

SECTION 9

EFFECT ON HYDROLOGY & WATER QUALITY

9.1 Introduction

9.1.1 This chapter assesses the impact of the proposed housing development at An Camas Mòr on surface water, groundwater and water quality. The chapter considers the impacts from the new development during the construction phase (finishing in 2027) and at any stage of the operational phase. The assessment also includes consideration of impacts of new access roads and river crossings.

9.1.2 The assessment of the proposed development on flood risk is included in the Supporting Document, Flood Risk Assessment and the impact on ecology at the site is considered in Volume 2, Chapter 9, Section 4.

9.2 Consultations

9.2.1 Consultation occurred with SEPA on Thursday 28th August 2008 where the chapter outline was presented. This was followed by a telephone discussion on 10th September 2008 where SEPA agreed to continue with outline given in the proposed note of scope. During the discussions SEPA were asked if they knew of any abstractions or discharges within the area. Information was provided on two known abstractions held within the Rothiemurchus estate.

9.2.2 Scottish Water were contacted on the 5th August 2008 for data detailing connections, trunk mains, sewers, sewer outfalls, pressurised mains or any other assets owned by Scottish Water which need to be accounted for in the EIA. Elizabeth Baird from Scottish Water responded with this information on 6th August 2008 in the form of detailed maps showing Scottish Water assets.

9.2.3 Water quality data, flow data, flow duration curves, flood levels and maps and known abstractions and discharges were requested from SEPA on the 5th August 2008. Becky Thomson from SEPA responded on the 12th August 2008 with flow data and flow duration curves for Kinrara gauging station on the River Spey. SEPA stated that there are no gauging sites on the River Druie. On the 14th August Nicola Mitchard from SEPA responded with water quality information for both the River Spey and the River Druie.

9.2.4 The Highland Council were contacted on the 5th August 2008 to establish if there are any private water supplies or water features within the catchment which need to be accounted for in the EIA. No data was received. The request was followed by a telephone call on the 17th September 2008 however no information was given during the telephone discussion and no further data was received.

9.2.5 There have been no other scoping discussions to date.

9.3 Study Area

9.3.1 The proposed site is bounded by the River Spey, to the north and west, and the River Druie to the south-west. The confluence of the two rivers lies at the south-west corner of the

development. The catchment area of the River Spey, upstream of the confluence is 1067 km². The River Druie, which then joins the River Spey, has a much smaller catchment area of 119 km². Downstream of the confluence is a SEPA gauging station (Boat of Garten, NH 946 191) where the mean flow is 29.03 m³/s.

9.3.2 The overall site for An Camas Mòr is 104.6 hectares, of which 72 hectares have been designated for the housing development. The land use of this area is currently commercial forestry and rough heathland, which allows infiltration to occur and slows the velocity of surface runoff. The remaining 30 hectares, which lie to the north, west and south of the site (adjacent to the River Spey and River Druie), comprise arable farmland. Figure 9.1 shows the aerial photograph of the current land cover with the borderline of the proposed development at An Camas Mòr.

9.3.3 The development site lies within the Cairngorms National Park boundary, near the foothills of the Cairngorms. The main watercourses within the vicinity of the site are the River Spey and the River Druie. The Spey is a designated Special Area of Conservation (SAC) as well as a Site of Special Scientific Interest (SSSI). The Spey SAC designation covers the main watercourse and its tributaries as well as the confluence and stretch of the River Druie adjacent to the Proposed Development site.

9.3.4 The Spey is designated a SAC and SSSI for its populations of otter, Atlantic salmon (*Salmo salar*), sea lamprey (*Petromyzon marinus*), and freshwater pearl mussel (*Margaritifera margaritifera*). Whilst such species are sensitive to water quality, the River Spey Catchment Management Plan (Spey Catchment Steering Group, 2006) highlights that their water quality requirements are still poorly understood.

9.3.5 To assess the impact of the whole development, the development site itself, the major routes and all the land between the development boundary and the watercourses (River Spey and the River Druie) has been considered in this assessment.

9.4 Baseline Conditions

Surface Water Hydrology and Water Quality

9.4.1 Water Quality data is available from SEPA for the River Spey and River Druie. The classification network is divided into river stretches at confluences and pollution pressures. A monitoring point is assigned to each stretch where the biology, chemistry, aesthetics and toxicity are assessed. The overall 'class' of the stretch of river is then calculated from the monitoring point results.

9.4.2 The overall water quality of the River Spey has been classified by SEPA as "Good" (A2) and the overall water quality of the River Druie as "Excellent" (A1).

Groundwater Hydrology

9.4.3 The BGS Hydrogeological Map of Scotland indicates that the site of the proposed housing development is underlain by Quaternary sands and gravels. The superficial deposits comprise silts, sands, gravel and cobbles and are of a glacio-fluvial origin, forming terraced and gently undulating terrain. Areas adjacent to the main watercourses, where the distributor roads have been planned, are underlain by such freshwater alluvium (current river terrace).

- 9.4.4** In June 2006 trail pits were excavated at seven points around the development site with depths ranging from 1.35 m to 3.3 m. No evidence of groundwater was encountered during the trail pits and the results suggest the soil is well drained with infiltration rates of 1.05×10^{-4} to 3.59×10^{-4} m/s.
- 9.4.5** Groundwater levels in the River Spey floodplain near Rothiemurchus Fisheries and Dell Farm are thought to rise to 1 m below ground level during winter when the river levels are high but are thought to be deeper in the summer as river levels recede.
- 9.4.6** The groundwater potential varies based on the thickness of saturated material. Boreholes have been known to typically yield 10 L/s, with up to 15 L/s in some cases. The groundwater chemistry is variable, but mineralisation is typically weak. The exposed shallow nature of the groundwater places it at risk from diffuse and point source pollutants.
- 9.4.7** The underlying solid geology comprising schists and gneisses is described to have little potential for groundwater storage and transport, other than in cracks and joints associated with tectonic features or near surface weathering.
- 9.4.8** SEPA have identified two known water abstractions within the area held by the Rothiemurchus Estate. The first is located south of Dell Farm near a tributary of the River Drue (NH 9045 1135) and the second is located within Rothiemurchus Fisheries (NH 8985 1163).
- 9.4.9** The site does not lie in a nitrate vulnerable zone, although the shallow nature of the groundwater does put it at risk from diffuse and point-source pollution.

Sewers and Drainage

- 9.4.10** Scottish Water (SW) has provided information regarding the existing infrastructure in and around the proposed site. There are no public sewers or drains which run through the development. All existing surface drainage paths are on the periphery of the proposed development.
- 9.4.11** Scottish Water is undertaking a Development Impact Assessment (DIA) to consider network constraints and connection points to their existing infrastructure. Scottish Water has confirmed that they are willing to accept a new foul connection to their existing sewerage. A proposed enlargement of the WwTW in Aviemore should have the capacity to cope with all flow from the development if Planning Permission for the development is obtained before the works are designed. This fits with the management objectives of the River Spey Catchment Management Plan (Spey Catchment Steering Group, 2006) whereby it must be ensured that WwTW's have sufficient capacity to cope with planned expansions. The present works may have the capacity to deal with the first phase but that capacity cannot be reserved for An Camas Mòr (please refer to the Supporting Documents, ILUP Strategies, Services Strategy for further information).

Water Supply

- 9.4.12** Water is to be provided by Scottish Water through a new connection to the public network. Improvements to the Aviemore water supply are proposed by Scottish Water and will involve the building of a new Water Treatment Works (WTW) on a new site.

9.5 Methodology

- 9.5.1** The assessment comprised the following key stages:

- Desk study and field visit to ascertain the current baseline conditions of the site;
- Consideration of the potential impacts, during both the construction and operational phase of the development, on the current baseline conditions;
- Assessment of the significance of potential impacts taking into account the sensitivity of the receiving environment and the magnitude of the potential impact; and
- Identify mitigation measures to minimise the potential impacts of the proposed development.

Data Sources

- 9.5.2** The following data sources have been used for this assessment:

- Catchment characteristics for the two main watercourses; The River Spey and the River Drue (Flood Estimation Handbook);
- Topographic survey data for the site;
- Information regarding sewers, sewer outfalls, pressurised mains and assets owned by Scottish Water (SW);
- Baseline water quality information for the River Spey and the River Drue;
- Data from SEPA regarding licensed abstractions and known water users in the vicinity of the site;
- Data from SEPA regarding licensed discharges in the vicinity of this site;
- Information regarding protected water zones;
- Information from SW regarding the provision of water supply and sewerage services for the proposed development;
- British Geological Survey, Sheet 74, Solid and Drift Geology, 1:63360;
- Hydrogeology Map of Scotland, 1:625000; and
- Groundwater Vulnerability Map for Scotland.

Field Survey

- 9.5.3** Detailed topographical survey and initial infiltration tests were carried out on the 7th July 2006. A site walk over was also undertaken to assess the potential for the surface drainage and pollutant pathways.

9.5.4 The detailed results of these site investigations are included within other chapters of this report (Supporting Document, Flood Risk Assessment Report and Supporting Document ILUP Strategies, SuDS Strategy.)

Significance Criteria

9.5.5 The SNH publication, A Handbook on EIA (Tyldesley, 2005), provides guidance on assessing the likely significance of an impact on the environment. This is undertaken by an initial assessment of the sensitivity of the baseline environment and the potential magnitude of the predicted impact.

9.5.6 The sensitivity of the water resources to the potential impacts has been qualitatively evaluated and has been categorised as being of either, high, medium, or low sensitivity; see Table 9.1, below.

Table 9.1: Sensitivity Value Classification

Sensitivity value	Criteria
High	SEPA's National River Class A1 and A2 and Estuarine Water Class A. Water quality and environment are not significantly affected by human activity. The ecosystem depends on high quality groundwater, which may be often used for abstraction purposes. The area includes sites designated to meet international obligations and nationally designated sites, e.g. SPA/SAC, Sites of Community Importance, Ramsar Site (and proposed Ramsar Sites), World Heritage Sites, Biosphere Reserves, Biogenetic Reserves, National Scenic Areas, Regional Parks, Historic Gardens and Designed Landscapes, NNR, SSSI, Geological Conservation Review Sites, Nature Conservation Review Sites, Marine Nature Reserves, Area of Special Protection, EC Salmonid and Cyprinid Fisheries, Aquifer Protection Zones, Environmental Sensitive Areas
Medium	Quantifiable degradation in quality of surface water and groundwater features, River Class B and Estuarine Water Class B. The ecosystem is not directly dependent on the high water quality. Groundwater used as a local resource to some extent and/or local conservation areas known to be sensitive to groundwater impacts. The site includes local designations with a statutory or non-statutory basis, e.g. Conservation Areas, Country Parks, Picnic Sites, Statutory Local Nature Reserves, Tree Preservation Orders and etc.
Low	Surface water features of poor quality, River and Estuarine Water Class C and D. Major change in ecosystem due to the significant change in local quality of water. Groundwater of poor quality and/or very low permeability creates unfeasible conditions for abstraction purposes.

9.5.7 The magnitude of the potential impact has been evaluated and categorised as being either major, moderate, slight or no change, based on whether the impact leads to a fundamental or material change. The difference between a fundamental and material change is dependent on the impact on the intrinsic characteristics of the receptor. Impacts may be temporary or permanent and may have positive or negative impacts on the receptor. All impacts are highlighted in Volume 1, Chapter 7. Table 7.12 below, summarises the criteria for each category of changes.

Table 9.2: Magnitude of Change classification

Magnitude of Change	Criteria
Major	Loss of substantial part and/or integrity of ecosystems. Serious pollution results in serious/irreversible deterioration of water quality and ecosystems followed by downgrading in water quality classification level. The impact on the groundwater is permanent and/or long term in terms of water quality and yield capacity.
Moderate	Noticeable loss of part and/or integrity of ecosystems. Pollution from the development results in perceptible change from baseline conditions and with adverse effect on a receiving water body and nearby ecosystems. Change in ecological status of the watercourse and measurable changes in water quality might result to the change in classification level. The impact on groundwater may also be noticeable, but not serious.
Slight	The impact on quality of water is measurable but without any significant degree or extent. The ecosystems do not prove any considerable change from baseline conditions. No change in water quality classification.
No Change	The impacts are unlikely to be measurable and changes are barely distinguishable from baseline conditions.

9.5.8 The significance of an impact is based on the sensitivity of the receptor and the magnitude of the change. Table 9.3, below, provides a tool for assessing the significance of an impact. However, it does not demonstrate the complexities which often occur when defining the sensitivity of a receptor or magnitude of a potential impact.

Table 9.3: Significance Criteria

Sensitivity value	Magnitude of change			
	Major	Moderate	Slight	No Change
High	High	High	Medium	Low
Medium	High	Medium	Low	No Change
Low	Medium	Low	No Change	No Change

9.5.9 If an impact is classed as having 'major' or 'moderate' significance it is 'significant' in EIA terms and appropriate measures have to be applied to mitigate the predicted impact.

Legislative Framework

9.5.10 This assessment was undertaken in accordance with the following legislation:

International Legislation

The Water Framework Directive 2000/60/EC (WFD)

9.5.11 The WFD is broad European Legislation which sets out to safeguard aquatic ecosystems and to enhance water quality. At the same time, the WFD aims to promote sustainable use of water resources and ensure progressive reduction of groundwater pollution. All water bodies must reach 'good' ecological and chemical status for all inland and coastal waters by 2015. Heavily Modified Water Bodies must reach good ecological potential by 2015.

Local Policy

CNPA - The Cairngorms National Park Local Plan

9.5.12 The Local Plan Deposit includes a proposal for a new community at An Camas Mòr. The Local Plan identifies an indicative settlement boundary for the site, within which an expected 1,500 homes are to be developed. The Local Plan Deposit states that "the development of An Camas Mòr will comply with the policies of the Local Plan" and "permission for development will only be permitted if the planning authority is satisfied that proposals have been designed to avoid and minimise effects on the environment, mitigate any significant effects, and that the development would not adversely affect the integrity of the River Spey SAC".

9.5.13 Assessment of the potential flood risk from the development has been completed in accordance with Scottish Planning Policy 7. This is covered in the Supporting Document Flood Risk Assessment.

9.5.14 All SuDS developments would be in accordance with all local and regional planning policies.

9.6 Prediction and Assessment of Impacts

Introduction

9.6.1 This section considers potential environmental impacts of the new development on the surface water, groundwater and water quality baseline conditions. The potential impacts are considered for both the construction and operational phase of the development.

Construction Stage Impacts

9.6.2 Potential impacts on the water environment would likely to be of most significance during the construction period. The significance of the potential impact would be closely dependent on the specific method used to carry out the construction works. The conditions of work would be addressed in the Construction Environmental Management Plan and Method Statements which would incorporate appropriate environmental protection measures as outlined in SEPA's pollution prevention guidelines (SEPA, 1999).

9.6.3 The following section assesses separately the potential impact on the surface water and groundwater from the water quantity and quality perspective.

Surface Water

9.6.4 The potential impacts on the surface water bodies during the construction phase are assessed in terms of the impacts on water quantity and water quality.

9.6.5 The potential sources of impacts and consequently the potential changes to the water quantity are summarised in Table 9.4 and Table 9.5 below.

Table 9.4: Construction impacts on surface water quantity

Source of impact	Potential impact
<ul style="list-style-type: none"> ▪ Soil excavation, removal and storage <ul style="list-style-type: none"> ▪ Stockpiled material ▪ Loss of trees and moorland 	<ul style="list-style-type: none"> ▪ Increase in surface runoff from the site ▪ Interception of existing drainage pathways within the construction site ▪ Increased chance of sediment build-up further downstream in the River Spey and its tributaries

9.6.6 The sensitivity of the River Spey and the River Drurie are evaluated as high according to the sensitivity value classification identified in the previous section. According to the impacts outlined in Table 9.4 the potential magnitude of the change to the water quantity was considered as moderate.

9.6.7 Consequently the potential significance of the impacts of the construction phase identified in Table 9.4 on surface water quantity is assessed as medium, that is, significant, and appropriate mitigation measures are needed.

Table 9.5: Construction impacts on surface water quality

Source of impact	Potential impact
<ul style="list-style-type: none"> ▪ Change in land cover ▪ Site surface water runoff ▪ Disturbance of river terrace (B970 construction) ▪ Inappropriate storage of material ▪ Movement of traffic and plants ▪ Accidental spillage (chemicals, fuels, oil, concrete and building material) 	<ul style="list-style-type: none"> ▪ Increase in sediment and suspended solids runoff to the river channels ▪ Change in water quality due to chemical pollution ▪ Leachate from the construction site

9.6.8 The sensitivity of the watercourses is evaluated as high. According to the impacts outlined in Table 9.5 the potential magnitude of change to the water quality is considered as major. The significance of impact was therefore assessed as high, that is, significant, and appropriate mitigations are needed.

Groundwater

9.6.9 Potential impacts on the groundwater are displayed in Table 9.6 below.

Table 9.6: Construction impacts on groundwater

Source of impact	Potential impact
<ul style="list-style-type: none"> ▪ Excavation and dewatering ▪ Construction below the water table ▪ Inappropriate storage of material ▪ Movement of traffic and plants ▪ Accidental spillage (chemicals, fuels, oil, concrete and building material) 	<ul style="list-style-type: none"> ▪ Disruption to groundwater flow paths <ul style="list-style-type: none"> ▪ Change in water table level ▪ The risk of releasing pollutants into the groundwater reservoirs ▪ Change in water quality due to chemical pollution

9.6.10 The sensitivity value of the groundwater in the area is evaluated as medium according to the sensitivity value classification identified in the previous section. According to the impacts outlined in Table 9.6 the potential magnitude of the change is evaluated as moderate.

9.6.11 The potential significance of impact on the local groundwater was assessed as medium, that is, significant, and specific mitigation measures are needed.

Sewers and Drainage

9.6.12 A new pumping station has been proposed within the development. In the case of an emergency overflow from the proposed pumping station, there would be a significant adverse impact on the water quality of both the River Spey and the River Druie.

9.6.13 The pumping station would be constructed in accordance with the requirements of Sewers for Scotland and would be operated by the Developer to Scottish Water standards and in accordance with any conditions set by SEPA until adoption by Scottish Water. Consequently the chance of an emergency overflow would be significantly reduced and the risk to the watercourses would be negligible, that is not significant.

9.6.14 The plans for the proposed pumping station indicate that it may be located on land subject to waterlogging. Site specific ground investigations prior to construction would confirm suitability of the site and design specifications for storage of emergency overflow to ensure it would comply with the requirements for Sewers for Scotland and any conditions set out by SEPA would be drawn up.

Operational Stage Impacts

9.6.15 This section assesses the operational impact of the new development after the construction phase. The project is planned to be developed in three main stages:

- 2006-2011 – 100 residences in total;
- 2011-2016 – 400 residences in total;
- 2016-2018 – 600 residences in total; and
- 2018-2027 – 1500 residences in total.

9.6.16 The full stage of the development should be achieved by 2027 when there would be approximately 1,500 homes across approximately 105 hectares with associated infrastructure and services.

9.6.17 The range of potential impacts can vary widely and for consistency they were divided into the same categories as for the construction phase.

Surface Water

9.6.18 The potential impacts on the surface water bodies during the operational phase can be summarised as follows Table 9.7 and Table 9.8. The impacts are again considered in terms of water quantity and quality. The impact on flood risk is assessed separately in the Supporting Document, Flood Risk Assessment.

Table 9.7: Operational impacts on surface water quantity

Source of impact	Potential impact
<ul style="list-style-type: none"> ▪ Loss of trees and moorland ▪ An increase in impermeable surface areas <ul style="list-style-type: none"> ▪ Roadways and footpaths creating impermeable surface water flow paths ▪ Increase in water demand for local community 	<ul style="list-style-type: none"> ▪ An increase in the volume and rate of surface water runoff ▪ Creating of new drainage pathways in the area of development ▪ Impact on the downstream water levels and increase in flooding elsewhere (Supporting Document Flood Risk Assessment) ▪ Increased pressure on the local raw water resources

9.6.19 The sensitivity value of the watercourses is considered high. The potential magnitude of change due to the operation stage as outlined in Table 9.8 is evaluated as moderate. Consequently, the significance of impact was assessed as medium, that is, significant and appropriate mitigation measures are needed.

Table 9.8: Operational impacts on surface water quality

Source of impact	Potential impact
<ul style="list-style-type: none"> ▪ An increase in impermeable surface areas and change in drainage pathways ▪ Increase of traffic, accidental spillages ▪ Risk of pollutant spilling from domestic and business premises 	<ul style="list-style-type: none"> ▪ Increase in erosion and suspended solids load in surface runoff ▪ Increase in level of pollutants in run off

9.6.20 The sensitivity value of the watercourses is considered high. The potential magnitude of change without any mitigation measures is expected to be major. Hence, the significance of impact is considered as high, i.e. significant, and appropriate mitigation measures are needed.

Groundwater

9.6.21 The potential impacts of the operational phase on groundwater are summarised in Table 9.9 below.

Table 9.9: Operational impacts on groundwater quality and quantity

Source of impact	Potential impact
<ul style="list-style-type: none"> ▪ An increase in impermeable surface areas and change in drainage pathways ▪ Increased traffic, accidental spillages 	<ul style="list-style-type: none"> ▪ Change in water table level and groundwater availability ▪ Decrease in groundwater quality

9.6.22 The sensitivity value of groundwater in the area is evaluated as medium. The potential magnitude of the change is identified as moderate according to the potential impacts outlined in Table 9.9.

9.6.23 Consequently, the potential significance of impact on the local groundwater resources is assessed as medium, that is, significant, and additional mitigation measures are needed.

Sewers and Drainage

9.6.24 A new pumping station has been proposed within the development. In the case of an emergency overflow from the proposed pumping station, there would be a significant adverse impact on the water quality of both the River Spey and the River Drue.

9.6.25 The pumping station would be constructed in accordance with the requirements of 'sewers for Scotland' and would be operated by the Developer to Scottish Water standards and in accordance with any conditions set by SEPA until adoption by Scottish Water. Consequently the chance of an emergency overflow would be significantly reduced and the risk to the watercourses would be negligible.

9.6.26 The plans for the proposed pumping station indicate that it may be located on marshy land. If this is the case, additional consideration must be given to the storage of emergency overflow to ensure it would still comply with the requirements for 'Sewers for Scotland' and any conditions set out by SEPA.

9.6.27 Scottish Water have undertaken a Wastewater Network Development Impact Assessment (Supporting Document, Wastewater Network Development Impact Assessment) which examined a number of options for connecting An Camas Mòr to their wastewater network. The proposed option connects the proposed pumping station to Scottish Water's existing sewerage on the B970 Ski Road by way of the proposed footbridge / cycleway over the River Drue.(Volume 1 Chapter 5 Figure5.2).

9.7 Mitigation

9.7.1 In this section appropriate mitigation measures are discussed in respect of preventing, reducing or offsetting the potential impacts on both, surface water and groundwater during the construction and operational phase of the project development.

Construction phase

9.7.2 It is evident from Section 9.6 that there is a risk of environmental impact on surface water and groundwater during the construction phase. This risk may not be totally eliminated. However, it

can be significantly reduced through the incorporation of suitable protective measures following SEPA guidelines on pollution prevention (SEPA, 1999) and CIRIA technical guidance.

9.7.3 Prior to construction, a Construction Environmental Management Plan (CEMP) should be produced by the developer which the site personnel should then be familiar with. The CEMP should address all the main issues created by the construction phase of the project, these could include:

- Site personnel awareness;
- Mitigation measures at the construction site with particular reference to prevention of soil erosion;
- Solid waste management and minimization; and
- Site Restoration.

9.7.4 Table 9.10 below summarises potential mitigation measures that could be employed during the construction phase of the project. These follow SEPA's water pollution prevention guidelines (SEPA, 1999).

Table 9.10 Mitigation measures during the construction phase

Construction Stage
<ul style="list-style-type: none"> ▪ On-site training among the site personnel to raise the awareness of water pollution issues. ▪ The adoption of SEPA's appropriate pollution prevention guidelines to reduce the risk of sediment laden surface run-off entering watercourses and groundwater. ▪ Soil would be stockpiled in a location away from watercourses and potential surface drainage pathways. Binding of stockpile would be provided, acting as an impermeable barrier ▪ Adequate measures to deal with fuel and oil transport and storage, such as the inclusion of appropriately bounded areas and spillage trays. ▪ Removal and disposal of off-site or on-site treatment of any silty waters created in the construction site working areas and pumped out via the dewatering process. ▪ If working adjacent to watercourses, such as with river crossing construction, specific control measures during concreting work should be employed to reduce the risk of concrete being released to local watercourses. Alternatively, use of pre-cast concrete structures if possible. Use of designated washout area and sediments would be allowed to settle prior to discharge to watercourses. <ul style="list-style-type: none"> ▪ Consent of discharge of treated run-off would be obtained from SEPA if required. ▪ Emergency /contingency procedures to deal with accidental spillages – SEPA pollution incident response planning. <ul style="list-style-type: none"> ▪ Implementation of SuDS to reduce the risk of pollution to watercourses and groundwater. ▪ Adherence to sustainable re-uses of material and best practice with regard to waste management. <ul style="list-style-type: none"> ▪ Adequate site restoration strategy after the construction phase of the project.

Residual Impact

9.7.5 With the implementation of the mitigation measures described in the previous section, residual impacts on surface water and groundwater are predicted to be insignificant, that is, not significant. The implementation of mitigation measures would reduce the moderate impacts on

water quantity to negligible impacts. The impacts on the water quality would also be reduced to minor / negligible (see Table 9.11).

Table 9.11 Residual impacts during the construction phase

Construction Phase
<ul style="list-style-type: none"> ▪ Decrease the significance of impacts on surface water quality from major to minor/negligible. ▪ Decrease the significance of impacts on surface water quantity from moderate to negligible.

Cumulative impact

9.7.6 The impact of increased traffic on the existing public road network around the development would increase the potential impact of road runoff and the chance of accidental spillage. The nature of the traffic would not change .i.e. the type of vehicle using the public roads would not change, however the amount of traffic would increase. The effectiveness of the existing public road drainage system should be assessed by The Highland Council in terms of the increase in traffic generated by the development.

Operational phase

Surface Water Drainage

9.7.7 The change in surface water drainage over the operational area of the development would be due to the artificial increase in surface runoff from the site. Most of the rainfall falling on the ground is percolating through the soil travelling slowly towards watercourses (slow response). Only a small percentage of the rainfall is conveyed by the surface runoff directly to watercourses (rapid response). This ratio between the slow and rapid response to a rainfall changes with the replacement of permeable areas with impermeable ones. These changes have a direct or indirect effect on the quantity and quality of water in adjacent watercourses and further downstream. However, the magnitude of the impact, particularly in terms of water quantity, should be reduced as a result of the potential for infiltration between the development and the watercourse and the implementation of SuDS.

SuDS

9.7.8 SuDS would provide the control of the rainfall runoff and surface water drainage at the site. In Scotland, the use of the SuDS approach is a legal requirement and should be designed in accordance with General Binding Rules (GBR's) 10, 11 and 12. The SuDS approach should be used on all sites to minimise the impact of the development on the environment.

9.7.9 The results of the infiltration tests conducted in June 2006 identify that disposal of surface water via infiltration SuDS is possible over the main development area.

9.7.10 As previously mentioned, the groundwater in the River Spey floodplain can rise to 1 m below ground level and the interaction between surface water and groundwater may be high in places, in particular along the new sub-station route. Consequently, appropriate measures should be incorporated into the infiltration SuDS so that the risk to the watercourse from contaminants in drainage runoff is negligible.

9.7.11 The risk of hydrocarbon contamination may be raised over car parking areas. The SuDS proposal has incorporated techniques to trap potential hydrocarbons in the surface water runoff before being drained to the soakaway. This should reduce the potential impact on the water quality at these areas.

9.7.12 The detailed assessment of the SuDS strategy is in the Supporting Document, ILUP Strategies, SuDS Strategy.

Foul Water Drainage

9.7.13 Scottish Water has confirmed that they are willing to accept a new foul connection to their existing sewerage. A proposed enlargement of the WwTW in Aviemore should have the capacity to cope with all flow from the development if Planning Permission for the development is obtained before the works are designed.

9.7.14 A new scalable sewage pumping station has been proposed within the development. The pumping station would be constructed in accordance with the requirements of Sewers for Scotland and would be operated by the Developer to Scottish Water standards and in accordance with any conditions set by SEPA until adoption by Scottish Water. Consequently the chance of an emergency overflow would be significantly reduced and the risk to the watercourses would be negligible, that is, not significant.

9.7.15 The proposed option connects the new pumping station to Scottish Water's existing sewerage on the B970 Ski Road by way of the proposed footbridge / cycleway over the River Druie.(Paragraph 9.6.27 and Volume 1, Chapter 5, Figure 5.2).

Water Supply

9.7.16 Water is to be provided by Scottish Water through a new connection to the public network. Improvements to the Aviemore water supply are proposed by Scottish Water and would involve the building of a new Water Treatment Works (WTW) on a new site.

Table 9.12: Summary of mitigation measures

Operational Phase
<ul style="list-style-type: none"> ▪ The adoption of measures to eliminate potential leakage and water losses in the new distribution network ▪ The adoption of appropriate pollution control procedures, in accordance with SEPA's prevention of pollution guidelines (SEPA, 1999), to reduce the risk of pollution to the water environment ▪ Provision of adequate foul water treatment and emergency procedures at the proposed pumping station <ul style="list-style-type: none"> ▪ Provision of adequate SUDS to control storm water drainage

Residual Impact

9.7.17 The implication of the mitigation measures discussed in section above would decrease the significance of impact from major and moderate to negligible, that is, not significant. This would provide the sufficient mitigation of the negative impacts of the development on the surface water, ground water quantity and quality.

Table 9.13: Residual impacts during the operational phase

Operational Phase
<ul style="list-style-type: none"> ▪ Decrease the significance of impacts on surface water quality from major to minor/negligible ▪ Decrease the significance of impacts on surface water quantity from moderate to negligible.

Cumulative Impact

9.7.18 The impact of increased traffic on the existing public road network around the development would increase the potential impact of road runoff and the chance of accidental spillage. The nature of the traffic would not change .i.e. the type of vehicle using the public roads would not change, however the amount of traffic would increase. The effectiveness of the existing public road drainage system should be assessed by The Highland Council in terms of the increase in traffic generated by the development.

9.7.19 The downstream impact on flood risk is assessed in the Supporting Document, Flood Risk Assessment.

9.7.20 Minimizing all negative impacts of the operational development is essentially achieved through implementation of environmental good practice and enhancement of environmental awareness among service companies and the residences themselves.

Impact on Raw Water Resources and Future Water Supply-Demand Balance

9.7.21 As discussed in section 9.2, the new development would have an impact on the raw water resources demand. It has been estimated that the total average water demand for Phase A would be 56, 592 litres / day. Once the development is complete (Phase D) it has been estimated that the total average water demand would be 783, 416 litres / day. A detailed investigation of the water demand can be found in the Supporting Document Indicative Land Use Plan Strategies Section 7 Paragraphs 1.7.4 to 1.7.11. This has to be considered in the future water supply-demand balance for Aviemore Water Resource Zone (WRZ).

9.8 SUMMARY

9.8.1 The impact of the development has been assessed in terms of the potential impact on surface water quantity, quality and impact on groundwater.

9.8.2 The River Spey and the River Druie have been classified by SEPA as “A1” and “A2” respectively, consequently the sensitivity of the site is ‘High’. The potential magnitude of the impact on surface water quantity and groundwater is ‘moderate’ therefore the significance of the potential impact is ‘Medium’.

9.8.3 The magnitude of impact on surface water is ‘Major’ and so the overall significance is ‘High’.

9.8.4 It is evident that there is a risk of environmental impact on surface water and groundwater during the construction phase. This risk may not be totally eliminated; however it can be significantly reduced through the incorporation of suitable protective measures following SEPA and CIRIA technical guidance. The mitigation measures would decrease the significance of impact from major and moderate to minor / negligible which are not considered significant.

9.8.5 It is evident that there is a risk of environmental impact on surface water and groundwater during the operational phase. Through the adoption of appropriate pollution control measures and SuDS the risk can be significantly reduced and these measures would decrease the significance of impact from major and moderate to minor / negligible, which are considered not significant.

REFERENCES

CIRIA, C648. (2006). *Technical guidance on Control of pollution from linear construction project* [online] Available from: <http://www.ciria.org/acatalog/c648.pdf> [Accessed on 10/10/2008]

European Commission (EC), 2000. *Water Framework Directive 200/60/EC(2000)*.

Scottish Environment Protection Agency (SEPA), (1999), *Guidelines for Water Pollution Prevention from Civil Engineering Contracts*.

Scottish Environment Protection Agency (SEPA), (2002), *Interim Policy Guidance Note – responses to Consultations on Engineering Operations*.

Spey Catchment Steering Group, (2006), *River Spey Catchment Management Plan*.

Tyldesley, D. (2005). *A Handbook on Environmental Impact Assessment*. SNH. Edinburgh.

Morris, P., Therivel, R. (2001). *Methods of Environmental Impact Assessment*. Spon Press. London.