and Hawkes, 1997) is another biotic index of water quality that was used in the current appraisal and is more applicable to large rivers such as the Shannon. In this system, each family recorded in the sample is assigned a habitat specific score. This score depends on the pollution sensitivity of the invertebrate family together with the characteristics of the site where the invertebrates were found. A higher BMWP score is considered to reflect a better water quality and a score over 100 is indicative of very good water quality.

Assessment Methodology

Impact significance is a combined function of the value of the affected feature (its water quality, fisheries or aquatic ecology importance), the type of impact and the magnitude of the impact. It is therefore necessary to identify the value of surface water features within the study area in order to evaluate the significance and magnitude of possible impacts. To achieve this, the results of the desk and field assessment were evaluated to determine the significance of identified features located in the study area on an importance scale ranging from international-national-county-local. The criteria used are shown in Table 16-2. The means of assessing impact significance was based on the Institute of Ecology and Environmental Management's "Guidelines for Ecological Impact Assessment in the United Kingdom" (IEEM, 2006) and the EPA's "Waste Water Discharge Licensing Application Guidance Note" (EPA, 2008). The significance of impacts was assessed on a combined basis of the value of the feature being affected and the magnitude of the impact. According to the EPA (2008), a discharge from a WWTP would be considered to have a significant adverse effect on the receiving waters if it were to:

- Cause a deterioration in the chemical status or ecological status (or ecological potential as the case may be) in the receiving body of surface water;
- Cause a deterioration in the chemical status in the receiving body of groundwater;
- Cause the input into groundwater of hazardous substances, except where it is established that the input concerned is in a quantity and concentration so small as to obviate any present or future danger of deterioration in the quality of the receiving groundwater;
- Cause deterioration or result in significant and sustained upward trends in the concentrations of pollutants in groundwater in the case of pollutants that are not hazardous,
- Permanently exclude or compromise the achievement of the objectives established for protected species and natural habitats in the case of European sites where the maintenance or improvement of the status of water is an important factor in their
protection or which is inconsistent with the achievement of environmental quality standards established under national regulations in relation to designated bathing waters, designated shellfish waters, areas designated for the protection of freshwater fish and areas designated for drinking waters.

Table 16-2 Criteria Used in Assessing the Importance of Surface Water Features (NRA, 2004)

<table>
<thead>
<tr>
<th>Rating</th>
<th>Qualifying Criteria</th>
</tr>
</thead>
</table>
| A      | Internationally Important  
Sites designated (or qualifying for designation) as SAC or SPA under the EU Habitats or Birds Directives.  
Undesignated sites containing good examples of Annex I priority habitats under the EU Habitats Directive.  
Major salmon river fisheries  
Major salmonid lake fisheries. |
| B      | Nationally Important  
Sites or waters designated or proposed as an NHA or statutory Nature Reserves.  
Undesignated sites containing good examples of Annex I habitats (under EU Habitats Directive).  
Undesignated sites containing significant numbers of resident or regularly occurring populations of Annex II species under the EU habitats Directive or Annex I species under the EU Birds Directive or species protected under the Wildlife (Amendment) Act 2000.  
Major trout river fisheries.  
Water bodies with major amenity value.  
Commercially important coarse fisheries. |
| C      | High Value, Locally Important  
Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or significant populations of locally rare species.  
Small water bodies with known salmonid populations or with good potential salmonid habitat.  
Sites containing any resident or regularly occurring populations of Annex II species under the EU habitats Directive or Annex I species under the EU Birds Directive.  
Large water bodies with some coarse fisheries. |
| D      | Moderate Value, Locally Important  
Sites containing some semi-natural habitat or locally important for wildlife.  
Small water bodies with some coarse fisheries value or some potential salmonid habitat.  
Any water body with unpolluted water (Q-value 4-5). |
| E      | Low Value, Locally Important  
Artificial of highly modified habitats with low species diversity and low wildlife value.  
Water bodies with no current fisheries value and no significant potential fisheries value. |

16.1.2 Consultation

Preparation of this assessment included consultation, either directly or through publicly-available information, with:

- Environmental Protection Agency (EPA),
- Westmeath County Council,
- National Parks and Wildlife Service (NPWS),
- Shannon Regional Fisheries Board (ShRFB),
• Central Fisheries Board (CFB),
• Office of Public Works (OPW),
• Electricity Supply Board (ESB),
• Athlone Town Council, and
• Botanical Society of the British Isles (BSBI).

16.2 EXISTING ENVIRONMENT

A detailed desktop review of available information was completed as part of this assessment. The results are set out in Appendix F.

Chemical Water Quality

The results of the on-site chemical water quality assessment are provided in Table 16-3. These samples were taken using a grab sampler on the 1st September 2008. The values obtained for all parameters were within the limit ranges provided in EPA (2001). Moreover, there were no notable difference between the values of parameters determined from samples taken both upstream and downstream of the existing WWTP discharge point. This suggests that the existing WWTP was having a negligible impact on background water quality in the River Shannon on the day of the sampling. It is also noteworthy that the proposed upgraded plant would be treating effluent to higher standard to that of the existing WWTP.

Table 16-3 Results of the current on-site chemical water quality assessment at sites located upstream and downstream of the discharge point from the existing Athlone WWTP.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Upstream of WWTP</th>
<th>Downstream of WWTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ortho Phosphate as PO4</td>
<td>mg/l</td>
<td>&lt;0.03</td>
<td>&lt;0.03</td>
</tr>
<tr>
<td>Nitrate as NO3</td>
<td>mg/l</td>
<td>1.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Nitrite as NO2</td>
<td>mg/l</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Ammoniacal Nitrogen as N</td>
<td>mg/l</td>
<td>&lt;0.2</td>
<td>&lt;0.2</td>
</tr>
<tr>
<td>Total Ammonia as N</td>
<td>mg/l</td>
<td>0.08</td>
<td>0.09</td>
</tr>
<tr>
<td>Total Alkalinity as CaCO3</td>
<td>mg/l</td>
<td>170</td>
<td>160</td>
</tr>
<tr>
<td>COD</td>
<td>mg/l</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td>BOD</td>
<td>mg/l</td>
<td>&lt;2</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Suspended Solids</td>
<td>mg/l</td>
<td>&lt;10</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Dissolved Mercury Low Level</td>
<td>mg/l</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Diesel Range Organics</td>
<td>mg/l</td>
<td>&lt;10</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Mineral Oil by GC</td>
<td>mg/l</td>
<td>&lt;10</td>
<td>&lt;10</td>
</tr>
</tbody>
</table>
Biological Water Quality

A full species list of macroinvertebrates recorded from the three survey sites, together with the Q-value and BMWP calculations is presented in Appendix I.

Site 1 was located upstream of the Athlone WWTP discharge outfall at Burgess Park, directly downstream of the Athlone weir. This site comprised the control station for the current biological water quality assessment. A total of 14 macroinvertebrate families were recorded at this site. The macroinvertebrate community was dominated by pollution tolerant species. The hog louse *Asellus aquaticus* was numerous, while fair numbers of green chironomid larvae were found at this site. The freshwater shrimp *Gammarus* sp., the creeping water bug *Aphelocheirus aestivalis* and the wandering snail *Lymnaea peregra* were all common. Other snails present were the nerite *Theodoxus fluviatilis* and the common bithynia *Bithynia tentaculata*. Two caseless caddisflies at larval stage were recorded; those of the grey flag *Hydropsyche pellucidula* were scarce and the trumpet-net caddisfly *Holocentropus* sp. were present. Flatworms (Platyhelminthes) were also present at this site. Two species of mayfly...
lature were present; blue-winged olive *Ephemerella ignita* and large dark olive *Baetis rhodani*. Zebra mussels were recorded from the hard substrate at this site.

The EPA Q-rating methodology (Toner *et al.*, 2005) for biological monitoring of water courses was designed for riffled stretches of rivers where macro-invertebrate diversity is greatest. Therefore this system is not ideally suited to the River Shannon within the study area, due to the depositing nature of the river at this location. However the EPA carry out regular monitoring at this location and further downstream on the Shannon main channel and interpretation of the macro-invertebrate results is combined with on-site observations relating to dissolved oxygen levels, macrophyte growth and siltation, among other factors.

Applying the Q-rating system, this site is deemed to be 'Class B, Slightly Polluted (Q3-4)'. This value has been adjusted to take into account the nature of the stretch of river at the sampling location; however, it is considered to be at the lower end of the Class B water quality status band. This is due to the relative abundance of pollution tolerant indicator groups (Group D organisms were numerous), with a low diversity of pollution sensitive taxa. Group B creeping water bugs were present in fair numbers, while Group C organisms were common. Using the revised BMWP system this site scores 57.1. This upstream section of the River Shannon therefore corresponds to a 'Moderately Impacted' water quality status.

A second sampling site was selected on the River Al whose confluence with the River Shannon is upstream of the WWTP discharge point. This river meets the Shannon upstream of the Athlone WWTP site. Macroinvertebrates diversity was low at this site with only eight families recorded. The hog louse (Group D organism) was dominant. The next most abundant organism was the non-biting midge larvae of the green chironomid which was common. Mayflies (Ephemeroptera) were represented by the large dark olive mayfly (*Baetis rhodani*) larvae, which were recorded in fair numbers. Other flies recorded at this site were true fly larvae of the bloodworm *Chironomus sp.* (scarce) and the biting midge (present). Molluscs present at this site were the wandering snail (*Lymnea peregra*) and the orb mussel *Pisidium sp.* The crawling water beetle *Haliplus conformis* and the lesser water boatman (*Corixidae*) were also present at this site. Using the Q-value methodology and appreciating that the site was on a low-land, depositing stretch of river, this river is considered to be 'Class C, Moderately Polluted (Q3)'. No sensitive Group A or Group B organisms were recorded at this site while the Group D hog louse was dominant. This site was scored 25 on the BMWP scale for pool habitat and is attributed a 'Poor' water quality category. This part of the river is therefore interpreted as being 'Polluted or Impacted'.

MGE0129RP0004 90
The third biological assessment site was located on the River Shannon main channel, downstream of the Athlone WWTP discharge point. Sampling was carried out ca. 2-3m from the bank. The substrate at this site was very soft silt and provided little cover and poor macroinvertebrate habitat. Macroinvertebrate diversity was low at this site with a total of 12 different families recorded. The most abundant taxa was again the hog louse, which was numerous. The lesser water boatman (Corixidae) was common, while fair numbers of the freshwater shrimp (Gammarus sp.) were recorded. The diving beetle Potamonectes sp. in subfamily Hydroptorinae were scarce. True fly larvae present were those of solitary midges (Thaumaleidae) and green chironomids. The greater water boatman (Notonectidae), leech Theromyzon tessulatum, zebra mussel, wandering snail and crawling water beetle were all present at this site. Group A and Group B pollution indicators were absent at this site. Pollution tolerant group C (true fly larvae, beetles, snails, etc.) and group D (hog louse) accounted for the entire macro-invertebrate faunal community. Therefore, this site is deemed to be 'Class C, Moderately Polluted (Q3)' using the EPA Q-value methodology, although this score has been adjusted to account for the depositing nature of this stretch of river. In the BMWP scale for pool habitat, this site scored 32.3 so water quality is considered to be 'Poor'. This score is interpreted as 'Polluted or impacted'.

Overall, the Q-value results for all survey sites indicate moderate pollution, based on the macroinvertebrate species present. The variation in diversity and abundance within the three sites is not differentiated by the Q-value scores at these sites. However, the BMWP scores take the numbers of families into account and relate this to habitat present. Scores were determined based on the communities expected from a pool habitat (Walley and Hawkes, 1997), which is thought to more closely represent the depositing nature of the River Shannon within the study area. According to the BMWP scores the upstream site at Athlone weir is attributed a moderately polluted rating, while the sites on the River AI and the River Shannon downstream of the Athlone WWTP discharge are considered to be polluted/impacted.

Areas Designated for Nature Conservation

The study area is situated within the River Shannon Callows Special Area of Conservation (Site Code: 000216) and the Middle Shannon Callows SPA (Site Code 004096). The Shannon corridor, including the callows, is an internationally recognised habitat for flora and fauna. Athlone weir is located ca. 450m north of the River Shannon Callows SAC and lies outside of any conservation designation. The River Shannon Callows SAC is limited to the water corridor within the townland of Golden Island until the confluence with the AI River downstream. The agricultural land downstream of this point is liable to flooding and is
included in both the SAC and the SPA designations. This conservation designation includes the site of the existing WWTP discharge point.

The River Shannon Callows contains habitats listed on Annex I of the EU Habitats Directive including *Molinia* meadows, alluvial woodland, limestone pavement and low wetland meadows. Additional habitats of high conservation importance include semi-natural woodland, marsh and reedbed habitat. Important fauna recorded from this conservation site include otter, salmon, lamprey, crayfish and a diversity of internationally important wintering wildfowl, many of which are reliant on the aquatic and wetland nature of the site.

Qualifying interests of the River Shannon Callows SAC relating to aquatic ecology within the study site include otter *Lutra lutra*, recorded throughout the River Shannon catchment. The Annex I habitats *Molinia* meadows and low wetland meadows are directly related to the River Shannon floodplain, but are not considered to be aquatic habitats and are dealt with in the flora and fauna section of this EIS. A number of wetland bird species that are listed in the Middle Shannon Callows SPA could potentially occur within the study area. These species include Bewick's swan, kingfisher, whooper swan, golden plover, lapwing or Greenland white-fronted goose. However, the study area is not recognised as an important breeding site for any of these species, further details on bird species utilising the site are given in the flora and fauna section of this EIS.

Lough Ree, located 2.4km upstream of the study area (north of Athlone town), is designated as a SAC and as a SPA on account of the presence of lake shore and terrestrial habitats, aquatic flora including the rare *Chara tormentosa* and aquatic fauna including otter, pollan *Coregonus autumnalis* and a rare opossum shrimp *Mysis relicta*. The site is also nationally important for breeding duck species, gull and tern species; as well as nationally important populations of great crested grebe and the common scoter (a species listed in the Red Data book).

Two other designated sites occur within a 5km radius of the proposed Athlone WWTP development. Both the Crosswood Bog SAC and the Carrickynaughtan Bog NHA are are designated for raised bog habitat, which is listed as a priority Annex I habitat under the EU Habitats Directive.

Lough Ree and the two peatland conservation sites are geographically removed from the study area and are not considered to be affected by any aspect of the proposed upgrade in relation to surface waters or aquatic ecology.
A search for protected aquatic flora and fauna known to occur within the River Shannon catchment (i.e. lamprey, crayfish and otter) was carried out during the current field assessment of the aquatic environment. Detailed surveys at three points within the study area, combined with observations upstream and downstream of these locations confirmed the absence of protected species from the study site.

Protected aquatic species recorded are discussed in Chapter 18.

Recreational and Commercial Fisheries
The fisheries of the entire Shannon catchment are controlled by the Electricity Supply Board (ESB) and managed in association with the Shannon Regional Fisheries Board and the Central Fisheries Board. McCarthy (1997) reported a total of twenty three freshwater fish species in the Shannon catchment area above Limerick and noted that the fish community includes a large proportion of introduced species. Dace *Leuciscus Leuciscus* and Chub *Leuciscus cephalus* have been illegally introduced into the Shannon system in recent years bringing the current number of species in the river system to twenty five. The fish community includes the catadromous European eel *Platichthys flesus* and the anadromous sea lamprey *Peteromyzon marinus* and river lamprey *Lampetra fluviatilis*, Atlantic salmon *Salmo salar* and Smelt *Osmerus eperlanus*. The Shannon also contains a variety of resident, or largely within-catchment migratory species. This group includes the pollan *Coregonus autumnalis*, brook lamprey *Lampetra planeri*, brown trout *Salmo trutta*, Pike *Esox lucius*, Perch *Perca fluviatilis*, and members of the cyprinidae family; Bronze Bream *Abramis brama*, Roach *Rutilus rutilus*, Tench *Tinca tinca*, Minnow *Phoxinus phoxinus*, Gudgeon *Gobio gobio*, and Rudd *Scardinius erythrophthalmus*.

According to O'Reilly (2004), the Shannon is a great mixed fishery and holds a wide range of coarse fish and pike as well as trout and salmon. The stretch of the River Shannon downstream of the study area at Meelick weir was, until the early 1990's, considered to be an important salmon fishery. However the numbers of salmon ascending through the Shannon dams in the lower reaches of the river has declined dramatically since this time and salmon are now only occasionally caught at this location. The stretch of river in the study area at Athlone was never known to be of importance for game angling and is physically unsuitable for use by salmonids for spawning (O'Reilly, 2004). However, there are reports of very occasional salmon being taken here still.

The River Shannon, downstream of the Athlone weir is a well-known coarse fishing stretch with angling competitions held at Burgess Park and also international match fishing.
competitions on the opposite bank at The Meadows. The river here has a good stock of bream with roach becoming more prevalent in recent years, as is the case for the remaining stretch of the River Shannon within the study area. The west bank of the river, directly downstream of the study area is recognised as an excellent venue for pike fishing with a steep shelf from the bank into the deeper, navigable waters of the river. Pike fishing improves further downstream from Athlone town. Perch, rudd and eels are also frequently caught by coarse anglers downstream of Athlone town (CFB, 1992).

Commercial and experimental fishing for yellow eels has been carried out on Lough Ree and at Athlone Weir since 1992. The Lough Ree fishery has yielded in the region of 10 tonnes of yellow eels caught during the summer months (May to August) by a number of fishing crews who operate in designated fishing zones throughout the lake. There are usually in the region of 10 zones on Lough Ree (McCarthy, 1994). Fishing crews are authorised to fish by means of fyke nets, although permits for longlining have also been issued. Lough Ree is also the only lake in Ireland where commercial netting for brown trout has been allowed (O'Reilly, 1998). Commercial eel fishing for silver eel has been suspended from the Athlone weir since 2005 due to declining eel stocks in the Shannon (McCarthy, 2006).

Invasive Species

The zebra mussel is an exotic biofouling bivalve which appeared in the lower Shannon during 1997 (McCarthy et al., 1997). It is though that zebra mussels spread to Ireland via leisure craft imported from Britain or the Netherlands (Minchin & Moriarty, 1998). Its potential to foul surfaces such as water intake pipes is of particular concern. Since their discovery in the Shannon in 1997, they quickly spread upstream throughout the Shannon system. These mussels have the ability to quickly reach extremely high densities, as they can produce large numbers of free floating planktonic larvae which subsequently can disperse widely, settle and colonise a wide variety of solid structures (including water intake screens and structures associated with industrial abstraction and use of raw water). The occurrence of zebra mussels has resulted in declines of the two of species of mussel (*Anodonta anatina*, *Anodonta cygnea*) in some areas of the Shannon. No living *Anodonta* spp., were found in Loughs Derg, Ree and Key during 2000 and 2001 studies (Minchin et al., 2002). However, in many European countries where the populations have been established for several decades and longer the mussels do not have such an impact, most likely due to the stabilisation of the populations after an initial expansion period. Zebra mussel densities in Killinure Lough, directly upstream of Athlone town have recently been estimated to range from 10,000 – 100,000 individuals per m² (Minchin et al., 2002).
Water Abstractions

There are no drinking water abstraction points from the River Shannon within the study area. The existing water supply for Athlone is taken from the outlet of Lough Ree on the River Shannon, directly upstream of Athlone town. Any abstractions from the Shannon directly downstream of the study area are limited to agricultural usage. In Ireland, waters intended for human consumption are protected under the Drinking Water Regulations.

The closest drinking water abstraction point downstream of the Athlone WWTP discharge point is in Lough Derg (ca. 60km downstream), which is a designated protected area for drinking water abstractions.

Designated Recreational and Bathing Waters

The Quality of Bathing Water Regulations (S.I. 155 of 1992) implemented the requirements of the Bathing Water Directive (76/160/EC) into Irish law. The purpose of the legislation is to ensure that the quality of bathing water is maintained and, where necessary, improved so that it complies with specified standards designed to protect public health and the environment. A new Bathing Water Directive (2008/7/EC) was entered into force in March 2006. This new Directive aims to provide greater benefits in relation to improved health protection for bathers and a more pro-active approach to beach management including public involvement. The new Bathing Water Quality Regulations 2008 (S.I. No. 79 of 2008) transposed the 2006 Directive into Irish Law on 24 March 2008 (Source: EPA).

The closest designated bathing water site downstream of the Athlone WWTP discharge is at Portumna, on the north shore of Lough Derg, ca. 60km from the discharge point. This site comprises one of the nine designated freshwater bathing sites in Ireland and was compliant with minimum EU Mandatory Values in 2007; however, it was compliant with more stringent Guide Values in previous years up to 2006 (Source: EPA).

A further two designated bathing water sites are located on lower Lough Derg in Mountshannon village (90km downstream of the discharge at Athlone WWTP) and in Ballycuggeran, just north of Killaloe on the western shore of Lough Derg (ca. 100km downstream of the discharge at Athlone WWTP). Both these sites were compliant with more stringent EU Guide Values in 2007 (Source: EPA).

Nutrient Sensitive Areas

The River Shannon catchment contains two lakes listed as nutrient sensitive waters. Lough Ree upstream of the existing Athlone WWTP discharge and Lough Derg, ca. 60km
downstream of the Athlone WWTP site are both designated as nutrient sensitive areas under the Urban Waste Water Treatment Regulations, 2001. In addition the River Camlin in County Longford is a tributary of the River Shannon and is designated as a nutrient sensitive area from the sewage treatment plant at Longford town to its confluence with the River Shannon west of Longford town. The River Brosna enters the River Shannon downstream of the study area and is also classified as a nutrient sensitive watercourse.

Within the southern portion of Lough Derg, downstream of the study area the River Nenagh is designated as a nutrient sensitive area downstream of its WWTP discharge point in Nenagh town, County Tipperary, to its entry into Lough Derg. This site is ca. 100km downstream of the study area in Athlone town.
16.3 POTENTIAL IMPACTS

Potential impacts on water quality could originate from construction works on the site and contamination incidents from the operation of the WWTP. However, mitigation measures have been provided to ensure that significant impacts on the River Shannon do not occur during either the construction or operation of the proposed scheme. The provision of a modern WWTP at this site is expected to result in significant benefits for water quality, fisheries and aquatic ecology compared with the "do nothing scenario". Potential impacts during the construction and operational stages of the proposed WWTP are discussed individually below.

16.3.1 Construction Stage

The current scheme would utilise the existing discharge pipe into the River Shannon so there would be no instream works or works within the SAC boundary. Therefore any impacts would be indirect only and would be associated with the upgrade of the WWTP and the installation of a stormwater storage tank adjacent to the Golden Island Pumping Station.

The potential impacts on surface water quality during the construction stage are primarily related to the potential impacts on water quality. There is a risk that releases of untreated sewage to the River Shannon could occur during the construction stage as new elements of the scheme are installed. However, the risk of such an event happening will be minimised with suitable project timing and management. It is envisaged that the existing treatment plant would remain fully operational while the upgrade is constructed.
The main pollutant of concern to fish and other aquatic life during the construction stage would be suspended solids entering the River Shannon from the works areas either at the WWTP site or at the Golden Island Pumping Station site. Other pollutants such as raw concrete, wash water, fuels, lubricants etc. would also have deleterious effects on fish if allowed to enter local watercourses or the River Shannon itself. There is the potential for proposed works to result in runoff of suspended solids and other pollutants that could enter local drains including the AI River. Such releases could potentially have an indirect impact on the River Shannon main channel directly downstream. However, with the mitigation measures proposed, no significant impacts on surface waters are predicted. The WWTP site is not located in the vicinity of any watercourse which is used by salmonids for spawning or nursery purposes.

There is the potential that machinery working on the site could introduce non-native species to the area. Non-native, invasive plant species include the rhododendron (*Rhododendron ponticum*), Japanese knotweed (*Fallopica japonica*), giant hogweed (*Heracleum mantegazzianum*), giant rhubarb (*Gunnera tinctoria*), curly waterweed (*Lagamisiphon major*) and Indian balsam (*Impatiens glandulifera*). However, as the work areas are set well back from the river (630 metres) the risk of such an introduction would be low. Moreover, mitigation measures to prevent the introduction of non-native species to the development area will be adhered to. Proper cleaning of machinery before entering the site will ensure that introduction of exotic species does not occur.

16.3.2 Operational Stage

Any malfunctions or breakdown at the WWTP could result in a pollution episode that may affect water quality in the receiving water to which the outfall is discharging. However, the risk of such an event occurring is extremely low in a modern well managed plant. The large size of the River Shannon adjoining the site and the fact that no salmonid spawning or nursery areas are present would mean that the receiving waters would also have a high resilience to such unlikely events. A gross pollution event could potentially affect macroinvertebrate and fish populations in the River Shannon, with indirect impacts on breeding birds for which Middle Shannon Callows SPA is designated. The risk of an accidental pollution event happening at the WWTP would be much lower than is currently the case.

The quality of the wastewater discharged into the River Shannon is likely to be much improved. Likewise the scheme provides for storage/attenuation and separation of stormwater and sewage delivering a significant positive impact when compared to the current situation. There is therefore a potential positive impact from the Golden Island stormwater
storage tank, Pumping Station upgrading and WWTP upgrade at Athlone, with moderate beneficial impacts for water quality, fisheries and aquatic ecology within the River Shannon.

The River Shannon upstream of the Athlone WWTP has been shown to have sufficient assimilation capacity to receive discharges from the upgraded WWTP without incurring significant water quality impacts downstream. These calculations are detailed in Appendix K. This is based on the design criteria outlined in Table 16-4.

The upgrade of the existing treatment works will be designed to achieve the effluent standards and projected hydraulic and BOD loading listed in Table 16-5.

The Design BOD loading is based on 60g/h/d and the Dry Weather Flow is based on 140l/h/day. The upgraded WWTP will be designed to treat a peak flow of 3 DWF. Flow greater than this will be stored in a stormwater storage tank proposed for the Golden Island Pumping Station.

The final effluent standards as will be met through a combination of two approaches:

(i) Upgrade to the existing facilities: Upgrade to the inlet works, control house, ferric sulphate storage facilities and sludge dewatering facilities, provision of an additional pump within the Golden Island Pumping Station, and

(ii) Construction of additional elements: These will include provision of additional secondary treatment (aeration basins), settlement tanks and sludge thickening facilities.

Table 16-4 Design Standards for the Upgrade of Athlone Wastewater Treatment Plant.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Standard Based on the Urban Wastewater Treatment Regulations: Sl 254, 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspended Solids</td>
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</tr>
<tr>
<td>Biological Oxygen Demand</td>
<td>25 mg/l</td>
</tr>
<tr>
<td>Chemical Oxygen Demand</td>
<td>125 mg/l</td>
</tr>
<tr>
<td>Total Nitrogen</td>
<td>15 mg/l</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>2 mg/l</td>
</tr>
</tbody>
</table>

Table 16-4 Design Standards for the Upgrade of Athlone Wastewater Treatment Plant.
### Table 16-5 Hydraulic and BOD Loading for the Upgrade of Athlone Wastewater Treatment Plant.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Projected Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Dry Weather Flow (DWF)</td>
<td>0.097 m³/sec</td>
</tr>
<tr>
<td>Design Hydraulic Load for Full Treatment (3DWF)</td>
<td>25,200 m³/day</td>
</tr>
<tr>
<td>Design BOD Load</td>
<td>3,600 kg/day</td>
</tr>
<tr>
<td>Design Population Equivalent</td>
<td>60,000 PE</td>
</tr>
</tbody>
</table>

### 16.4 PROPOSED MITIGATION MEASURES

Mitigation measures will be required to reduce the likelihood and extent of the potential impacts on water quality and aquatic ecology outlined above. The relevant recommendations in the publication ‘Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites’ by Murphy (2004) will be adhered to during the construction phase of the upgrade and associated works. The requirements of The Fisheries Consolidation Act (1959) and other relevant legislation for the protection of water quality and fisheries will also be adhered to. The contractor will be required to provide a detailed method statement showing how water quality impacts during the construction stage of the scheme will be minimised. This will be approved by both the National Parks and Wildlife Service (NPWS) and the Shannon Regional Fisheries Board (ShRFB) prior to any works taking place. Mitigation measures for the protection of surface waters during both the construction and operational stages of the project are outlined below.

#### 16.4.1 Construction Stage

There is a risk that untreated sewage could be released to the River Shannon during the construction stage. However, the risk of such an event happening will be minimised with suitable project timing and management. It is envisaged that the existing WWTP would remain fully operational while the upgraded WWTP is being constructed. Wastewater generated in Athlone will continue to be discharged to the existing wastewater treatment plant during the construction period.

The main potential contaminant during the construction stage is suspended solids. The risk of releasing water contaminated with suspended solids is greatest during wet weather. However, as no works are taking place along the River Shannon the risk of such pollution is low. During the construction stage at the existing WWTP and at Golden Island measures will...
be implemented to accommodate run-off from these sites. These measures will be designed to deal with run-off during heavy rainfall events, accidental spills of fuel etc.

Excess subsoil from site clearance including topsoil and subsoil will be stockpiled. Potentially hazardous materials (oils, paints and fuels etc.) will be stored and disposed of in an appropriate manner. The contractor will be required to prepare and appoint a specific site person e.g. foreman who will have overall responsibility for waste management.

16.4.2 Operational Stage

The operation of the upgraded WWTP will have a beneficial impact on the River Shannon due to improved treatment of sewage, and separation of stormwater and sewage streams. The discharge will be subject to licence under the Waste Water Discharge (Authorisation) Regulations 2007.

Impacts of runoff from new impermeable areas at the existing WWTP site and at the Golden Island site will be minimised by diverting stormwater into an oil/water separator before discharge.

16.5 RESIDUAL IMPACTS

The environmental impacts of construction of an upgraded WWTP and associated works at Golden Island have been considered from the perspective of the receiving surface waters. Mitigation measures set out above will be adhered to in order to limit the risk of contaminants entering the River Shannon.

With the mitigation measures proposed, the predicted impact on surface waters during the construction stage is assessed as being insignificant.

The quality of the discharge into the River Shannon once the WWTP has been upgraded is predicted to be improved. Likewise the scheme provides for separation of stormwater and sewage streams delivering a significant positive impact when compared to the current situation. The upgraded WWTP is predicted to deliver a moderate beneficial impact for water quality, fisheries and aquatic ecology within the River Shannon.
16.5.1 Monitoring

Water quality in adjoining sections of the River Shannon will be monitored periodically during the construction stage to confirm that no impact on water quality occurs.

During the operation of the plant the discharge and adjoining areas of the River Shannon will be monitored regularly. The monitoring regime will be agreed in advance with Westmeath County Council, NPWS, ShRFB and the other relevant agencies.

16.5.2 Reinstatement

As there will be no significant negative effects on any watercourse, no reinstatement will be required.

16.6 CONCLUSIONS

Potential impacts on surface water quality could originate from construction works at the existing WWTP and at the Golden Island site. Mitigation measures have been provided to ensure that significant impacts on the River Shannon do not occur during either the construction or operation of the proposed upgrade.

The River Shannon upstream of the Athlone WWTP has been shown to have sufficient assimilation capacity to receive discharges from the upgraded treatment plant without incurring significant water quality impacts downstream. Intermittent water quality monitoring carried out by Westmeath County Council at stations upstream and downstream of the existing effluent discharge point indicates that the water quality in the river is relatively good with little difference in quality between upstream and downstream points. However, stormwater and sewage streams are currently not fully separated in the existing scheme posing a risk to water quality in the River Shannon.

The upgrading of the WWTP is expected to result in significant benefits for water quality, fisheries and aquatic ecology compared with the current situation. In storm events the current sewerage system overflows to the River Shannon at least six times a year. The addition of a storm water storage tank at Golden Island will reduce the frequency and duration of these occurrences.
17 LANDSCAPE AND VISUAL

17.1 INTRODUCTION & METHODOLOGY

This chapter of the EIS assesses all the potential impacts on the landscape and visual environment associated with the proposed upgrade. It covers the potential landscape and visual impact of the proposed upgrade on the landscape and visual resources of the immediate area and includes the following elements;

a) Establish the baseline conditions,

b) Record and analyse the existing character, quality and sensitivity of the landscape and visual resource. This includes elements of the landscape such as:
   - Landform;
   - Land cover including the vegetation, the slopes, drainage, etc;
   - Landscape character;
   - Current landscape designations and planning policies; and
   - Site visibility (incorporating short, medium and long distance views).

c) Identify the Impacts of the Development on the Landscape and Visual Resource,

d) Identify the landscape and visual impacts of the proposed upgrade at different stages of its life cycle, including:
   - Direct & indirect landscape impacts of the proposed upgrade on the landscape of the site and the surrounding area,
   - Visual impacts including the extent of potential visibility, the view and viewers affected, the degree of visual intrusion, the distance of views and resultant impacts upon the character and quality of views,
   - Assess the significance of the landscape and visual impacts in terms of the sensitivity of the landscape and visual resource, including the nature and magnitude of the impact,
   - Detail measures proposed to mitigate significant residual detrimental landscape and visual impacts and assess their effectiveness,
• Assess the ability of the landscape and visual resource to absorb the proposed upgrade, and

• Identify any positive benefits.

A detailed description of the methodology used and the planning context associated with the site are presented in full in Appendix L.

17.2 EXISTING ENVIRONMENT

17.2.1 Landscape Character

The landscape is generally characterised by physical factors such as landform and land cover including topography, water, vegetation and settlements.

The WWTP site is located to the south of Athlone Town. It is situated in an area characterised by a mix of low lying and under grazed rough grassland and boggy ground. The immediate landscape that surrounds the site is low lying and flat, extending in all directions. To the south, east and west of the site this is interspersed by sporadic mature vegetation. The landscape is open towards Athlone Town to the north. The surrounding fields are broken up by the existing network of minor roads, generally bound by mature hedgerows. Along these roads there are also a number of detached dwellings of varying styles.

For the purposes of this assessment the study is contained within the Zone of Visual Influence (ZVI) illustrated in Figure 17.1. Locations outside of the study area have been visited and no significant landscape and visual impacts are predicted.

The landscape character of the study area can be described by the use of distinctive landscape character areas as follows:

• Athlone Urban Landscape,
• Shannon River Landscape, and
• Urban Fringe Agricultural Landscape.
River Shannon Landscape

The River Shannon and its environs dominate the western part of the study region. This area, known as the Shannon Callows is designated as a:

- Special Protection Area,
- Natural Heritage Area, and
- Special Area of Conservation.

The Westmeath County Development Plan identifies this area as the Lough Ree/Shannon River Landscape Character Area. It is one of the most valuable wildlife habitats around Athlone and is characterised by botanically rich lowland and wet grassland. It is also part of the ecosystem to help support the internationally endangered Corncrake. These designations mean the landscape quality is identified as being "Exceptional." Because of the obvious low lying nature of the Shannon there will be no views towards this from the site. Similarly, the site is not visible from within this area. Again this is because of the low lying nature of the host landscape and also because of the intervening elements such as field vegetation and dwellings. Because of the national and international importance of this area the landscape character has a high sensitivity to change. It should be noted that none of the residential properties listed in the landscape and visual index are within this area.

Athlone Urban Landscape

Athlone Town dominates the northern portion of this study area. Known as the urban capital of the midlands it is a centre for employment, education, commerce and industry. The southern outskirts of the town are visible towards the north from the site and its surroundings. There is a mixture of commercial and residential properties visible ranging in height from 1 ½ to 5 storey level. From the site the town presents an imposing façade, occupying as it does, a rising hillside. From the urban area the northern boundary of the site is visible. Any manmade structures are obscured by mature vegetation along the sites northern boundary and within the northern portion of the site itself. The existing Development Plan has the relevant lands along the southern portion of Athlone zoned as mixed use, commercial and residential. There is one recorded monument to the north east of these lands. Because of the eclectic nature of the development within these lands this landscape must be designated as being of low quality with a low sensitivity to change.
Urban Fringe Agricultural Landscape

The WWTP site is in close proximity to Athlone Town. The intervening lands have been identified here as the "urban fringe agricultural landscape." The Westmeath County Development Plan identifies this area as being part of the Western Lowland Landscape Character Area. Around the site these lands make up an area of open, low lying and apparently under grazed grassland. Until one almost reaches the northern boundary of the site, the fields are largely devoid of significant vegetation. Other vertical elements are evident in the landscape in the form of telegraph poles. Within the existing plan the area has been earmarked for the development of a Local Area Plan. This has yet to occur however. The area is devoid of any exceptional character. Similarly it is devoid of any specific designation within the local plan. Views to and from the site are generally obscured by the mature vegetation along, and within, the sites northern boundaries. Despite the fact that this area remains rural it is earmarked for a Local Area Plan (LAP) and subsequent development. The low lying fields and subsequent mature vegetation present an immediate and attractive contrast to the urban landscape of Athlone. These lands are therefore identified as having a medium sensitivity to change and being of medium quality.

17.2.2 Visual Character

As previously suggested the landscape of the study area varies quite considerably, depending upon location. Generally however, the host landscape is low lying and flat, with Athlone Town occupying a more elevated and prominent location towards the north of the study area. From the town there are more long term views to the south across the low lying landscape, broken by occasional mature vegetation. The low lying nature of the rural landscape combines with characteristics such as roadside trees and hedgerows to eradicate any long term views within the rural area. An exception is occasional northbound views towards Athlone, gained from the surrounding road network. As mentioned, the town is slightly more elevated with mixed use development evident, nesting into the low hillside. The most imposing development is residential in type and large apartment blocks up to 5 storeys dominate the scene. Other low rise commercial developments are visible towards the lower portion of the hill, whilst the steeple of a nearby church can also be viewed.

Views to the west of the study area are dominated by the River Shannon. At intermittent locations along here there are longer term views towards Athlone Town. Again, the stepped nature of development is evident on the hillsides rising adjacent to, and on both sides of the river. Features such as the twin spires of the Church of St. Peter and St. Paul dominate the
scene. Views towards the rural area and the site from here are generally obscured by adjacent developments and landscape features.

17.3 POTENTIAL IMPACTS

17.3.1 Direct Landscape Character Impacts

The upgrading of the WWTP is proposed at the location of the existing WWTP. The present site is within the "Urban Fringe Agricultural Landscape". It is also in close to medium proximity to the Athlone Urban Landscape and River Shannon Landscape, identified in the same section. The following text should be read in conjunction with Appendix L.

River Shannon Landscape

Due to the separation distance between the site and this area, alongside intervening natural and manmade features, this landscape character area is not directly or indirectly affected by the proposed upgrade.

Because of the attributes and special protective designations evident in this area, the quality of this landscape has been identified as "Exceptional." This landscape character has been designated as having a "High Sensitivity." The predicted magnitude of the change in landscape resource is, "No Change." Consequently, the significance of the impact on this landscape area is, "No Change."

Athlone Urban Landscape

Because of existing vegetation there are no views of the manmade structures on site. The site will be accessed by the existing road network. It is not anticipated that the proposed upgrade will have any negative landscape or visual impact on the urban landscape or its setting.

There is an eclectic mix of development types, uses and styles within this southern portion of Athlone Town. There are no specific designations to protect any areas or individual buildings. Because of the lack of character and structure, this urban landscape must be identified as being of "Low" quality. It is also capable of absorbing substantial change and is therefore of "Low Sensitivity." It is predicted there will be, "No Change" in the magnitude of
landscape resource. Again, the significance of the impact on the landscape area is, "No change."

Urban Fringe Agricultural Landscape

Because of the intervening vegetation to the south of this area, it will not be directly or indirectly affected by the proposal. The landscape quality of this area is identified as "Medium" as is the landscape sensitivity. It is predicted there will be "No Change" in the magnitude of landscape resource. The significance of the impact on the landscape area is, "No Change."

17.3.2 Zone Of Visual Influence (ZVI)

The ZVI for the proposed upgrade is illustrated in Figure 17.1.

Because of the low lying nature of the site and its surroundings, generally devoid of rising topography, the ZVI is quite confined around the site. The exception to this is to the north, where the southern fringes of Athlone Town occupy a low hillside. In this instance the existing mature vegetation around, and in close proximity to the site combine to offset and eradicate any potential views. The low level nature and small scale of the proposal further combine with these natural features to limit any potential views.

The ZVI has been used to identify the locations where potential visual impacts may occur. The following text describes the predicted visual impacts on visual receptors within the ZVI.

17.3.3 Visual Impacts On Residential Properties

Residential properties that have potential views of the development, within the ZVI, have been assessed in order to establish the level of visual impact. Table 17-1 illustrates the predicted visual impact for properties that may be affected. The vast majority of properties within the study area have been assessed as having "No Change". It is predicted that that the proposal will only impact visually on 1 dwelling, that is located immediately west of it, at Point 3, Figure 17.2. This impact will be minimal however. Furthermore, within 5-10 years, mitigating factors such as proposed planting will entirely obscure any views into the site from this, or any other residence.