Chapter 10: Transportation

10.1 Introduction

RPS has been commissioned by Pragma Planning and Development Consultants Ltd to undertake a Transportation Assessment in relation to the proposed residential and mixed used development at Bowtown, Newtownards. The site currently consists of agricultural fields with a number of farm groups and individual dwellings mixed into the area. This chapter should be read in conjunction with Appendix 10.1 Transportation Assessment.

10.1.1 Site Location

The proposed development (see Figure A in Appendix 1 for indicative site boundary) is located on the eastern boundary of Newtownards. It is approx. 600 meters north of the shoreline of Strangford Lough, bound to the north by the B172 Movilla Road and to the south by the Bowtown Road. The western boundary of the site is in close proximity to the residential Abbot Drive area and the eastern boundary is open countryside.

10.1.2 Project Description

The proposed development will occupy a land area of just over 41 hectares. It will comprise 675 no dwellings. These will be a mix of apartments, town houses, semi-detached and detached houses. A mixed used High Street is proposed for the core of the development and this is intended to meet local needs in terms of convenience shopping, child care and related facilities. A local distributor road will run through the development connecting Bowtown Road to Movilla Road, the road is to accommodate a bus route. A pedestrian and cycleway network is also to be provided. The proposed development is located within the administrative area of Ards & North Down Borough Council.

10.2 Policy and Legislative Context

The assessment has been undertaken in accordance with the following Policy & Guidance;

- Guidelines for Traffic Impact Assessments;
- Transport Assessment Guidelines for Development Proposals in Northern Ireland;
- Development Control Advice Note (DCAN) 15, 2nd Edition;
- Planning Policy Statement (PPS) 3, Access, Movement & Parking;
- Planning Policy Statement (PPS) 13, Transportation & Land Use;
- Ards & Down Area Plan 2015.

10.3 Assessment Methodology

10.3.1 Assessment Criteria and Assessment of Significance

The Assessment Criteria and Assignment of Significance is based on the thresholds identified within the Transport Assessment Guidelines for Development Proposals within Northern Ireland and the Guidelines for Traffic Impact Assessments published by the Chartered Institution of Highways and Transportation.

These guidelines indicate a detailed assessment is required when the following thresholds are exceeded;

- Traffic to and from the development exceeds 10% of the existing two-way flow on the adjoining highway; and
- Traffic to and from the development exceeds 5% of the existing two-way flow on the adjoining highway, where traffic congestion exists or will exist within the assessment period, or other sensitive locations.

The Guidelines for Traffic Impact Assessments also indicate the following;

- Traffic flow on any uncongested road frequently varies by up to 10% on a day to day basis. In congested conditions, where flow variations are smaller it may be difficult, if at all possible, to distinguish these variations from traffic specifically related to the new development; and
- The environmental conditions on a road do not change significantly with changes of traffic of less than some 30% (see IEA Guidelines on the Environmental Impact of Road Traffic) unless there are major changes in flow composition.

As agreed with DFI Roads, the 5% threshold level has been considered within the detailed analysis provided within the Transportation Assessment included in Appendix 10.1.

10.4 Significance of Effects

Based on the detailed assessment undertaken as part of the Transportation Assessment in Appendix 10.1 the traffic impact (based on the 5% threshold) of the proposed development would be considered to be a low sensitivity and a low magnitude of impact as the surrounding highway network can accommodate the traffic generations associated with the proposed development without requirement for offsite mitigation works with the exception of the Donaghadee Road / Movilla Road junction where it is proposed to signalise the existing priority or implement other works to be agreed with DFI Roads.

10.5 Baseline

A detailed suite of traffic surveys were undertaken on the surrounding highway network as set out in Section 4.2 of the Transportation Assessment included in Appendix 10.1. These surveys allowed the existing peak hour periods to be calculated for the surrounding road network. The existing traffic flows were factored by National Road Traffic Forecasts (NRTF) low rates, as agreed with DFI Roads at Scoping Study state. Traffic growth is considered in Section 4.3 of the Transportation Assessment included in Appendix 10.1.

Committed developments, that is, those developments which have received planning approval but are not yet constructed and operational were assessed and included in the baseline traffic scenario. The included committed developments are identified in Section 4.4 of the Transportation Assessment included in Appendix 10.1.

Baseline traffic flows are included in Appendix E of the Transportation Assessment in Appendix 10.1.

10.6 Impact Assessment

10.6.1 Assessment of Construction Effects

Construction traffic is not known at this time, however, the volume of construction traffic will be significantly less than the operational phase which has been considered in detail in the Transportation Assessment in Appendix 10.1.

10.6.2 Assessment of Operational Effects

The operational effects of the proposed development have been considered in detail in the Transportation Assessment included in Appendix 10.1.

The analysis indicates that the proposed development can be accommodated on the surrounding highway network without the requirement for any offsite (excluding the proposed site access junctions) mitigation measures with the exception of the Donaghadee Road / Movilla Road junction. A proposal is included within the Transportation Assessment (Appendix 10.1) to signalise this junction, or other works to be agreed with DFI Roads.

10.6.3 Assessment of Cumulative Effects

The Transportation Assessment included in Appendix 10.1 includes a number of committed developments and therefore has assessed the potential for all developments to be operational at the same time, therefore cumulative impact has been considered.

10.6.4 Inter-relationships

There are two main areas of potential inter-related effects between transportation and other ES topic areas which are Air and Noise, however, separate chapters have been prepared in support of each of these disciplines.

10.7 Mitigation Measures

10.7.1 Construction

There are no mitigation measures required as part of the construction phase of the proposed development. The surrounding highway network is suitable to accommodate all relevant construction vehicles which are currently permitted on UK roads.

10.7.2 Operational

As indicated above, with the proposed development construction and operational there is a proposal to signalise the Donaghadee Road / Movilla Road junction, or other works to be agreed with DFI Roads.

10.8 Statement of Significance of Residual Effects

10.8.1 Construction

It is not anticipated that there will be any residual effects associated with the construction phase of the development. There is no significant effect on the surrounding highway network due to the construction phase predicted.

10.8.2 Operation

The operational phase of the proposed development has been assessed and the traffic generation associated with the proposed development can be accommodated on the surrounding highway network without the need for off-site mitigation measures with the exception of the proposal to signalise (or other works agreed with DFI Roads) the Donaghadee Road / Movilla Road junction.

10.9 References

Guidelines for Traffic Impact Assessmnt (1994) Chartered Institute of Highways and Transportation;

Transport Assessment Guidelines for Development Proposals in Northern Ireland (2006), The Planning Service;

Development Control Advice Note (DCAN) 15 (2nd Edition) Vehicle Access Standards (August 1999), The Planning Service;

Planning Policy Statement 3 (PPS 3 Revised Feb 2005) Access, Movement and Parking, The Planning Service;

Planning Policy Statement 13 (PPS 13) Transportation and Land Use, Department for Regional Development;

Ards & Down Area Plan 2015, The Planning Service.

Chapter 11: Drainage and Flood Risk Assessment

11.1 Introduction

RPS was commissioned by Pragma Planning & Development Consultants Ltd on behalf of Frazer Homes Ltd to undertake a Drainage and Flood Risk Assessment for a proposed residential development located between the Bowtown Road and the Movilla Road, east of Newtownards.

The drainage and flood risk assessment will provide an outline review of the drainage impact the proposed development will have in accordance with PPS15 Planning and Flood Risk – Annex D.

This report will approximate the storm drainage discharge rates and attenuation requirements for the proposed development through examining the storm water flows generated from the existing green field site and comparing it with the storm water flows generated on the proposed redeveloped site.

This report will outline the approximate location of foul sewer networks, pumping stations and locations of emergency overflow points on the site.

The drainage and flood risk assessment will also provide a review of Flood Risk from the proposed development will have in accordance with PPS15 Planning and Flood Risk.

11.2 Site Profile

Site Location

The proposed development site is located on the eastern extents of Newtownards Town, between the Bowtown Road and the Movilla Road within close proximity to Strangford Lough. The boundary of the site is detailed in Figure A: Site Location Plan at Appendix 2.

The proposed site is bounded by the Abbot Drive and Movilla Mews residential developments to the west and northwest respectively. To the south and east the site is bounded by open countryside. Current vehicular access to the site is gained via the Ballyreagh Road which connects the Movilla Road at the northern extent of the site with the Bowtown Road at the southern extent of the site.

The Irish Grid Reference for the proposed development is 351380, 373914.

Site Description

The proposed site is approximately 43.37ha in area and is made up of predominantly agricultural land. A number of farm groups and individual dwellings with associated hard standing areas are located within the proposed site's bounds. It is estimated that the site comprises of approximately 2.79ha of hard standing areas. It is estimated therefore that the site is approximately 93.5% permeable and is considered to be classified as a green field.

The Bowtown Road Stream, a DfI Rivers designated watercourse (U3510Ext), flows within a 1,500mm diameter culvert in a generally southern direction within the site's south western boundary. At the southern boundary of the site the watercourse crosses under the Ballyreagh Road and discharges into an open channel immediately south of the Ballyreagh Road. The watercourse continues in a generally southern direction to its confluence point with Strangford Lough approximately 600m south of the site.

The alignment of the Bowtown Road Stream through the site is detailed in Figure 11.1 below.

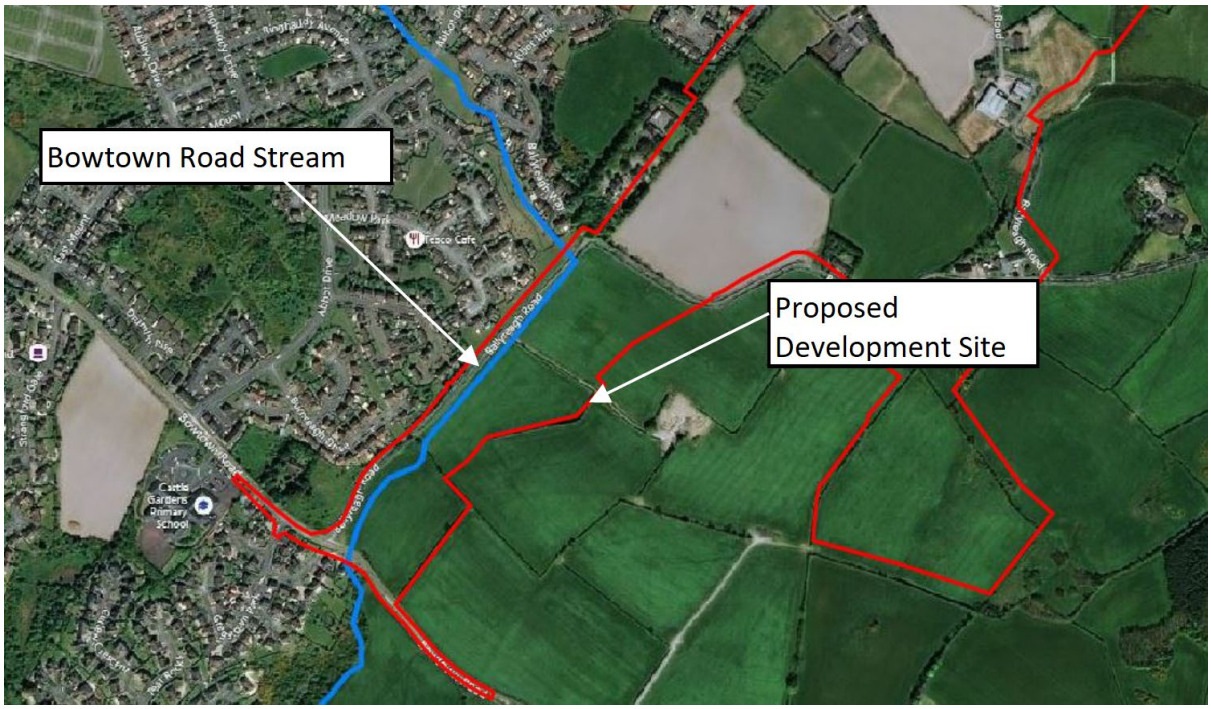

Figure 11.1

11.3 Extent of Development

The proposed 43.37ha development site will comprise 35.77ha of housing lands and 7.6ha designated for amenity open space. The number of dwellings under consideration for development is estimated to be around 675. This results in a gross site density of 19 per hectare based on the 35.77ha of housing lands.

As part of the proposed development the Ballyreagh Road will be upgraded to the standards of a distributor road to provide a link from the northern Movilla Road and the southern Bowtown Road. The upgrade will incorporate a bus route as well as a segregated pedestrian and cycle network.

The proposed development will also feature a Neighbourhood Centre comprised of mixed use commercial properties. This will be located in the centre of the development site and to the west of the distributor road. The Neighbourhood Centre will be the focus for the provision of public transport, shops and local facilities.

The 7.6ha designated for amenity open space will be located within the North West corner of the site. The Abbot Drive residential development will bound the amenity open space to the west.

The proposed general arrangement of the site is outlined in Figure B: Concept Master Plan at Appendix 2. For the purposes of the drainage assessment the site has been divided into a Road plot and 12 housing development plots as shown on the Proposed drainage discharge drawing in Appendix 11.1. As explained later in the report these plots have been merged to create 5 No. discharge points.

11.4 Topographical Survey

A topographical survey of the proposed development site and surrounding area was undertaken in October 2018 by CSS Land Surveys. This survey is presented in Appendix 11.2.

The existing site comprises of an undulating landscape with drumlins located throughout the site.

The existing ground levels fall from a level of approximately 54.00mOD on the northern boundary of the site to a level of approximately 36.00mOD on the southern boundary of the site. Levels fall from approximately 58.00m OD on the northwest boundary to approximately 28.00m OD on the southeast boundary of the site. Drumlin high points occur throughout the site's bounds.

A 225mm diameter storm sewer serving a number of field drains runs east to west within the southern section of the site. The storm sewer connects into the 1,500mm diameter Bowtown Road Stream culvert along the western boundary of the site adjacent to the Abbot Drive residential development.

A series of interconnected field drains are located within the site bounds. The drains flow generally in a southern direction toward Strangford Lough where it is assumed, they ultimately discharge naturally into the Lough.

11.5 Approach to Drainage Assessment

In Northern Ireland, guidance relating to planning and flood risk is outlined in Planning Policy Statement 15 (PPS 15), published in September 2014.

PPS 15 sets out the Department of the Environment's planning policies to reduce flood risk to people, property and the environment. Due to current understanding with regards to climate change and flood risk, PPS 15 adopts a precautionary approach to decision making.

PPS 15 annex D states that a drainage assessment will be required to facilitate the proper consideration of a planning application for a proposed site where:

- The development compromises of 10 new dwellings or more;
- The development exceeds one hectare;
- Changes of use involving new buildings and/or hard surfacing which exceeds 1,000m² in area; or
- Surface water run-off from the development may adversely impact upon a sensitive area.

11.6 Assessment of Storm Water Run-Off

The proposed development site is approximately 43.37ha in area. As the site consists mainly of agricultural land it is considered to be classified as a Greenfield Site.

The proposed development site has been divided into 12 Housing plots and 1 Road plot. For this assessment, plots have been combined to create 5 No. discharge points. The plots that are associated with each discharge point are shown below:

- Discharge Point 1 – Plot 1, Plot 2 and Road Plot
- Discharge Point 2 – Plot 3, Plot 4 and Plot 5
- Discharge Point 3 – Plot 6, Plot 7 and Plot 8
- Discharge Point 4 – Plot 9
- Discharge Point 5 – Plot 10, Plot 11 and Plot 12

The total combined area of the 12 Plots and Road Plot is approximately 43.37ha. At this initial review stage it is assumed that the hard-standing area within each of the proposed housing development zones is 70%. This therefore correlates to a proposed hard standing area of 24.7ha when each plot is evaluated in relation to its hard-standing areas. This therefore gives a overall site break down of 57% Hard standing including all open space areas.

The Wallingford IOH124 formula has been used to estimate the greenfield run-off rate for a 1 in 100 year return period. The industry standard Interim Code of Practice (ICP) recommends that the IOH124 formula is applied to an area greater than 50ha and the resulting discharge is linearly interpolated for the required area, in this instance the area of each separate drainage assessment zone.

Using the aforementioned method the estimated peak green field storm flow run-off from each of the proposed drainage assessment zones was estimated during a 1 in 100 year storm event. The results are presented in Table 11.1 below. A summary of the calculation of the 1 in 100 year peak green field storm flow for each drainage assessment zone is provided within Appendices 11.3 to 11.7.

Table 11.1

Drainage Assessment Zone – Discharge Points	Zone area (ha)	Greenfield Run-off Rate Q100 + 20% Climate Change (l/s)
1	4.35	21.8
2	9.20	46.0
3	15.17	75.9
4	5.22	26.1
5	9.43	47.2

The peak storm water run-off flow generated post development will be higher than that generated from the existing greenfield site. The peak storm water run-off rate generated in each of the zones by the proposed development is outlined below in Table 11.2 below. The proposed development run-off calculation for each discharge point of shown on the Proposed Drainage Discharge Drawing S6/0001 presented in Appendix 11.8.

Table 11.2

Drainage Assessment Zone – Discharge Points	Proposed Hard Standing Area (ha)	Proposed Soft Standing Area (ha)	Proposed Peak Flow 100 year peak flow (l/s)
1	2.595	1.758	414.37
2	4.719	4.483	766.29
3	8.049	7.124	1301.88
4	3.646	1.562	573.02
5	5.689	3.747	907.32

As highlighted earlier in the report, the storm water from each of the plots will be discharged at a number of discharge points either located along the Bowtown Road Stream or on the smaller undesignated watercourses located throughout the eastern boundary.

Under the Water (Northern Ireland) Order 1999, the discharge of storm sewerage waste to any watercourse requires the consent of the Department of the Environment. Schedule 6 has therefore been applied for and approved. Following approval of the application DfI Rivers have stated the allowable discharge rates associated with each discharge point. Schedule 6 approval for the scheme is located within Appendix 11.9.

Limiting the surface water discharge rate from the proposed development will ensure that there is no adverse affect on the risk of flooding due to surface water run off to the development or to neighbouring properties. This approach to the storm water drainage for the proposed site is in line with PPS 15's precautionary approach to flood risk and its encouragement of Sustainable Urban Drainage Systems to improve water quality.

In order to attenuate the peak flows for each of the development zones to that allowed within the schedule 6 approval, a suitably designed attenuation system with capacity suitable for a 1 in 100 year (plus 20% climate change) storm event is recommended. The discharge rate from the attenuation system can be limited to the recommended run-off rates through the installation of a hydrobrake or other similar proprietary flow control device in the system.

Utilising the Causeway Flow Drainage software package the volume of storage required for a 1 in 100 year storm event (plus 20% climate change) has been estimated for each of the development zones and the results are presented in Table 11.3 below.

Table 11.3

Drainage Assessment Zone – Discharge Points	Zone Area (ha)	Proposed Attenuated Peak Flow - Schedule 6 approved	Estimated Volume of Attenuation Required (m^3)
1	4.353	121.47	425 to 765
2	9.202	117.84	1052 to 1797
3	15.173	273.76	1565 to 2710
4	5.208	117.77	730 to 1252
5	9.436	201.27	1086 to 1885

The preliminary layout and calculated volumes of storage required for the 1 in 100 year event are for guidance use only and based on ranges. Design of the storm drainage system and attenuation system are to be undertaken as part of the detailed design stage of the project with more accurate values determined at detailed design stage.

A schedule 6 application for consent to undertake works to a watercourse has been submitted and approved by DfI Rivers for each storm water discharge point throughout the proposed development. The approval is located in Appendix 11.9.

Consent will also need to be granted by the Department of Environment in order to discharge storm water into the existing water courses within and surrounding the proposed development site. As such discharge consent applications will also need to be submitted to the NIEA for each of the proposed discharge points.

11.7 Foul Sewerage Assessment

This section of the report provides a summary of the foul sewerage infrastructure required for the proposed development including the general arrangement of gravity sewers, location of pumping stations and rising mains, foul storage requirements and emergency overflow locations and discharge rates in emergency conditions.

Existing Conditions

As the site is predominately greenfield, there are no existing foul infrastructure within the site boundary. There is existing foul infrastructure within Bowtown Road and Movilla Road. An

existing 600mm diameter foul sewer is located to the South West of the site at Burnreagh Drive, crossing the Ballyreagh and Bowtown Roads before traversing around the eastern side of the Gregstown Park / Teal Rocks.

The overall site generally slopes from the northern to southern extents and furthermore slopes from the western to eastern extents of the site where the watercourses are also located. The housing roads and distributor link road will tie into the existing topography closely and therefore the proposed site topography will slope in a similar manner. Due to this proposed site topography, pumping stations and rising mains are expected along the eastern extents of the site.

Pre-Development Enquiry (PDE)

Northern Ireland Water (NI Water) were consulted by Ards and North Down Borough Council on the proposals for this development. NI Water provided a consultation response on 27th of April 2020 which referred to a PDE from 15th January 2020 for the same scheme. The PDE noted the following key information in relation to foul sewers:

- There was a 600mm diameter foul sewer was located to the south west of the scheme which may serve the development;
- An assessment of the receiving pumping station at Portaferry Road, Newtownards 1 Wastewater Pumping Station (WwPS) would be required to ensure it can serve the proposal; and
- The receiving Wastewater Treatment facility (Ballyrickard WwTW) has capacity to serve this proposal.

A further PDE was lodged with NI Water in May 2020 to which NI Water responded on the 1st of June 2020. The PDE noted the following key information in relation to foul sewers:

- Due to the sewer network being at capacity within the Newtownards catchment and sewer flows spilling from CSOs into the environment, NI Water is recommending to Council Planners that no further foul connections should be made to this network or a condition should be incorporated which requires an alternative drainage / treatment solution for the site. This is because of the risk of NIEA prosecution should NI Water breach its Water Order Consent or contravention of the Water Order should the company causes detrimental impacts to existing customers i.e. sewer flooding of properties.
- An upgrade scheme(s) will be delivered once solutions are identified through the use of best practice sewer modelling and optioneering techniques and if adequate funding is available within NI Water's investment cycle known as a Price Control. NI

Water is currently developing its Price Control 21 (PC21) Business Plan which assesses its wastewater (and water) needs for the period 2021 to 2027 and importantly prioritises them with its regulators. A significant increase in NI Water's funding is required to address this and other similar sewer network capacity problems across Northern Ireland.

- The receiving Wastewater Treatment facility (Ballyrickard WwTW) has capacity to serve this proposal.

NI Water Consultation

Since this PDE response was issued by NI Water, there has been extensive liaison with NI Water to consider options for a solution to the network capacity issues affecting this site and others.

As part of these discussions NI Water suggested that any solution should be a strategic solution and that developers from NS19 Bowtown Road lands (Fraser Homes Limited) and NS20 Rivenwood lands (Fraser Houses Limited) should work together to deliver this solution and as such NI Water now consider this to be a Pilot Scheme for their Solution Engineering team which means this will be a developer led and self-funder solution with assistance from NI Water to help deliver the strategic solution. Therefore, Fraser Homes Limited have been working in collaboration with Fraser Houses Limited to deliver a strategic solution to the network capacity issues which affect both the NS19 Bowtown Road Scheme (Circa 675) and the NS20 Rivenwood scheme (circa 1100 dwellings). NI Water have also alluded to the potential of any solution providing further capacity to the remaining NS20 lands to the North.

The Newtownards pilot scheme is therefore developer led off-site infrastructure working with NI Water to provide sewer capacity for lands associated with Fraser Houses Limited, Fraser Homes Limited and potentially others.

During discussions NI Water have confirmed to both developers that the Portaferry Road WwPS has sufficient capacity to serve these developments as it has had recently been subject to improvement works and that the receiving Waste Water Treatment facility (Ballyrickard WwTW) which the Portaferry Road WwPS pumps to, continues to have capacity to serve these proposal although NI Water are now aware that capacity is limited. NI Water have also confirmed that the network upstream of the existing Portaferry Road WwPS has insufficient capacity to convey the foul flows from the proposed developments and that the developer will be responsible for transferring flows to the existing NI Water Terminal WwPS on the Portaferry Road which has sufficient capacity. Initial discussions with NI Water have also indicated that the proposed Ballyreagh / Bowtown WwPS should pass forward Formula A and that emergency overflows from the proposed WwPS can be discharged to the existing NI Water network on the Bowtown Road.

Proposed Foul Sewerage Strategy and Infrastructure

A foul wastewater drainage strategy has therefore been developed which outlines the proposals for delivering the foul flows form the NS20 Rivenwood lands to NS19 Bowtown Road lands and from the Bowtown Road to the Portaferry Road WwPS.

Phase 1 is relatively flat therefore the foul infrastructure only includes gravity sewers which can connect to a truck sewer in the distributor link road.

The Phase 2 extents are on both the western and eastern sides of the distributor link road. The western side of this phase slopes towards the link road therefore only includes gravity sewers. The eastern side of Phase 2 slopes away from the distributor link road and so gravity sewers flow from the northern road extents and from development close to the distributor link road can connect by gravity to the trunk sewer in the distributor link road however the remaining roads on this phase flow by gravity towards Pumping Station D and will be. pumped back to the trunk sewer in the distributor link road.

The Phase 3 extents are on the western sides of the distributor link road. The western side of this phase slopes towards the link road therefore only includes gravity sewers that flow to the trunk sewer in the distributor link road.

The Phase 4 extents are on the eastern sides of the distributor link road. The eastern side of this phase slopes away from the link road therefore gravity sewers near the distributor link road can flow directly into the trunk sewer main by gravity. The remaining sewers flow by gravity to two separate pumping stations (B and C) and will be pumped back to the trunk sewer in the distributor link road.

This foul drainage strategy for the new development therefore involves a trunk 300mm diameter sewer through the NS20 Rivenwood lands continuing along the realigned Ballyreagh Road. The foul from the NS19 Bowtown Road lands will be via a number of small sub-catchment WwPS's (Pumping Station B,C and D) transferring to the 300mm diameter trunk sewer along the realigned Ballyreagh Road which will deliver foul flows to a larger WwPS (Pumping Station A) off the Bowtown Road.

From pumping Station A, all flows will be pumped to a high point from which they will then gravitate to the existing NI Water Portaferry Road WwPS before being pumped to the Ballyrickard Wastewater Treatment Works (WwTW) for treatment. The feasibility of a number of options for routing of the discharge pumping main and or gravity sewers from the NS19 Bowtown Road site to the existing NI Water Terminal WwPS at Portaferry Road are currently being considered on behalf of the Developers and for agreement with NI Water. The route options currently being considered are shown below in Figure 11.2.

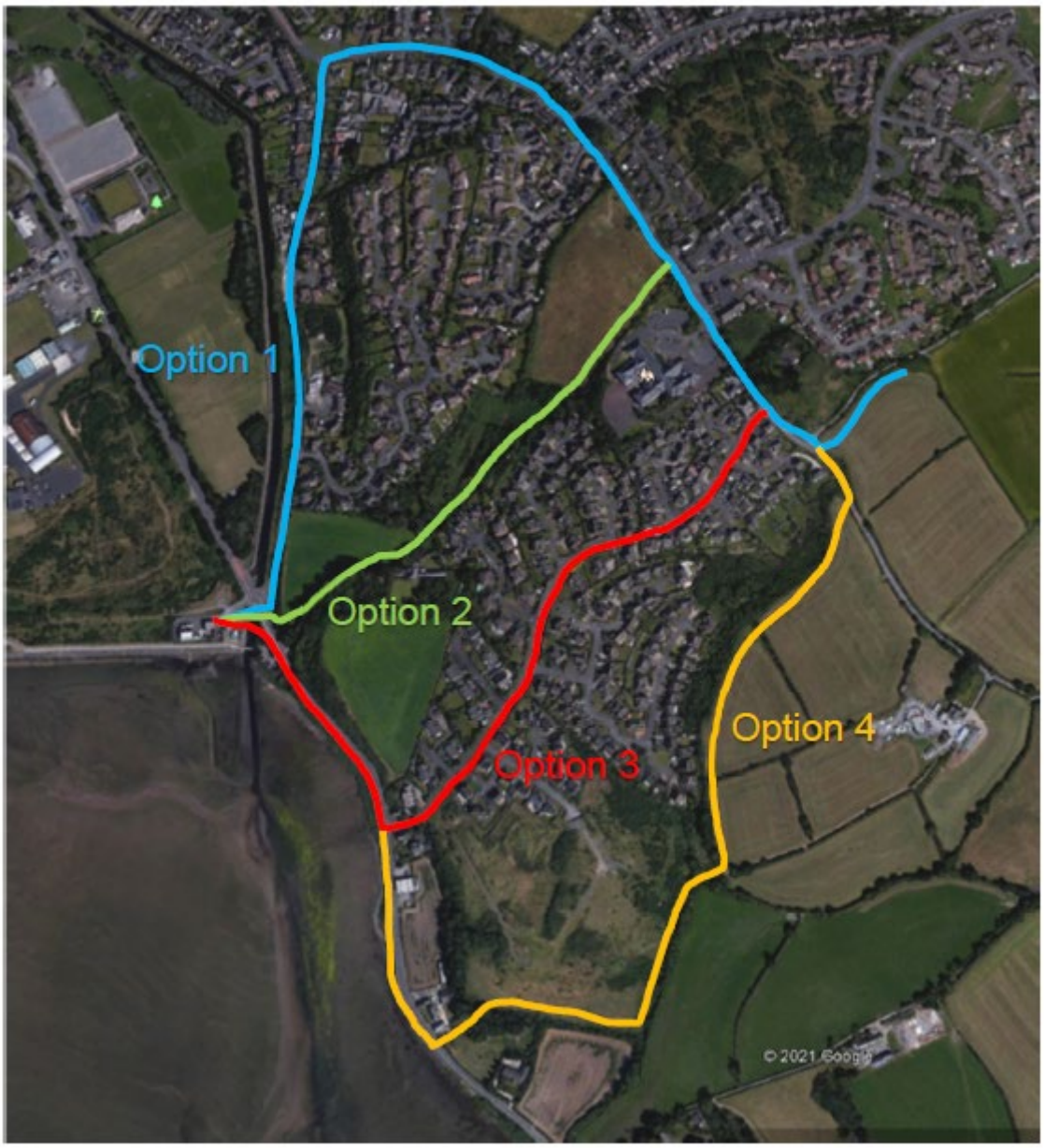

Figure 11.2

The route options currently being considered are described as follows:

1. Rising Main (and Gravity Sewers) from the proposed Terminal WwPS at Ballyreagh Rd, onto Bowtown Road and then Old Shore Road before crossing the A20 Portaferry Rd and entering the existing NI Water WwPS.

2. Rising Main (and Gravity Sewers) from the proposed Terminal WwPS at Ballyreagh Rd, onto Bowtown Road and then through agricultural lands adjacent to Castle Gardens School before crossing the A20 Portaferry Rd at the junction with Old Shore Road to discharge to the existing NI Water WwPS.

3. Rising Main (and Gravity Sewers) from the proposed Terminal WwPS at Ballyreagh Rd, onto Bowtown Road and then along the development roads of Gregstown Park and Teal Rocks before joining the main A20 Portaferry Rd and continuing to discharge at the existing NI Water WwPS.
4. Option four passes through private lands under various ownership and along a greater stretch of the Main Portaferry Road (A busy commuter route).

It is currently considered that there will be no Trade Effluent flows within the proposed drainage catchment and all foul flows will be domestic in nature. The foul drainage strategy for the proposed developments also ensures that foul drainage will remain fully separate from surface runoff within the area of the developments and therefore there will be no storm water influence on the design flows.

The next stage of this process will be to provide NI Water with a feasibility assessment of the routing options and recommend a preferred option for agreement with NI Water Developer Services and Solution Engineering Teams to be taken forward for design and delivery.

The proposed foul sewerage strategy and infrastructure are illustrated in Appendix 11.10.

Proposed Emergency Overflow Conditions

Consent will also need to be granted by the Department of Environment in order to discharge foul sewage under emergency conditions from the pumping stations into the existing water courses within and surrounding the proposed development site. As such discharge consent applications will also need to be submitted to the NIEA for each of the proposed discharge points.

Pumping Station A is required to store and pump 1778 units. The required emergency storage is 266.7m³ and the emergency overflow discharge is 82.3 l/s. The sewage from this pumping station will be pumped to the Portaferry WwPS via the routes under consideration. When required, the emergency overflow will discharge to the existing 600mm diameter NI Water network along the Bowtown Road as agreed with NI Water. This will avoid any significant adverse effect on the existing watercourses.

Pumping Station B is required to store and pump 229 units. The required emergency storage is 34.4m³ and the emergency overflow discharge rate is 10.6 l/s. The sewage will be pumped towards a gravity pipe falling towards the trunk sewer in the distributor link road. When required, the emergency overflow will discharge to a nearby stream/river.

Pumping Station C is required to store and pump 6 units. The required storage is 0.9m³ and the emergency overflow discharge rate is 0.28 l/s. the sewage will be pumped towards a gravity

pipe falling towards the trunk sewer in the distributor link road. When required, the emergency overflow will discharge to a nearby stream/river.

Pumping Station D is required to store and pump 91 units. The required storage is 13.7m3 and the emergency overflow discharge rate is 4.2l/s. The sewage will be pumped towards and gravity pipe falling towards the trunk sewer in the distributor link road. When required the emergency overflow will discharge to a nearby stream/river.

All pumping stations will need to be designed in accordance with NI Water guidance and specification for adoption. As such, pumping stations will have two pumps (duty and stand by) and alarm telemetry for failure and emergency overflow.

Foul Sewerage Impact Assessment

Therefore, the solution as described above is proposed to address the network capacity issues for both the NS19 Bowtown Road, NS20 Rivenwood and potentially other NS20 sites. It is considered that this solution will provide an appropriate connection to the NI Water foul sewer and treatment systems and therefore avoid or prevent what might otherwise have been a significant adverse effect on the environment and potentially provide further benefits to new developments upstream of these sites.

11.7 Flood Risk Assessment (FRA)

This section of the report provides a summary of the FRA which has been prepared for for the proposed development. A full copy of the FRA report is included within Appendix 11.11.

Site Overview

The proposed development site is located on the eastern extents of Newtownards, between the Bowtown Road and the Movilla Road. The proposed site is bounded by the Abbot Drive and Movilla Mews residential developments to the west and northwest respectively. To the south and east the site is bounded by open countryside. The Bowtown Road Stream Extension, a DfI Rivers designated watercourse (U3510Ext), flows within a 1,350mm diameter culvert in a generally southern direction along the south western boundary of the site. At the southern boundary of the site the watercourse crosses under the Ballyreagh Road and discharges into an open channel immediately south of the Ballyreagh Road. The watercourse continues in a generally southern direction to its confluence point with Strangford Lough approximately 600m south of the site.

Proposed Development

The site for a residential development (of a maximum of 675 dwellings) to include a mix of detached, semidetached, terrace and apartment dwelling types. The replacement of Ballyreagh Road with the Bowtown Road to Movilla Road distributor road and associated

roundabout junctions on Bowtown Road and Movilla Road. A mixed use centre to include ground floor units in retail and retail services uses in Class A and health, childcare and related community uses in Class D with apartments above and active elderly apartments in Class C1 (maximum 3 storey) open space including park, play area, MUGA and greenway pedestrian and cycle route pedestrian and vehicular access landscaping incorporating hard and soft works drainage and any other necessary works.

Summary of Flood Risk

In line with the requirements of PPS 15, RPS have considered all possible sources of flooding and have taken a conservative approach in establishing the flood risk to the application site. An area of the site has been identified from the strategic flood map as being at risk of flooding from the Bowtown Road Stream Extension. This flooding comes from a manhole on the culverted watercourse. As only the strategic flood map is available, DfI Rivers PAMU requested that the applicant verify the more accurate extent of the floodplain.

Hydrological Analysis

Full details of the hydrological analysis is included in the FRA report which is included within Appendix 11.11.

Climate Change

UK Climate Projects (UKCP09) predict that future climate change may lead to warmer and drier summers, warmer and wetter winters with less snow, and more extreme temperature and rainfall events. This predicted increase in rainfall leads to predicted increases in river flows and increases river flooding. In the assessment, RPS has considered the impact as a 20% increase of present day flows by the 2080 epoch in line with 'Technical Flood Risk Guidance in relation to Allowances for Climate Change in Northern Ireland' (DfI, February 2019).

Hydraulic Modelling

Full details of the hydraulic modelling is included in the FRA report which is included within Appendix 11.11.

Proposed Realignment of Culvert

During the design of the proposed site several issues associated with the location of the existing culvert and its levels were identified, which need to be addressed as part of the proposed development. These are described below.

<u>Location of existing culvert</u>

The route of the existing culvert through the proposed site runs largely parallel with the existing Ballyreagh Road. The proposed local distributor road for the Bowtown Road scheme which will become part of the future eastern Newtownards Link Road also runs parallel with the

existing Ballyreagh Road at this location and therefore the existing culvert if retained in its current location would be located within the carriageway of the proposed road link. To remove the need for traffic management for future maintenance access to the culvert it should be diverted out of the proposed road carriageway. As part of the design risk management assessment and process this would be considered to be a benefit to health and safety by eliminating the need to access the culvert from a live carriageway.

Levels of existing culvert

The existing culvert is a 1500mm diameter pipe with cover ranging between 400-900mm, with cover at one of the existing manholes (MH05) at around 400mm. In addition to Point 1, if the existing culvert was left it in its current location then it would lie beneath the proposed road link, the proposed levels would reduce cover at MH01 and MH02 to 400mm and 700mm respectively which would be within the proposed road construction. A diversion of the existing culvert into the proposed verge/ footway /cycleway would mitigate this issue, however it would still need to be lowered to achieve the minimum requirement for 900mm cover and 1200mm where it does eventually cross the proposed road.

New foul sewers and pumping station

The proposed development requires a sizeable foul pumping station which will pump the foul sewage from the Bowtown Road end of the scheme to the Portaferry Road pumping station. The land currently available in which to house this pumping station is also where the existing culvert crosses diagonally across the field to the discharge point on the other side of the Bowtown Road, and therefore a diversion of this culvert will be required to facilitate the foul pumping stating and incoming foul lines.

Proposed Realignment

It is therefore a key requirement to realign and divert the existing culvert to deliver the road and sewerage infrastructure for this scheme as described as follows:

- The culvert is to be moved from the proposed road carriageway into the proposed verge/ footway/ cycleway to facilities future access and maintenance. The proposed drawing illustrates the proposed location and an associated maintenance strip.
- It is proposed to lower the invert levels to facilitate the proposed development levels and to achieve minimum cover in the proposed verge/ footway/ cycleway and at road crossings.

- Preliminary assessments indicate that the pipe will need to upsized to 2100m diameter as part to facilitate the realignment and diversion from existing MH05 to the outfall on the western side of Bowtown Road.

Consultation with DfI Rivers Area Office

The proposals for the culverted watercourse were submitted to DfI Rivers Area Office for Schedule 6 approval, which was granted in June 2021. The response which is shown Appendix H states 'The Department for Infrastructure has reassessed your proposals to divert the designated watercourse known to the Department as Bowtown Road Stream Ext. and as detailed in the drawings attached with your application and confirms that the Department is satisfied that the proposals will not render the watercourse less effective for drainage purposes'.

Modelling of Proposed Realignment

The existing model was amended to include the proposed realignment of the culverted watercourse as described above. The results show that once the culvert has been realigned and upgraded then there is no flood risk to the site in the present day scenario. During the present day event, upgrading the culvert also has the result of alleviating the area of flooding at Ballyreagh Crescent. There is no increase in flood risk elsewhere as a result of the amendments to the culvert.

The post-development model was then run for the climate change event. The results show that once the culvert has been realigned and upgraded then there is no flood risk to the site in the climate change scenario. There is still an area of flood risk upstream of the site, but it has been substantially reduced due to the upgraded culvert. There is no increase in flood risk elsewhere as a result of the amendments to the culvert.

Compliance with PPS 15 Policy FLD1

The Revised Planning Policy Statement, PPS 15 'Planning and Flood Risk' was published in September 2014. In line with the requirements of PPS 15, RPS have considered all possible sources of flooding and have taken a conservative approach in establishing the flood risk to the application site. The information provided in this FRA is compliant with the requirements of Annex D of the Revised PPS 15. Policy FLD1 of Revised PPS 15 does not permit development within the 1% AEP fluvial floodplain unless the applicant can demonstrate that the proposal constitutes an exception to the policy. An area of the site has been identified as being at risk of flooding. This flooding comes from a manhole on the culverted watercourse. This assessment is submitted on the basis that the development is a permitted exception to Policy FLD1.

It is a key requirement of the proposed scheme to realign and divert the existing culvert to deliver the road and sewerage infrastructure for this scheme. In completing this necessary work it is possible to alleviate the risk of flooding from the development site in both the existing and climate change (2080) scenario. There is no increase in flood risk elsewhere as a result of the amendments to the culvert. This means that the site will no longer be affected by the floodplain and therefore Policy FLD1 does not apply.

11.7 Conclusion

Drainage Assessment

This drainage assessment has been prepared by RPS to provide an outline review of the drainage an flood impact the proposed development will have in accordance with PPS15 Planning and Flood Risk – Annex D.

The report also approximates the storm drainage attenuation requirements for the proposed development through examining the storm water flows generated from the existing green field site and comparing it with the storm water flows generated on the proposed redeveloped site

The construction of the proposed development has the potential to result in the generation of storm run-off flows in excess of those previously experienced on the site. The increase in storm run-off flows may result in the increased risk of flooding to neighbouring lands during a storm event.

Limiting the surface water discharge rate from the proposed development will ensure that there is no adverse effect on the risk of flooding to neighbouring properties. This approach to the storm water drainage for the proposed site is in line with PPS 15's precautionary approach to flood risk and its encouragement of Sustainable Urban Drainage Systems to improve water quality.

The proposed development site is approximately 43.37ha in area and is currently considered to be a green field site. Approximately 35.77ha of this area will be development into 5 discharge points of varying scale. The remaining 7.6ha will remain as open public green space. For the purpose of this report it will be assumed that the percentage of hard standing within each of the housing development zones will be 70%

The increase in hard standing area will result in an increase to the peak storm water discharge rates; refer to Table 11.3.

Foul Sewage Assessment

The PDE response from NI Water has indicated that the local sewer network does not have any capacity to serve this development however the WwTW at Ballyrickard has sufficient capacity to serve this development.

Further liaison with NI Water has confirmed that the WwPS at Portaferry Road has sufficient capacity to serve this development.

NI Water have therefore requested a developer led strategic solution for NS19 Bowtown Road lands and NS20 Rivenwood lands which will be a Pilot Scheme for the NI Water Solution Engineering team which means this will be a developer led and self-funder solution with assistance from NI Water to help deliver the solution.

This solution will be a combined pumped and gravity solution from a proposed pumping station at the southern end of the NS19 Bowtown Road scheme which will transfer foul flows to the Portaferry Road WwPS. NI Water have indicated that emergency overflows from the proposed WwPS can be discharged to the existing NI Water network on the Bowtown Road.

A number of routes and options are currently being considered by the developers for agreement with NI Water to be taken forward as a preferred solution. It is considered that this solution will provide an appropriate connection to the NI Water foul sewer and treatment systems and therefore avoid or prevent what might otherwise have been a significant adverse effect on the environment and potentially provide further benefits to new developments upstream of these sites.

Flood Risk Assessment

RPS have considered all sources of flooding that may affect the proposed development site. The Bowtown Road Stream Extension, a DfI Rivers designated watercourse (U3510Ext), flows within a 1,350mm diameter culvert in a generally southern direction along the south western boundary of the site. The Strategic Flood Map for Northern Ireland indicates that part of the site is affected by the 1% AEP floodplain of the Bowtown Road Stream Extension.

In order to confirm the extent of the flood plain and determine an accurate flood level for the site a computational model was constructed of the watercourse. The results of the modelling show that there is flooding within the site from one of the manholes on the culverted watercourse.

It is a key requirement of the proposed scheme to realign and divert the existing culvert to deliver the road and sewerage infrastructure for this scheme. In completing this necessary work, it is possible to alleviate the risk of flooding from the development site in both the existing and climate change (2080) scenario. There is no increase in flood risk elsewhere as a result of

the amendments to the culvert, in fact flood risk is reduced in upstream areas. This means that the site will no longer be affected by the floodplain and therefore Policy FLD1 does not apply. The FRA has demonstrated that:

a) All sources of flood risk to and from the proposed development have been identified; and
b) There are adequate measures to manage and mitigate any increase in flood risk arising from the development.