INFRASTRUCTURE & TRAFFIC):

Taking the counts for the 12-month period to the end of December 2008, a total of 66,155 vehicles have used the civic amenity site in that period, and 9,137 vehicles have used the weighbridge in the same period. The landfill manager would estimate that approximately 90% of the weighbridge traffic would be HGV's. HGVs can be broadly categorised as associated with Waste transport or Leachate transport, with smaller numbers associated with transport of recyclables and cars with trailers sent for weight measurement.

It is estimated that the daily traffic counts entering the landfill access road at present are:

Vehicle Type	Vehicles per day (based on 6-day week)
HGVs :	26
Cars and light commercial	215

The above average (2008) counts of HGVs include vehicles for movement of leachate to Castlebar WWTP (which at present is transported via articulated tanker to Westport WWTP). The volume of

leachate arising at the landfill reflects the seasons and other operational conditions. Table 3-3 below summarises the annual leachate volumes at Derrinnumera.

Table 3-3 Leachate Transportation from Derrinnumera (2001 – 2009)

Year	Total Leachate Volume transported off site	Estimated HGV units required for leachate transport
	<i>m³/annum</i>	<i>Nr./annum</i>
2001	73,430	3,387
2002	114,418	5,202
2003	64,526	2,933
2004	95,534	4,565
2005	97,230	4,266
2006	88,116	3,866
2007	91,968	4,035
2008	129,403	5,545
2009	99,879	4,223

It is clear from this table that leachate transport accounts for a significant fraction of the HGV traffic at the Landfill at present. The future impact on traffic, and particularly HGV traffic, is discussed in Section 4.10, where it will be seen that compensating factors of discontinuation of leachate haulage and commencement of sludge haulage result in a slight reduction in HGV traffic levels overall.

3.12 MATERIAL ASSETS (ARCHAEOLOGICAL AND CULTURAL HERITAGE OF DEVELOPMENT SITE):

An assessment of the cultural heritage and archaeological amenity of the Derrinnumera area was previously conducted by Mr M. Gibbons BA, MIAPA, for the original Waste Licence Application in September 1998. This entailed a comprehensive desk study of an area within 3.5km of the Derrinnumera landfill site. The Recorded Monuments listed by the Heritage Service within the 3.5km radius were investigated, along with the Topographic Files, the Finds Register of the National Museum of Ireland, and relevant aerial photographs. In addition, a ground walkover was also carried out, covering an area within 500m of the landfill site boundary, to see if any unrecorded archaeological sites or monuments were in existence.

Subsequent to the original desk study, an on-site archaeological study has been completed at the landfill site, concentrating on an area adjacent to the northwest boundary of the site, outside the existing licence boundary. This area has served as a borrow area for the construction of Cell No. 2, which will, after clearance, become part of the proposed Sludge Hub Centre. A number of unrecorded *fulacht fiadhs** were discovered during clearance of this area. These finds resulted in an archaeological excavation, leading to the logging and removal of the *fulacht fiadhs* in accordance with a licence issued from the National Museum of Ireland. No other archaeological finds were recorded, and a report on the archaeological dig has been compiled.

*Fulacht Fiadhs: Ancient cooking places, which usually survive as small horseshoe shaped mounds of charcoal-enriched soil packed with fragments of heat-shattered stones. They are usually situated close to a water source, like a stream, or in wet marshy area. They date from the Bronze Age to the medieval period.

3.13 MATERIAL ASSETS (ARCHAEOLOGICAL AND CULTURAL HERITAGE OF PIPELINE ROUTE):

A preliminary archaeological assessment was undertaken by Linda Beirne, MA Archaeologist, Mayo County Council. An examination of the relevant Recorded monument and Place Maps and Manual for County Mayo was carried out, so as to assess the impact on known archaeological constraints.

The Report concluded that the dedicated treated leachate rising main will not intercept any areas of archaeological interest or possible archaeological interest over its' entire length, from the Derrinnumera Treated Leachate Pumping Station to the Newport WWTP outfall. At the outlet from the Newport WWTP, the treated municipal effluent and the treated leachate combine into a single outfall pipeline.

With regard to the combined outfall pipeline, to be constructed from the Newport WWTP at Caulicaun to the final discharge location north of Rosmore, three areas of archaeological interest or possible archaeological interest, which are all within the same area of constraint, were identified to be located in the vicinity of the proposed pipeline route. Site No. 1 has been classified as an Enclosure. Site No. 2 has been classified as a Possible Hut Site. Site No. 3 refers to the pipeline crossing of an inter-tidal area between Caulicaun and Lisduff. All three sites are located in the same area of constraint in the townland of Lisduff.

4 POTENTIAL IMPACTS AND MITIGATION MEASURES:

4.1 HUMAN BEINGS:

4.1.1 *Effect on Population – General*

The proposed Sludge Hub Centre and Leachate Treatment Facility are necessary for the County for two reasons. Firstly, the proposed development is necessary for sludge treatment for County Mayo. As all local authority sludge will be treated at the Sludge Hub Centre, Mayo's wastewater infrastructure will improve, thus enhancing the region as an attractive area for development. Secondly, with the proposed development in place, leachate transport from Derrinnumera to Westport WWTP will no longer be necessary, hence allowing the WWTP to accept additional wastewaters, thereby attracting more industries into the Westport region.

4.1.2 *Effect of Traffic on Population: Construction Phase*

It is not envisaged that the construction phase will have a negative impact on the R311, due to the current good condition of the road and the estimated slight increase in traffic volume during this stage. The delivery of building materials will lead to an increase in traffic volumes during the construction of the Sludge Hub Centre; however the effects will be short term and will be similar in scale to any medium construction project.

The construction of a pumped rising main for transfer of treated leachate from Derrinnumera Leachate Treatment Facility to Newport will have a short-term impact on traffic patterns in the affected area.

Traffic management will be a key issue for this element of the development. Traffic management plans will be compiled in accordance with the requirements of the *'Traffic Signs Manual (Chapter 8 – Temporary Traffic Measures and Signs for Roadworks)'*, Department of Environment, 2006 to ensure the smooth and safe flow of traffic along the pipeline route.

In the interests of avoiding interruptions in traffic flow the Contractor will be required to phase the works so that a maximum of 100m of pipework can be constructed at any one time. Complete Road closures will not be permitted and access will be maintained at all times for private entrances and business premises affected by or adjacent to the works.

It is envisaged that the pipeline construction will have a very minor short-term negative impact on traffic patterns during the construction period.

4.1.3 *Effect of Traffic on Population: Operational Phase*

The main concerns regarding the operation of the proposed development is the potential increase in traffic volumes at the site and on the adjoining road network. However, a reduction in traffic must also be considered due to the future discontinuity of tanker transport of leachate from the site with the introduction of the Leachate Treatment Facility. The effects of the Sludge Hub Centre and Leachate Treatment Facility are considered to be minimal with regards to impacts on the population of the area. As the current landfill has been in existence for over three decades, the proposed Sludge Hub Centre will not unduly impact on the population, especially when the distance to the nearest habited dwelling is taken into account (800m from composting tunnels, 945m from sludge drying building). The proposed site does not have any facilities such as churches, post offices, shops or national schools in the immediate vicinity.

Overall, it is expected that the decrease in HGV traffic associated with leachate transportation will effectively cancel out any increase in HGV traffic volume, thus preserving the present traffic situation at Derrinnumera.

4.1.4 *Possible Effects of Sludge Transportation Vehicles on Population*

The transportation of sludge to the site has the potential to impact on the population as a result of spillages of dewatered sludge from vehicles. In order to combat this licensed contractors will transport the sludge to the site using vehicles that are sealed, roadworthy and that meet the relevant standards for sludge transport vehicles.

4.1.5 *Effects on Employment*

The project will create and continue to support local employment, both directly and indirectly. The proposed development will bring about the need for at least 6 No. extra full-time employees on site, as well as a number of drivers for transporting the sludge to the facility. In addition, throughout the construction period, plant and equipment and associated operatives will be sourced locally where practicable. It is also intended that during operation local people and services will be used for ongoing operation and maintenance where feasible.

Mitigation measures are not applicable, as additional employment will be created as a result of this development.

4.1.6 *Impacts on Agriculture and Landuse*

The proposed development, during its construction and operational phases will have no impact on any agricultural lands, as the development is to be located on the site of the existing landfill and land use in the immediate area is deemed negligible. The impacts of the proposed development have the potential to be significant, in a worst-case scenario, as a result of fugitive emissions. The treatment facility will be operated under best practice guidelines at all times so that adverse impacts shall not be felt in the surrounding areas. There have been no significant impacts on farming activities or animal health as a result of the activities at the landfill to date. It is envisaged that the locating of a Sludge Hub Centre and Leachate Treatment Facility here, will not increase any risk of negative impacts on farming activities or animal health.

4.1.7 *Effects on Amenities and Tourism*

Tourism generates considerable revenue for the west of Ireland. In 2002 it generated 2.35 million visitors to the region (Ireland West Tourism). The proposed development has the potential to impact negatively on the amenities and tourism in the area, though, there is no major tourist attraction within 9km of this development. The nearest walking route, the “Western Way”, is located 3km from the site during some of its stages. The walking route of the four-day walking festival runs close to the proposed development site during some of its stages. The current landfill however has been in operation for over three decades and has not impacted on the popularity of this walking route.

The on-site surface water collection system limits the potential of pollution to the associated water channels. Therefore the amenities at Beltra Lough and Newport River will not be impacted upon. Although tourism is an important sector in the economies of County Mayo the landfill and its proposed development is located in an area of the county, which is not considered to be a significant tourist attraction. Since the proposed Sludge Hub Centre and Leachate Treatment Facility is to be sited at the existing landfill site behind Cell 1, the visual impact of the proposed development will not cause any significant impact.

4.1.8 *Effects of Traffic on Property*

The main potential impacts on dwelling houses will occur during the construction phase of the development from increased traffic and related noise. However, traffic increases will be negligible due to the constant history of landfill activity, construction and capping over the last few years at this site.

In relation to the possibility of devaluation of residential and other properties adjacent to the site it is concluded that, when the development is built and operated in accordance with the proposed plans, that any adverse impact on the overall value of the property in the area will be negligible. There are relatively few dwellings in proximity to the site with the nearest dwelling located approximately 800m from the proposed developments. This means that the impacts of this type of development will be limited by its remote location and will have a negligible impact on relatively few people. Impacts on

property on the current leachate haulage route through Newport to the Westport WWTP will be favourable as this traffic is discontinued.

The visual impact of the proposed Sludge Hub Centre and Leachate Treatment Facility at the existing landfill site is also limited due to its location behind Cell 1.

4.1.9 *Effects of Odour on Property*

As stated in Section 3.8, the landfill has experienced some problems with regard to odour and odour complaints in recent years. The permanent capping of Cell 1 (already complete) and Phase 1 Cell 2, combined with the continued proper waste housekeeping techniques will be expected to remedy current landfill related odour problems in the future.

A detailed odour impact assessment carried out for this Sludge Hub Centre and Leachate Treatment Facility (which has been reviewed in January 2008) shows that no significant odour impact will be perceived in the vicinity of the proposed development. In keeping with commonly used odour annoyance criteria internationally, the proposed development, which will be operated using best practice techniques, will be unlikely to generate complaints.

Also refer to mitigation measures in 'Impact on Air (Odour Emissions)' Section 4.7.

4.1.10 *Safety and Security*

On site impacts regarding the health and safety of this proposed development, relate primarily to concerns about individuals either straying or trespassing into the subject area. In the case of workers and visitors to the site, the day to day operation of this development, including any activities associated with site machinery and on-site vehicles, and additionally how visitors are to present and conduct themselves when engaging with the proposed SHC and LTF, will be undertaken in compliance with the current health and safety legislation pertaining to such.

Health and safety concerns also relate to treated leachate pipeline construction along the R311 public carriageway. During the pipeline construction phase on the R311, the Contractor shall be responsible for the planning, implementation and maintenance of traffic safety and management measures required in order to facilitate the work including the ultimate removal of temporary traffic control facilities (i.e. traffic cones, traffic cylinders, signage and lighting) when each phase of the works is complete.

The proposed SHC and LTF will be designed, constructed and operated in accordance with relevant health and safety legislation. Site Specific Health and Safety Plans shall be provided and adhered to for both construction and operational phases in accordance with relevant legislation.

Fencing shall be put in place around the proposed Sludge Hub Centre and Leachate Treatment Facility so as to maximise safety and security at the site. Only people depositing sludge or involved in monitoring or otherwise authorised by Mayo County Council will be permitted to enter the SHC or LTF site. Access to the site outside of normal operational hours is not permitted unless specifically authorised and supervised by Mayo County Council.

Prior to the commencement of the pipeline construction works the Contractor will be required to provide detailed traffic management plans, compiled in accordance with the requirements of the *'Traffic Signs Manual (Chapter 8 – Temporary Traffic Measures and Signs for Roadworks)'*, Department of Environment, 2006 (or any subsequent amendments thereof).

In the interests of public safety, all appropriate traffic control and safety measures will be put in place and maintained on a continuous basis, i.e. traffic cones, traffic cylinders, temporary traffic signage and lighting. The Contractor will be required to appoint a Traffic Safety and Control Officer to liaise with the Gardai and put into immediate effect any traffic measures considered necessary to ensure the safety of the public.

4.2 ECOLOGY

4.2.1 Development Site:

The Sludge Hub Centre and Leachate Treatment Facility will be constructed at the Derrinnumera landfill in an area that has been cleared of vegetation and potential habitats, therefore the potential impact on flora and fauna is negligible. The proposed development will be in the catchment of the Newport River cSAC, however, during operation there will be no release of pollutants, siltation or leachate to watercourses in the area. Therefore indirect impacts on the cSAC will be very unlikely with appropriate water quality control measures in place.

Consideration will be given to avoidance and reduction of impacts on the ecological environment at all stages, however, as with all development, some degree of impact is inevitable.

Detailed mitigation measures are set out in order to lessen the potential impact, which will include appropriate handling, storage and treatment of all hydrocarbons used during the construction stage, surface runoff from roads and hard standings, leachate, and silt-laden runoff, thus avoiding potential adverse impacts on watercourses. In periods of warm weather, the spraying of insecticides may augment fly control, however this will be carried out using best practice techniques and kept to a minimum at all times.

The Sludge Hub Centre and Leachate Treatment Facility are to be located in the grounds of an existing landfill thus mitigating against the need to construct the development in a green field site. There will be no removal of trees or other areas of semi-natural habitat during construction.

4.2.2 Pipeline Construction

Pipeline construction impacts on ecology will include habitat disturbance due to trench excavations. This will involve the temporary loss of some habitats but the actual permanent loss of habitat will be minimal. Along the largest length of the route, from Derrinnumera to the Newport River, the pipeline would affect road verges that comprise hard-core, grass areas or disturbed ground. Apart from a relatively short length of hedgerow along the route, there are no hedgerows or treelines of note. None of these habitats are of significant conservation value and disturbance by the development is rated as an impact of minor significance. The various species of fauna (mammals, birds, amphibians) which

occur along the pipe route would be largely unaffected by the scheme and all will continue to occur in the immediate vicinity. It is noted that no badger setts were located along the pipe route. Similarly, there are no colonies of nesting birds such as rooks or grey herons in any of the trees that could be affected.

The Newport River cSAC is an important site for the pearl mussel (*Margaritifera margaritifera*) and the Atlantic salmon, species that are listed on Annex II of the EU Habitats Directive. Other important species such as otter and kingfisher also occur. As pollution incidents during construction could affect the food supplies of these important species, suitable mitigation measures to counteract this occurrence will be enforced. Pearl mussels are particularly sensitive to silt runoff. A short episode of silt pollution can kill all pearl mussels in the age group of 0+ to 5+. A prolonged silt episode can kill adult mussels.

If disturbance of any of the ground between the Newport River and existing road is necessary, works will be strictly supervised by an ecologist. Any native species disturbed during pipeline construction shall be replaced with a similar species (probably mostly hawthorn and ash), whilst non-native species such as sycamore should be replaced with ash or oak. Banks and ditches that are disturbed shall also be re-instated.

During the construction phase, strict pollution control measures will be taken to prevent run-off or other pollutants from entering the Newport River and potentially affecting the food supplies of otter and kingfisher, and to prevent potential run-off from reaching the three small lakes close to the R311 (Doogan Lough, Tully Lough, Cuilmore Lough).

Given that the extent of the pipeline proposed to run along the Newport River (up to 1.5km), and the fact that it coincides with the main concentration of the mussel population, all reasonable efforts will be made to keep the pipeline trench as great a distance as possible from the bankside of the Newport River. Where this is not possible, the contractor will be required to provide proposals for stringent siltation prevention along the pipeline route and to provide contingency planning in regards to the risk attached to pipelaying as regards siltation episodes.

Where the pipe crosses the river, it is proposed to lay a pipe in the bridge upstream of Newport Town (trench within the bridge on the R311) in lieu of excavating a trench across the riverbed, thus negating the requirement to disturb the riverbed. Consultations will be undertaken with the National Parks and Wildlife Service in advance of this construction. It is proposed that river crossing works will be strictly supervised by an ecologist.

4.2.3 Treated Leachate Pipeline Operation:

In terms of risks associated with the treatment of the leachate, and transfer of treated leachate to the outfall, these risks can be broadly categorised as follows:

- (a) Power failure or mechanical failure at the Leachate Treatment Plant or at Newport WWTP;
- (b) Bursting or blockage of the treated leachate pumped pipeline;
- (c) Accidental damage to the treated leachate pumped pipeline;
- (d) Low-level leakage from the pipeline.

(a) *Power Failure or Mechanical Failure:*

In terms of mechanical reliability, or in the event of a power failure, raw leachate collected from the unlined waste-body (below the lined cells) will continue to flow to the lagoon as it does at present. Similarly, leachate pumps, which would normally lift leachate from wells within the lined cells directly to the treatment plant, will automatically shut down, allowing leachate levels to temporarily accumulate within the cells, which is permitted to a depth of 1 metre on the base liner. A suitable emergency valved bypass facility (to be installed) will intercept any leachate that has to be pumped to remain within this temporary storage constraint. Intercepted leachate will then flow gravitationally to the lagoon for storage. The lagoon will be kept drawn down as its' normal condition, so that this storage capacity will be available when needed.

The Lagoon pumps will not lift leachate for treatment on power failure, and neither will the treated leachate pumps deliver into the pipeline, while power supplies are out. A SCADA signal on power failure will in any case prevent the treated leachate pumps at Derrinnumera starting up. Equally, in the event of power interruption at the municipal treated effluent pumps at Newport WWTP, a SCADA signal will prevent the treated leachate pumps at Derrinnumera starting up. Therefore, for the duration of a power or mechanical failure at either treatment plant, treated leachate will not be pumped to Newport, and balancing facilities will be utilised in Derrinnumera to accommodate this leachate.

(b) *Bursting or blockage of the treated leachate pumped pipeline:*

The leachate treatment process will have a clarification phase as a minimum and may also include a filtration stage. The risk of blockage of the treated leachate pipeline is therefore small. Nonetheless it will be equipped with Scour Valves at the lowest points of its longitudinal section, with the scour discharge taken into sealed offline chambers from which scoured washdown of the line would be removed by tanker.

The impacts associated with bursting of the treated leachate pumped pipeline, would result in an accidental release of treated leachate to the surrounding lands and watercourses and at worst case entering Newport River, which is a water supply source for Newport Village and its environs. Treated Leachate in this pipeline will already meet standards as described below. Mitigation measures for this risk are outlined below.

(c) *Accidental damage to the treated leachate pumped pipeline:*

Accidental damage to the treated leachate pipeline again could also result in an accidental release of treated leachate. Mitigation measures for this risk are outlined below.

(d) *Low-level leakage from the pipeline:*

It is possible that low-level leakage could also occur as a result of minor accidental damage to the pipeline, short of a visually noticeable burst. This would lead to an accidental release of treated leachate to the surrounding environment. Mitigation measures for this risk are outlined below

The treatment of leachate being discharged into Clew Bay will be to an appropriate standard based on limits specified in Irish legislation. The design philosophy has been to comply with the Urban Waste

Water Treatment Regulations, 2001 and to otherwise treat the leachate such that the environmental quality standards specified in the Water Quality (Dangerous Substances) Regulations, 2001 and European Communities (Quality of Shellfish Waters) Regulations, 2006 are already attained in the pipeline prior to discharge to the receiving environment. The Environmental Protection Agency have a key role in establishing discharge standards for the treated leachate at Derrinnumera landfill as part of the Waste Licence review which is currently being conducted.

The accidental release of a leachate, which has been treated to these very high standards, would have a minimum impact on the environment into which it leaks. Nonetheless it is very important to ensure that accidental releases of treated leachate does not occur, therefore numerous mitigation measures will be put in place along the entire route of the pipeline

A Pipeline Construction Methodology was prepared as a proposed mitigation measure to prevent against potential impacts from treated leachate pipeline construction and operation. The methodology includes such elements as: the isolation of pipeline sections for leakage detection purposes; the use of marker posts and marker tape, which will be responsive to electronic detection equipment, used at the surface to locate the position of the pipeline (this would alert any machine driver as to the presence of the pipeline, it would also prevent accidental misinterpretation of it as a watermain or other service); sleeving of pipelines where the pipeline crosses a stream to prevent accidental release of treated leachate to watercourses, etc.

Welding of pipelines will be carried out by specialist pipeline welders, each certified as competent to do this work, under controlled conditions.

In terms of pipeline bursting, this would be evident from the change in pressure conditions as experienced at the pumping station for any burst which occurred close to that station, if it were not evident by visual means near the burst site. In accordance with normal flow monitoring at both Derrinnumera and Newport, two flow meters will be installed on the pipeline, one at the treated leachate pumping station at Derrinnumera, and the other immediately prior to the combined outfall at Newport WWTP. In the case where there is a detected instantaneous difference in flow-rate, greater than 15%, showing up on the two flow meters, (thus indicating a possible significant loss of leachate along the pipeline route), an investigation to determine the cause of this deviation will be carried out immediately and an automatic shutdown facility will be immediately triggered. Similarly, if the sum of the daily bulk flows differs from meter to meter by more than 10% on any one day, this will again warrant an immediate investigation. The treated leachate pipeline would be a continuously welded pipeline, pressure tested at the time of its construction, and before being commissioned to carry treated leachate. If low-level leakage were subsequently suspected, the pipeline can be divided into convenient lengths for testing purposes by closure of valves along it, in a sequential manner, until the section unable to sustain a test pressure is identified. If it is found that a leakage of leachate is the probable cause for these anomalies in flow readings, step testing of the pipeline between valve chambers will be undertaken to identify the location of the leak. Again the lagoon at the headworks would provide sufficient balancing capacity to interrupt the discharge, repair the burst or leak, and if necessary mobilise tankers to transport the treated leachate on a temporary basis to the Westport Main Drainage system.

4.3 IMPACTS ON SOIL AND GEOLOGY:

Removal of peat, unconsolidated subsoils and some bedrock is deemed necessary to facilitate construction of the proposed Sludge Hub Centre and Leachate Treatment Facility, which will be a direct and permanent effect. However, this is not considered to be a significant negative impact.

Any water ingress encountered by removal of subsoils and bedrock during the construction phase will be intercepted and diverted to an existing drainage channel.

Where it is necessary to remove overburden or topsoil to facilitate construction, where possible and in the context of an agreed landscaping plan, any soils removed to allow for construction of development will be reused for the construction of landscaping features around the development site. These measures will ensure that any loss of existing topsoil or overburden resource is minimised.

Permanent groundwater monitoring wells exist at the landfill site; from which routine sampling will be carried out during both the construction phase and the operational phases to ensure that no adverse impact occurs that is associated with its development.

4.4 IMPACTS ON WATER AND HYDROGEOLOGY:

4.4.1 Construction Phase - Runoff from Development Site

During the construction phase of the proposed development, it is likely that peat washings and a high content of suspended solids will be added to the drainage channels that drain the subject site. This is not considered to be a significant negative impact as the drainage channels flow to a settlement pond prior to discharge to the Glaishty River, enabling settlement of any peat washings and suspended solids prior to discharge. Furthermore this impact is short-term and temporary, during the construction phase only.

4.4.2 Groundwater/Surface Water Resource Protection

The proposed development would have potential to cause groundwater and surface water contamination from vehicular fuel spillages and accidental sludge spillages on the sludge reception area or from potential spillages from material storages on site.

The proposed development is to be founded on a concrete hardstand and it is proposed that any surface water runoff on the concrete hardstand area which is deemed to be potentially contaminated will be diverted to the existing 'grey water' collection network for treatment to ensure that no contaminants discharge from the site. It is not envisaged that implementation of the proposed development will have any increased impact on the quality of the underlying groundwater resources.

4.4.3 Groundwater Resource Protection

The GSI⁷ Groundwater Classification Schemes designate aquifers in the majority of the area surrounding the development site as L1/H (Locally Important Aquifer which is moderately productive only in local zones with high vulnerability) with some areas surrounding the site having a classification of L1/E (with small pockets of extreme vulnerability)

Notwithstanding the above classifications however, it is not envisaged that the implementation of the proposed development will have an adverse impact on groundwater resources, as liquids generated within the process are captured for treatment, unless they are of a standard permitting discharge to surface waters, and there are no local groundwater abstractions in the area or downgradient of the proposed development.

The proposed development would have the potential to cause groundwater contamination from vehicular fuel spillages and accidental sludge spillages on the sludge reception area. To mitigate this the development will be founded on a concrete hardstand, so that any surface runoff will be diverted to the existing surface water collection network, thus ensuring no contaminants discharge from the site. As stated above, runoff from paved areas, which are deemed potentially contaminated, shall be diverted to the 'grey water' collection network for treatment at the Leachate Treatment Facility.

4.4.4 Stormwater Runoff

The development of the proposed Sludge Hub Centre and Leachate Treatment Facility will result in additional stormwater runoff generation from the impermeable surfaces on the site. However, it is likely that much of the proposed development will be paved. This will reduce the amount of effective rainfall infiltrating the soil and bedrock aquifers.

This is a direct, long-term effect but is not considered to be a significant negative impact given that there is an existing stormwater management system at the landfill site that can accommodate this additional runoff. Stormwater collected from roofs can be collected and used as process water in the operations of the proposed Sludge Hub Centre.

4.4.5 Impacts on Water (Proposed Pipe-Laying):

4.4.5.1 Construction Phase – Pipe-laying of Treated Leachate Rising Main

The provision of a treated leachate rising main between Derrinnumera Leachate Treatment Facility and Newport WWTP combined outfall will involve a crossing of the Newport River in a location upstream of Newport Town, along with the pipe-crossing of several streams on route. It is intended to trench the pipeline in the bridge above the Newport River. In addition, there are a number of small loughs, which, although will not be directly affected by excavation works, are in close proximity to the pipeline route. The primary impact associated with pipe-laying is the potential occurrence of silt pollution events.

Stringent mitigation measures will be put in place for the prevention of such an event. During the construction phase, strict pollution control measures will be taken to prevent run-off or other pollutants

⁷ DoEHLG, EPA, GSI (1999), "Groundwater Protection Schemes", Joint Publication.

from entering the Newport River, and to prevent potential run-off from reaching the three small lakes close to the R311 (Doogan Lough, Tully Lough, Cuilmore Lough).

4.4.5.2 Potential Impacts from Accidental Spillages/Breakages of Treated Leachate Pipeline

As stated in the 'Treated Leachate Pipeline Operation' in the Impacts on the Ecology Section of this document, the impacts associated with bursting, blockage or accidental damage to the treated leachate pumped pipeline, would result in an accidental release of treated leachate to the surrounding lands and watercourses and at worst case entering Newport River, which is a water supply source for Newport Village and its environs.

A risk assessment has been prepared with mitigation measures for the proposed transfer of treated leachate to the outfall at Newport (provided in the *Impact on Ecology Section*).

4.4.6 Impacts on Water (Proposed Outfall from Leachate Treatment Facility):

4.4.6.1 Potential Impacts on Receiving Waters from Marine Discharge of Treated Leachate

The discharge of a treated leachate to the marine environment in inner Newport Bay has the potential to impact negatively on the surrounding habitats and species. The results of the impact could include the loss of species and their habitats, with the contamination of water, sediment and biota. Given the environmental significance of the receiving environment, the mitigation strategy that will be adopted to protect that environment and its inhabitants will be through the adoption of adequate discharge standards in the leachate treatment process.

The treatment of leachate being discharged into Clew Bay will be to an appropriate standard based on limits specified in Irish legislation. The design philosophy has been to comply with the Urban Waste Water Treatment Regulations, 2001 and to otherwise treat the leachate such that the environmental quality standards specified in the Water Quality (Dangerous Substances) Regulations, 2001 and European Communities (Quality of Shellfish Waters) Regulations, 2006 are already attained in the pipeline prior to discharge to the receiving environment. The Environmental Protection Agency have a key role in establishing discharge standards for the treated leachate at Derrinnumera landfill as part of the Waste Licence review which is currently being conducted.

In addition to the monitoring requirements for the treated leachate as specified by the Environmental Protection Agency in the Waste Licence for Derrinnumera landfill, biannual monitoring of the receiving waters, sediment, fish and shellfish at a matrix of sites adjacent to the proposed discharge and other representative sampling stations moving away from the discharge will be implemented to safeguard the ecological integrity and in particular the favourable conservation status of the receiving environment in the short, medium and long-term.

In light of more recent legislation (i.e. European Communities Environmental Objectives (Surface Waters) Regulations, S.I. 272 of 2009) a review of the list of monitoring parameters was recently undertaken, to include additional water quality parameters included in the new legislation. It is proposed that the receiving water screening criteria should be expanded to include the specific pollutants, priority substances and priority hazardous substances as outlined in the 2009 regulations. The additional trace substances that were detected during the baseline study of Newport Bay shall also be included in the proposed monitoring programme for receiving waters. The sampling locations

originally proposed are still considered appropriate to the proposed development and have been shown on Drawing No. 1908-2415 Rev A, included as Appendix A.

The development and implementation of this monitoring programme will be conducted in consultation with the relevant state and semi-state bodies (i.e. Environmental Protection Agency, Department of the Environment, Heritage and Local Government and the Department of Communications, Marine and Natural Resources [including the Marine Institute]) with input from local stakeholders.

It should be noted that the results of this Monitoring Programme will be forwarded to the Environmental Protection Agency for consideration as part of their Waste Licence enforcement activity at Derrinnumera Landfill.

Ultimately the Environmental Protection Agency will establish the discharge standards for the leachate being discharged from Derrinnumera landfill and outline monitoring frequencies as part of the Waste Licence Review process, which is currently on going.

Clew Bay Final Pollution Reduction Programme (PRP)

Section 5.0 of the Pollution Reduction Plan deals with Actions Programmes and Measures, which relate to future development only. The measures require, inter alia, that:

“Under Article 4 of the European Communities (Quality of Shellfish Waters) Regulations 2006 (S.I. No. 286 of 2006) (as amended), every public authority that has functions the performance of which may affect shellfish waters shall perform those functions in a manner that will promote compliance with the objectives of this pollution reduction programme and with the objectives of the Shellfish Waters Directive.

The functions of particular importance – in light of the objectives of Directive 2006/113/EC and of this PRP – include waste water treatment (licensing and operations), implementation of the GAP Regulations, waste management (licensing and operations), effluent discharge licences, planning and development and building control.”

Article 4 of the Quality of Shellfish Waters Regulations includes a requirement that public authorities, in the performance of their functions, must ensure, as far as practicable that shellfish waters must comply with the quality standards specified in Schedule 2 of the regulations.

In terms of the Derrinnumera development, which will be located within the Clew Bay Shellfish Waters Catchment Area, the proposed discharge standards for treated leachate have been based on Schedule 2 of the European Communities (Quality of Shellfish Waters) Regulations 2006 (S.I. No. 286 of 2006). The regulations specify environmental quality standards (EQS's), however the discharge limits have been proposed such that these EQS's are actually attained in the pipeline, even prior to discharge the receiving environment. This is an important point, whereby these standards are achieved independently of dilution in the receiving water.

4.5 IMPACT ON AIR (NOISE & VIBRATION EMISSIONS):

The nature and scale of the proposed development is such that noise emissions will arise during the daytime from a number of fixed and mobile sources of noise. In addition, there will be noise emissions arising nocturnally from certain items of equipment, including the leachate treatment facility. The final design and the operation of Leachate Treatment Facility and Sludge Hub Centre will proceed with regard to the need to mitigate noise emissions.

In carrying out this assessment, it is assumed that there will be no blasting carried out during the construction phase. Taking account of the nature of the likely excavation works for the plant, buildings and associated pipework, such as excavation and rock-breaking, and the distance to the nearest properties (nearest property approximately 800m away from composting facility), it is expected that the resulting vibration levels will not affect properties and will be well within the vibration limits for protection against structural damage, and in terms of nuisance, will be imperceptible.

During the construction stage of the development all plant and machinery used on site will comply with the EC (Construction Plant and Equipment) Permissible, Noise Level Regulations.

With regard to transportation noise, road vehicles will comply with the EC (Construction Plant and Equipment) Permissible, Noise Levels Regulations. Traffic noise from the Leachate Treatment Facility and Sludge Hub Centre will not give rise to any nuisance or significant impact, however, simple mitigation measures (such as good maintenance, switching off idling machines and avoiding unnecessary revving of engines) will help to minimise any potential impacts.

4.6 IMPACT ON AIR (DUST EMISSIONS):

Dust emissions have the potential to adversely impact the environment and amenity of the lands surrounding the proposed Sludge Hub Centre and Leachate Treatment Facility. Potential sources of dust include those arising during the construction phase of the proposed developments from stockpiles of construction materials that dispersed from construction vehicles as well as generation of dust from the handling of the dried bio solids product.

To mitigate impacts of dust dispersion during the construction phase the following will be put in place; a wheelwash at the entrance to the facility to prevent dust dispersion from vehicles exiting the site, spraying of access routes and other exposed areas during periods of dry weather, vegetation of stockpiles and embankments immediately following placement to reduce the surface area open to the environment.

Overall there will be no anticipated impact from dust emissions during the operation phase of the proposed development as sludge handling will take place indoors, though a complaints register will be maintained on site to deal with any complaints should they arise.

4.7 IMPACT ON AIR (ODOUR EMISSIONS):

Odour emission rates were calculated using Olfactometry data. The predicted overall odour impact of the following five scenarios was calculated to determine the potential odour impact of the proposed development:

- Existing landfill operation assuming input capacity
- Existing landfill operations (maximum capacity) and proposed leachate treatment on site utilising SBR diffuse fine bubble aeration
- Existing landfill, leachate treatment and operation of existing proprietary engineered diesel fuelled sludge drier situated in Castlebar WWTP
- Existing landfill, leachate treatment and operation of new sludge drying system (generic at this stage of development)
- Existing landfill, leachate treatment and proposed tunnel composting system.

A worst-case odour-modelling scenario was chosen to estimate worst-case odour impact from the proposed site. (The model was reviewed again in January 2008 following a re-examination of the location of sensitive receptors). Results of the modelling scenario indicated that no significant odour impact would be perceived in the vicinity of the operated Derrinnumera site for scenarios 1 to 5.

In terms of sludge drying and composting processes, biofilters can be applied as successful means of odour abatement and air emission control. Biofilters containing sea-shell media tend to be utilised at sludge drying plants to specifically target Volatile Organic Compounds and Hydrogen Sulphide. Peat filters are typically utilised at composting plants to target ammonia and Volatile Organic Compounds.

As stated in Section 3.8, the landfill has experienced some problems with regard to odour as reflected in the odour complaints received in recent years. The permanent capping of Cell 1 (now complete) and Phase 1 Cell 2, combined with the continued proper waste housekeeping techniques will be expected to remedy current landfill related odour problems in the future. In keeping with current recommended odour annoyance criterion in this country, the Derrinnumera site operations, which will be operated using best practice techniques, will be unlikely to cause odour problems.

4.8 EFFECTS ON CLIMATE:

No potential impacts are expected on the local climate of the area. Carbon dioxide resulting from the bioconversion of bio waste is not considered a net contributor to greenhouse gas emission, since the carbon is stored in the biomass for a limited number of years, whereas in the case of fossil fuels the carbon is stored for millions of year. Therefore, there will be no net contribution to greenhouse gas emission, thus aiding efforts to reach the targets set out by the Kyoto Protocol.

As stated in Section 3.9, the effects of climate change are not considered relevant with regard to existing and future landfill operations at Derrinnumera, as when the noticeable effects of climate change on rainfall begin to occur, landfill cells will already be sealed off from the atmosphere, and leachate generation will no longer be dependent upon rainfall patterns.

The development of the Sludge Hub Centre and Leachate Treatment Facility will result in additional stormwater runoff generation from the impermeable surfaces on site. This is not considered to be a significant impact as additional stormwater will be collected and used as process water or will be diverted to the existing stormwater management system on site which is capable of handling such an amount of additional runoff. (Refer to Section 4.4.4)

4.9 IMPACTS ON EXISTING LANDSCAPE:

The proposed Sludge Hub Centre and Leachate Treatment Facility are to be located on the western side of the existing landfill site, adjacent to Cells 1 and 2, and behind the existing civic amenity site and site accommodation building. The principal visual impact of the overall site and proposed development is on the Newport/Castlebar Road (R311) to the south. This road constitutes a popular tourist route; therefore there is a potential for significant negative visual impact on the landscape. However, because the proposed facility will be effectively masked by the existing landfill cells and site infrastructure from views from the R311 to the south, it is anticipated that the visual impact will be negligible.

4.10 MATERIAL ASSETS (ROAD INFRASTRUCTURE AND TRAFFIC):

Future traffic volumes will vary as a net result of the following:

- Increased traffic due to importation of sludges to the Sludge Hub Centre
- Increased traffic due to the importation of fuel for the sludge drier
- Reduced traffic in discontinuing the tanker transport of leachate to Westport
- Increased traffic of employees and service vehicles associated with the Sludge Hub Centre
- Increased traffic associated with exports of bio solids from the Sludge Hub Centre.

The following table provides a summary of the estimated annual existing and proposed traffic movements to the Derrinnumera Landfill Facility.

Table 4-1 Estimation of Existing and Proposed Traffic Movements to and from Derrinnumera Landfill Facility

	Traffic In	Traffic Out	Total
Existing Traffic *			
Leachate Transportation	5,545	5,545	
Other HGVs	2,678	2,678	
Civic Amenity Traffic	67,069	67,069	
Sub-total	75,292	75,292	
Total traffic movements per annum (existing)			150,584
Future Traffic			
Leachate Transportation	0	0	
Other HGVs	2,678	2,678	
Civic Amenity Traffic	67,069	67,069	
Import Sludge Cake	2748	2748	
Import Liquid Sludge	639	639	
Import Drier Fuel	1	1	
Export Biosolids	397	397	
Additional Staff Vehicles	1560	1560	
Sub-total	75,092	75,092	
Total traffic movements per annum (future)			150,184

* (based on latest counts from Derrinnumera On-site Records (2008))

It is envisaged that during the construction of the Sludge Hub Centre (SHC) and Leachate Treatment Facility (LTF), the volume of traffic is expected to increase slightly, however, the local road network is in good condition and will easily cater for the slight increase in traffic volumes.

Increased HGV movements will occur as a result of sludge importation to, and biosolids exportation from, the proposed facility. However, the discontinuation of tanker transport of leachate to Westport as a result of the proposed development, will in all likelihood cancel out any increases in HGV traffic at the site and may actually lead to a net decrease in the annual HGV movements to and from the site. Therefore, it is not envisaged that the proposed SHC and LTF will result in any negative impacts on HGV traffic volumes.

The number of car movements at the site will increase by 12 movements per day due to the additional six staff, which will be required to run the SHC and LTF. Based on current car movements at the facility, this will lead to an approximate 2.3% increase in car movements. It is not considered that this minor increase in car movements will have a negative impact on the community.

Effect of Treated Leachate Pipeline construction on Traffic

The construction of a pumped rising main for transfer of treated leachate from Derrinnumera Leachate Treatment Facility to Newport will have a short-term impact on traffic patterns in the affected area. Traffic management is a key issue for pipeline construction in narrow rural roads and therefore will be a key issue for this element of the development. Traffic management plans will be compiled in

accordance with the requirements of the 'Traffic Signs Manual (Chapter 8 – Temporary Traffic Measures and Signs for Roadworks)', Department of Environment, 2006 to ensure the smooth and safe flow of traffic along the pipeline route. It is envisaged that the pipeline construction will have a very minor short-term negative impact on traffic patterns during the construction period.

4.11 MATERIAL ASSETS (ARCHAEOLOGICAL AND CULTURAL HERITAGE):

The development of the Sludge Hub Centre and Leachate Treatment Facility will have no effect on the local cultural heritage. The archaeological sites found during the clearing of the borrow area (location of proposed development) have been logged and removed, and no other sites were found in the vicinity.

In terms of pipeline construction, the dedicated treated leachate rising main will not intercept any areas of archaeological interest or possible archaeological interest over its entire length, from the Derrinnumera Leachate Treatment Facility outfall to the Newport WWTP outfall.

With regard to the combined outfall pipeline, to be constructed from the Newport WWTP at Caulicaun to the final discharge location north of Rosmore, the crossing of an inter-tidal area between Caulicaun and Lisduff has the potential to impact on three identified known Recorded Monuments and Places (all within one area of constraint), therefore this crossing will be relocated north so that it is not within the area of archaeological constraint.

It is not envisaged that the proposed inter-tidal crossing will have a negative impact on the identified Recorded Monuments and Places, as the pipeline route will be relocated accordingly so that the tidal crossing will not be located within the area of archaeological constraint. As an additional mitigation measure, any section of the proposed rising main that do not run through and alongside the existing road shall be field walked prior to the commencement of any works.

5 INTERACTION OF THE FOREGOING

Throughout the EIS potential interaction between various environmental criteria are discussed. The baseline assessment for this project was completed prior to the application for the original waste licence (Ref No. W0021-01), which allowed major impacts to be avoided. The impact and mitigation measures proposed are designed to further ameliorate the impact of the waste management facility on the wider environment.

While there is potential for the above impacts to interact and result in a cumulative impact, it is unlikely that any of these cumulative impacts will result in significant environmental degradation.

The proposed Sludge Hub Centre & Leachate Treatment Facility will also have a very positive effect on the wastewater treatment plant (WWTP) at Westport. This is because leachate produced at the Derrinnumera Landfill will no longer be tankered to Westport WWTP and will be treated on-site at Derrinnumera.

Also, once the Sludge Hub Centre has been commissioned at the Derrinnumera landfill site, sludge cake transportation outside the county will cease, with sludge cake instead being transported to this centrally located Sludge Hub Centre. This will result in further reductions in traffic levels in the County as a whole thus reducing the impact on the environment.

6 CONCLUSION

Mayo County Council are now seeking approval for a County Mayo Sludge Hub Centre at the centrally located Derrinnumera Landfill Facility in accordance with the recommendations of the Mayo Sludge Management Plan (Review), 2002. In order to facilitate the future compliance with a condition issued by An Bord Pleanála to cease leachate imports to Castlebar WWTP, and following best environmental practice, the Council also wish to implement leachate treatment at source at Derrinnumera. It is proposed that the leachate treated here will be co-discharged with treated municipal effluent from Newport town, at the Newport WWTP proposed coastal outfall location. These measures will address sludge treatment and disposal, and leachate treatment and disposal, in a sustainable way.

The development of a Leachate Treatment Facility and County Mayo Sludge Hub Centre is critical to the infrastructural needs of County Mayo in terms of facilitating existing populations and sustainable growth of the county as a whole. An Environmental Impact Assessment (EIA) has been conducted for the proposed development, which has established the environmental sustainability of such a proposal.

In terms of effects on Human Beings, as stated above, the proposal is vital to the development of the county. The project will create and continue to support local employment, both directly and indirectly. The EIS has shown that there will be no negative impacts on property or on the amenity value of the region as a result of the construction of the above development.

As the development is to be sited at an existing landfill facility, impacts on ecology will be minimal, as the area has already been developed with consistent land uses, thus eliminating the need for disturbing a green-field site. There does exist a potential to impact on fauna/flora along the treated leachate pipeline route, however, the project team will strive to put in place all possible measures, which will effectively eliminate negative impacts on ecology.

Concerns from Stakeholders mainly centre on the marine discharge of treated leachate to Clew Bay. Given these concerns, and the potential to impact negatively on the species and habitats in the areas surrounding the proposed outfall, a philosophy has been developed, not only to treat the leachate to the appropriate Urban Waste Water Treatment Standards, but to also treat it such that the environmental quality standards specified in other Irish legislation (as detailed in Section 4.2.3) are actually attained in the pipeline prior to discharge to the receiving environment.

Fail-safe measures have already been planned for and will be implemented with regard to power failure or mechanical failure of all elements of the development, to ensure that no negative impacts will be felt as a result of development.

The EIS has established that the provision of a Sludge Hub Centre and Leachate Treatment Facility at Derrinnumera will not cause odour nuisance to local residents, and will be operated and managed at all time in accordance with best practice. Estimates of existing and proposed traffic movements have

shown that the siting of the development at Derrinnumera will not negatively impact on traffic in the area and is likely to actually cause a slight decrease in annual HGV traffic movements to and from the site.

Based on the mitigation measures proposed to be implemented as part of the development of the proposed Sludge Hub Centre and Leachate Treatment Facility and associated pipeline to Newport WWTP outfall, it is considered that the proposed development will not have any significant effect on the integrity of the Newport River cSAC or on the environment in general.

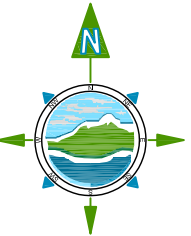
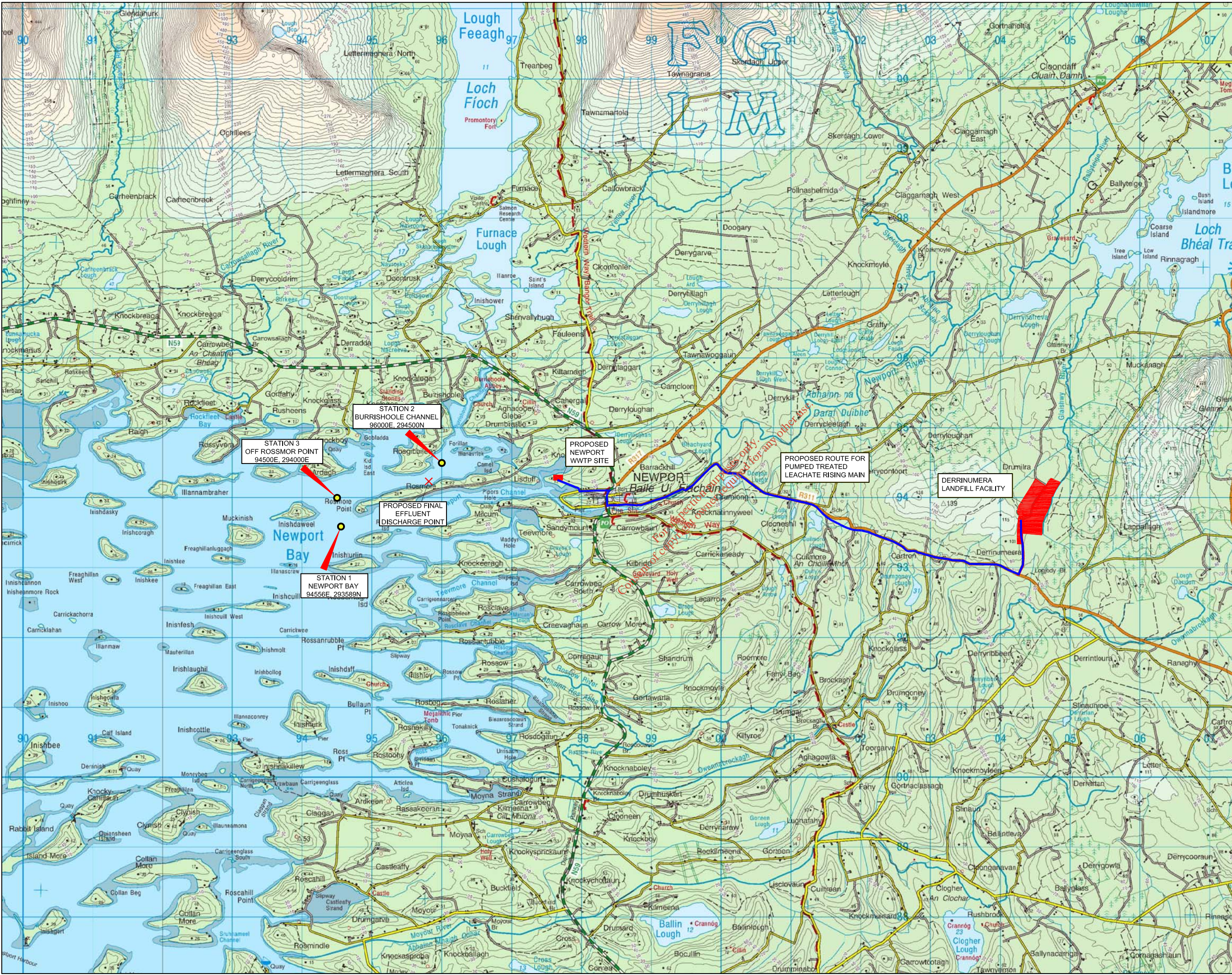
In addition, based on the fact that it is proposed to treat the Newport Sewerage Scheme municipal effluent and the Derrinnumera landfill leachate to the discharge standards specified in the *Urban Waste Water Treatment Regulations, 2001 followed by UV disinfection*, with further treatment of the landfill leachate to ensure that the treated leachate attains the environmental quality standards specified in the *European Communities (Quality of Shellfish Waters) Regulations, 2006* and the *Water Quality (Dangerous Substances) Regulations, 2001* prior to discharge, combined with regular monitoring it is considered that the combined discharge will not have a significant effect on Clew Bay cSAC or affect its overall integrity.


Finally, the Environmental Protection Agency (EPA) will provide direction with regard to operating standards and compliance monitoring requirements as part of their Waste Licence Review process, which is currently on-going. This will be an extension of the monitoring and guidance that they currently provide with the existing Waste Licence for the facility, with which Mayo County Council has a proven track record of compliance.

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APPENDIX A

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LEGEND:
 PROPOSED TREATED LEACHATE RISING MAIN

- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	17.05.10	ISSUE TO EPA	R.K.	M.H.

Client: **MAYO COUNTY COUNCIL**

Project: **DERRINUMERA SHC & LTF - APPLICATION FOR REVIEW OF WASTE LICENCE W0021-02**

Title: **PROPOSED MONITORING PROGRAMME
SEAWATER SAMPLING STATIONS**

Scale @ A3: **1 : 50,000**

Prepared by: R.K. Checked: M.H. Date: MAY 10

Project Director: **MICHAEL F. GARRICK**



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Drawing No.: **1908 - 2415** A

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