10 WATER RESOURCES

Introduction

10.1 This chapter considers the water, flooding and drainage effects that the proposed Jersey Future Hospital Main Site and Westaway developments will have on the surrounding area during construction and operation. It examines flooding due to surface water, drainage and tidal events. It also considers whether there would be an increase in foul and surface water flows from the development.

Review of proposed development

10.2 Phase 1A of the proposed development includes the demolition of existing commercial properties on Kensington Place and the existing hospital engineering service block, prior to the construction of Block A and the extension to Patriotic Street Car Park.

10.3 Phase 1B consists of the demolition of existing hospital buildings Peter Crill House, Gwyneth Huellin Wing and the lab block. This will make way for Block B to be constructed and a temporary hospital entrance to be provided. Refurbishments will be made to the Granite Block and an area of public realm provided around it.

10.4 Phase Two will consist the demolition of the 1980's and 1960's blocks to provide a new entrance and drop off area.

10.5 Phase 1A will also consist of the demolition of the existing accommodation blocks on Westaway and the construction of a 2, 3 and 4 storey building aiding the relocation of some departments from the existing hospital.

10.6 There are States of Jersey (SoJ) foul sewers on Savile Street, The Parade, Newgate Street, Gloucester Street and in Parade Gardens, combined sewers on Kensington Place and Gloucester Street and a surface water sewer on Gloucester Street.

10.7 The surface water sewer in Gloucester Street outfalls directly into St Aubin's Bay adjacent to the Marina. The foul drainage from the main hospital site drains to the Bellozanne Sewage Treatment Works, where it is treated before being discharged to St Aubin's Bay. It is assumed that the combined drainage from Westaway is also treated at the Bellozanne Sewage Treatment Works, subject to confirmation.

10.8 St Aubin's Bay is located within 275m of the proposed Main Site. St Helier is protected in this area by sea defences along Victoria Avenue and reclaimed land adjacent to the Marina. These sea defences consist of terraced revetments, sloped masonry and rock armour revetments. There have been recent incidents where these revetments have

been overtopped, in 2008 and 2014, causing flooding on Gloucester Street. However, the existing hospital and Westaway were not affected by the flooding.

10.9 There are no fluvial watercourses within 500m of the Main Site. The nearest watercourses are located approximately 1.1km to the northwest, and 1.2km to the northeast of the scheme. These will be unaffected by the proposals. There is a 'Brook Culvert' recorded on Department for Infrastructure (DfI) maps. The route of this culvert has been identified from a drawing provided by Rothwell & Partners Ltd which shows the culvert coming in towards Gloucester Road from the southeast before turning approximately 90º and running southwest along the route of Gloucester Street towards the Esplanade. Available construction drawings suggest the invert level of the culvert at a maximum depth of 2.7m bgl. However, the available construction drawing only covers a small section of the culvert between Newgate St and Patriotic Place. The Brook Culvert has foul and surface water connections and it is therefore assumed that it is treated at the Bellozanne Sewage Treatment Works before outfalling into St. Aubin's Bay.

10.10 There are also no fluvial watercourses within 500m of Westaway. The nearest watercourses are 1.2km to the northwest and 800m to the northeast of the site, which will be unaffected by the proposals.

10.11 Existing groundwater issues, including contamination and flooding, are covered in Chapter 9 (Geology, Hydrogeology and Contamination). No further reference is made to groundwater within this chapter.

Legislation, policy context and guidance

Legislation

10.12 The following Jersey specific legislation has been considered in the collation of this chapter in Table 10.1.

Table 10.1: Relevant legislation

Law	Description	Relevance
Building Bye-Laws (2007)	Sets out the general frameworks for the control of building work. Schedule 2 details the requirements of any new structure to be constructed.	Schedule 2 Part 6 – 6.1 defines foul water and the priority hierarchy for discharging foul water. 6.3 defines the hierarchy of discharge for rainwater.
Water Pollution (2000)	This legislation defines controlled waters as territorial sea adjacent	It sets out the framework for discharge permits. Where pollution

Law	Description	Relevance
	to Jersey, coastal waters, inland waters and groundwater.	of controlled water may occur, control measures (including monitoring) may be required. Where pollution has occurred, remediation may be required.
Drainage (Jersey) Law	Sets out the responsibilities for sewers and drainage within Jersey.	Relevant for the discharge of surface and foul drainage to existing public sewers. Also states responsibility for flood defences.

Policy context

10.13 The following policies in Table 10.2 have been considered in the collation of this chapter.

Table 10.2:Policy context

Policy	Description	Relevance
States of Jersey Strategic Plan (2015-2018)	Discusses the priorities of the States of Jersey to improve the lives of Islanders.	Discusses the effects of climate change on the island, and requires the impacts to be considered.
2011 Island Plan (Revised 2014).	Outlines the strategies and objectives of the Island, and translates them into policies and proposals for planning decisions over the next 10 years. Policy GD1 – developments should be sustainable, and not harm the natural and historic environments, the economy or nearby residents Policy LWM2 – development should connect into the mains public foul sewer network Policy LWM3 – SuDS should be incorporated into the development wherever practicable Policy NR1 – developments must not have an	Requires consideration of drainage facilities and the potential impacts of downstream flooding. Encourages the use of SuDS.

Policy	Description	Relevance
	unacceptable impact on the aquatic environment, including surface water and groundwater quality and quantity Policy NR2 – development should utilise all practicable water conservation and management measures for potable water	
Integrated Coastal Management Strategy (2008)	Co-ordinates different policies and management practices in coastal areas to ensure a sustainable approach to the future management of Jersey's coastal zone.	Discusses potential threats to Jersey's coastal zone through climate change.
Water Management Plan (2017-2021)	Outlines the strategies, including water monitoring, which are in place to improve the quality of Jersey's water.	Discusses the ways in which to manage particular nutrients and pesticides which reduce water quality.

Relevant guidance

10.14 The following guidance in

10.15 Table **10.**3 been considered in the collation of this chapter.

Table 10.3:Relevant Guidance

Guidance	Description	Relevance
Information on design parameters provided by States of Jersey.	Rainfall depths, design return period events and guidance on connections to public sewers	Allows design of the drainage systems for the proposed JFH
English Government National Planning Policy Framework guidance on flood risk	English Planning Policy guidance on flood risk, including impacts of climate change	There is no Jersey specific guidance on flood risk, therefore it has been agreed with the client and SoJ that this guidance can be used as an appropriate level of guidance
Climate change, Jersey: Effects on coastal defences. Report EX 5516	Report summarising the effects of climate change	The impact of climate should be considered when examining the risk of tidal

Guidance	Description	Relevance
	on the existing Jersey coastal defences	flooding for the proposed site.

Consultation

10.16 Consultation was carried out with the States of Jersey in order to confirm what issues should be assessed within the EIS. These are summarised Table 10.4:

Table 10.4:Response to consultation

Consultation comment from SoJ –Department for Infrastructure	Response
Separation of proposed foul and surface water drainage	Proposed foul and surface water will be separated within both sites. Where possible, foul and surface water will be discharged into dedicated foul and surface water DfI sewers. If it is required to outfall into a combined sewer, a single connection is preferred.
Flows from the sites into the surrounding public sewer networks will need to be approved	Flows will be agreed with the DfI for both surface water and foul drainage. Records of surface water and foul drainage have been provided by DfI, along with design parameters for rainfall on Jersey. Detailed calculations will be provided for surface water to allow DfI to confirm the capacity of the existing surface water drainage system. Where there is not sufficient capacity, flow attenuation will be considered.
The potential for consideration of Sustainable Drainage Systems (SuDS) for the surface water drainage design	The opportunity for use of SuDS is limited in the proposed sites. The main hospital site has a very constrained footprint which means that 'green' SuDS such as swales will not be possible. The basement for the main hospital building and the high groundwater levels mean that infiltration will not be possible. Limited space may be available on the Westaway site to allow for a small geo-cellular tank to provide infiltration.
Ensuring the adequacy of existing flood protection measures from tidal flooding	A tidal modelling study has been undertaken and is included as part of the Flood Risk Assessment (FRA). SoJ have provided information on previous flooding within the area, and sea defence records.

Assessment Methodology

Overview

10.17 This section sets out the methods used to undertake the water resource assessment, with reference to published standards, guidelines and best practice. The assessment is either qualitative or quantitative, depending on the appropriate method for the different aspects of the water environment and includes:

10.18 A baseline identification and appraisal of:

- All water bodies within the study area of 500m from the site based on its quality, scale, rarity and suitability; and
- Existing drainage infrastructure based on their size and available capacities and suitability.

10.19 Identification of the potential positive and negative effects on the water bodies and existing drainage infrastructure, firstly during construction and secondly during operation of the proposed development;

10.20 Appraisal of the magnitude of the potential effects of the proposed development on each water body and existing drainage infrastructure during construction and operation;

10.21 Mitigation of any adverse potential effects of the proposed development on each surface water body and existing drainage infrastructure during construction and operation; and

10.22 Final assessment of the significance of the potential effects, based on the importance of the water body and the magnitude of potential impact.

Methodology for establishing baseline conditions

10.23 The baseline describes the current condition of all water features, the capacity and location of existing drainage infrastructure and the current flood risk. The baseline conditions were obtained from a site visit on 4th October 2016, consultation with statutory consultee and the following sources:

- Existing record information from States of Jersey;

- HR Wallingford report – Climate change, Jersey: Effects on coastal defences (2007); and
- States of Jersey – Bathing water quality results for Victoria Pool.

10.24 The surface water bodies, flood risks and existing drainage infrastructure that might be impacted by the proposed JFH were identified from the above sources. The attributes of the identified surface water features are outlined in Table 10.5 (taken from UK Design Manual for Roads and Bridges (DMRB) HD45/09 Annex IV) and those of the existing drainage infrastructure to the attributes outlined in Table 10.6.

Table 10.5:Features and indications of quality

Feature	Attribute/Service	Indicator of quality	Possible measure
Flood plain	Conveyance of flood flows	Presence of floodplain; Flood flows.	Developed area within extent of floodplain affected; Existing flood risk/flood return period; Location/importance of flood flow routes.
Estuaries and Coastal Waters	Water Quality	Chemical water quality	Water Framework Directive (WFD) chemical status class
	Dilution and Removal of Waste Products	Presence of surface water discharges Effluent discharges	Daily volume of discharge (treated/untreated)

Table 10.6: Foul infrastructure features, their attributes and indicators of quality

Feature	Attribute/Service	Indicator of quality	Possible measure
Foul Infrastructure	Conveyance of foul flows	Foul flows; Presence of foul infrastructure	Location/importance of foul infrastructure. Capacity of foul infrastructure

10.25 The importance of each of the surface water resource attributes were identified based on the assessment of the services it provides and its quality, scale, rarity and substitutability.

10.26 Table 10.7 provides guidance on the criteria for estimating the importance of each attribute identified, based on the DMRB (2009) Road Drainage and the Water Environment 11.3 criteria.

Table 10.7: Criteria for estimating the importance of environmental attributes

Importance	Criteria
Very High	Attribute has a high quality and rarity on regional or national scale
High	Attribute has a high quality and rarity on local scale
Medium	Attribute has a medium quality and rarity on local scale
Low	Attribute has a low quality and rarity on local scale

Magnitude

10.27 The magnitude of impacts on the attributes of each water resource was established by a qualitative or quantitative assessment. Table 10.8, from DMRB HD45/09 presents the framework of the assessment to identify the magnitude of an impact. Impacts may be either beneficial or adverse.

Table 10.8: Criteria for determining impact magnitude

Magnitude	Criteria
Major	Results in loss or restoration of attribute
Moderate	Results in negative or positive impact on integrity of attribute, loss or gain of part of attribute
Minor	Results in minor impact on attribute
Neutral	Results in an impact on attribute but of insufficient magnitude to affect the use/integrity

Significance Criteria

10.28 The significance of potential effects from the proposed JFH is assessed by comparing the importance of each of the surface water resource attributes, identified as the baseline, with the magnitude of the potential effect on the attributes.

10.29 Table 10.9 provides the significance matrix for determining the qualitative significance of each effect on the valued attributes.

Table 10.9: Significance Criteria

	Importance of attribute			
Magnitude of potential impact	Very High	High	Medium	Low
Major	Very Large	Large/Very Large	Large	Slight/Moderate

	Importance of attribute			
Moderate	Large/Very Large	Moderate/Large	Moderate	Slight
Minor	Moderate/Large	Slight/Moderate	Slight	Neutral
Neutral	Neutral	Neutral	Neutral	Neutral

Limitations and assumptions

Limitations

10.30 The assessment methodology is based on the DMRB assessment methodology for transport schemes. Although the method was developed for use on transport schemes it is recognised by the UK Environment Agency and other statutory authorities, and has previously been used on a number of similar projects. Its use is therefore considered to be suitable for this assessment.

10.31 There are no available flood maps for Jersey. Existing anecdotal information regarding flooding in this area has been used, in addition to available records to determine the risk of flooding.

Assumptions

10.32 Construction activities are assumed to be in accordance with standard civil engineering construction practice.

Baseline Environment

Tidal and fluvial features

10.33 There are no watercourses in the vicinity of the Main Site or Westaway. There is a culvert which runs along Gloucester Street which is labelled ‘Brook Culvert’ within the DfI plans. The route of this culvert has been identified from a drawing provided by Rothwell & Partners Ltd which shows the culvert coming in towards Gloucester Road from the southeast before turning approximately 90° and running southwest along the route of Gloucester Street towards the Esplanade. Available construction drawings suggest the invert level of the culvert at a maximum depth of 2.7m bgl. However, the available construction drawing only covers a small section of the culvert between Newgate St and Patriotic Place. The Brook Culvert has foul and surface water connections and it is therefore assumed that it is treated at the Bellozanne Sewage Treatment Works before outfalling into St. Aubin’s Bay.

10.34 The Main Site is located approximately 275m from the coastal defences on St Aubin’s Bay. It is also within 450m of Jersey Marina. Westaway is approximately 500m from St Aubin’s Bay and is 750m from Jersey Marina.

10.35 There have been incidents of the coastal defences being overtopped in recent years along Victoria Avenue, including a storm in 2008 where waves overtopped the sea defences and caused flooding along Gloucester Street near the southern end of the proposed site. Due to the strategic importance of the hospital site, a flood study has been undertaken to determine the extent of the tidal flooding in the surrounding areas in an extreme tidal event. The flood study has examined a 1 in 200 year with climate change and 1 in 1000 year event to determine the extent and depth of flooding for these events. It is assumed that the existing flood defences are kept in good condition and are therefore not breached by an extreme event. The results of this are presented within the Flood Risk Assessment (FRA) provided in Appendix G-1.

10.36 The FRA in Appendix G-1 shows the Main Site is at risk of a 1 in 200 year event flooding a small area of the site. It is currently unclear whether this results in the hospital being in flood zone 2 or 3. In order to provide a conservative design, it has been assumed that it is currently located within flood zone 3.

10.37 The existing ground level at Westaway lies approximately 3m above the flood level of the 1 in 1000 year event. Whilst the development is classed as 'more vulnerable', as it will be above the 1 in 1000 year flood event, Westaway is in flood zone 1. Tidal flooding is therefore not considered a risk for this site.

10.38 Within St Aubin's Bay water quality monitoring is undertaken at Victoria Pool. The catchment for this area covers the majority of St Helier, including JFH. It is monitored for water quality on a weekly basis during the summer months, and has been since 1994. The monitoring measures levels of Escherichia coli (EC) and Intestinal enterococci (IE) in the water. In 2017 and 2016, it was rated as excellent bathing quality water, and in 2015 it was rated as good bathing quality water, in accordance with the Bathing Water Directive 2006/7/EC.

Surface water

10.39 The existing JGH site falls approximately 3m between Kensington Place in the north and Gloucester Street in the south. The area around the site is drained by gullies, linear drainage channels, pipes and manholes which connect to the Department for Infrastructure (DfI) surface water drainage system described below. There is no evidence of existing surface water flooding occurring on the site, and the gradients across the site are considered steep enough to avoid water from pooling within the site.

10.40 The area around Westaway is drained by gullies, linear drainage channels and rainwater downpipes which outfall into the combined DfI sewer on Savile Street. below. There is no evidence of existing surface water flooding occurring on the site.

Foul and surface water drainage

10.41 The existing drainage layout in the area of Jersey General Hospital is described within the FRA in Appendix G-1. There are DfI owned sewers on Kensington Place, Newgate Street, The Parade and Gloucester Street, which are outlined in Table 10.10 below.

Table 10.10: Description of sewers around the existing hospital site

Sewer Location	Size	Description
Gloucester Street	Approximately 2.45m width at the widest point	Brook Culvert lined with PRC liners. Egg sewer inside brick sewer, with concrete infill
Gloucester Street	1830mm segments lined down to 1525mm	Surface water tunnel with average cover of approximately 5.5m.
Gloucester Street	915mm x 760mm	Foul Brick Sewer with PRC liners. 230mm diameter spur connections
Gloucester Street	600mm diameter	GRP Foul sewer concrete bed and surround – gradient of 1 in 73
Kensington Place	915mm x 710mm lined to 730mm x 530mm.	Combined brick sewer with PRC M196 liner approximately 4.1m to invert.
Newgate Street	230mm to 300mm diameter.	Foul sewer at gradient of 1 in 76
The Parade	530mm diameter.	Concrete foul sewer laid at a gradient of 1 in 63.

10.42 The surface water and foul flows from Westaway discharge into DfI owned sewers in Savile Street and Parade Gardens. These are summarised in Table 10.11.

Table 10.11: Description of sewers around the existing hospital site

Sewer Location	Size	Description
Parade Gardens	450mm diameter	VC surface water sewer at a gradient of 1 in 131
Savile Street	840mm diameter	Class H concrete combined sewer at a gradient of 1 in 166
Savile Street	380mm diameter	GVC foul sewer laid within brick sewer at a gradient of 1 in 164
Gloucester Street	1830mm segments lined down to 1525mm	Surface water tunnel with average cover of approximately 5.5m
Gloucester Street	1000mm diameter	GRP foul sewer concrete bed and surround – gradient of 1 in 66

Foul drainage

10.43 Existing foul flows from Jersey General Hospital and Kensington Place commercial properties connect into DfI sewers on Gloucester Street, Newgate Street, The Parade, and Kensington Place. In order to estimate the change in flows in the sewers around the site due to the new development, an estimate has been made of the current flows discharging into the existing sewers. The calculations and assumptions are contained within the FRA in Appendix G-1. It is estimated that the maximum foul flow from the existing hospital is approximately 39l/s.

10.44 Foul flows from Westaway have been estimated using the population method, assuming 1.8 persons in a one-bedroom apartment and 2.3 persons in a two-bedroom apartment. This gives an approximate estimate of the existing peak foul flows to be 3.3l/s.

Surface water drainage

10.45 Surface water flows from the existing hospital connect into DfI sewers on Gloucester Street, Newgate Street, The Parade, and Kensington Place. The total surface water flow from the existing hospital area was estimated as 682 l/s. A breakdown of these results is shown in Table 10.12. Further information is provided within the FRA in Appendix G-1.

Table 10.12: Existing surface water flows from the existing hospital area

Sewer Location	Approximate storm flows entering sewer (l/s)
Newgate Street	123
Gloucester Street	177
The Parade	118
Kensington Place	193
Multi Storey Car Park	71

10.46 The surface water tunnel on Gloucester Street is the only dedicated surface water sewer immediately adjacent to the hospital. The sewer flows down Gloucester Street before outfalling into St Aubin's Bay. It is also the nearest dedicated surface water sewer to Westaway which would have sufficient capacity for unattenuated flows.

10.47 Surface water flows from Westaway have been estimated by developing an approximate model based on information provided by DfI and the Jersey specific rainfall data. It is estimated that that approximate maximum flow from the site is 69l/s, split across two outfalls onto Savile Street.

Assessment of Effects – Construction

10.48 Effects on the water environment arising from the construction phase would depend on a number of factors including, for example, a combination of the potential for pollution and flooding, the sensitivity of the receptor and capacity to withstand potential impacts and the effectiveness of control measures. These effects are considered below in the absence of mitigation.

10.49 The construction methods have been assumed based on typical civil engineering practices. Based on these construction assumptions, potential changes on the water resource attributes arising from construction of the proposed JFH were identified. These changes were then compared to the baseline conditions to establish the potential impacts.

Tidal features

10.50 See Surface Water drainage section below.

Surface water drainage

10.51 The surface water drainage around the site falls into the surrounding States of Jersey combined sewers, which are treated at Bellozanne Sewage Treatment Works and outfall to St Aubin's Bay. There are also relatively recent (2008) examples of the Flood defences being overtopped, with flood waters reaching Gloucester Street, although not reaching the existing hospital site.

10.52 During construction, sediment will be generated from a number of activities which may include excavation, additional vehicle movements, and material and earth stock piling.

10.53 Where sediments enter a water body, the level of suspended solids would increase which would result in an increase in turbidity and potentially a reduction in dissolved oxygen. Both of these would affect the chemical water quality. As a result, increased sedimentation could reduce the potential for the bay to support aquatic life. Sediments could also act as transporters of pollutants and enable hazardous material produced from construction activities to migrate off site.

10.54 The storage and use of fuel, chemicals, and other potentially polluting substances close to drains, may lead to a pollution incident where contaminants are carried through the surface water sewer to discharge to St Aubin's Bay. This could result in chemical pollution detrimental to fish and other aquatic organisms. Common chemicals that are likely to be used and stored on site include diesel, synthetic lubricating oil, mineral lubricating oils and paint.

10.55 St Aubin's Bay is considered to have a high importance, and the magnitude of an uncontrolled discharge is considered moderate. Therefore, the significance of the impact arising from construction activities is considered to be **adverse moderate**.

Foul drainage

10.56 The existing foul drainage on the site connects into various foul drainage connections. The construction of the hospital will be undertaken in stages, which will involve several relocation schemes for existing facilities from their current location to new areas. These will affect the flows in the temporary case. However, the relocation of the existing kitchens off site is anticipated to reduce the foul flows within the existing sewers.

10.57 Construction activities would generate a limited quantity of waste water on site, which if not conveyed appropriately, may cause pollution to watercourses on site and pose a risk to human health. Since the foul flows generated from the construction works would be lower than that produced by the full development, a connection to the existing public foul

sewers in the vicinity of the site would be required, with details to be confirmed following consultation with SoJ.

10.58 In light of the available capacity in the local sewer network the magnitude of the impact would be neutral. The sewer system is considered to be low environmental quality. Therefore, the significance of the impact arising from construction activities is therefore considered to be **neutral**.

Mitigation of construction impacts

10.59 In order to mitigate the potential impact to St Aubin's Bay through discharge of water to surface water sewer, all site works would be undertaken with the draft Construction Environmental Management plan. Construction vehicles would be properly maintained to reduce the risk of hydrocarbon contamination and would only be active when required. Construction materials would be stored, handled and managed with due regard to the sensitivity of the local aquatic environment and thus the risk of accidental spillage or release would be minimised.

10.60 Consideration of the SoJ Water Resources Section Guidance on Oil Pollution and the Aquatic Environment would be made if above ground storage tanks are required on-site during the construction period. No underground storage tanks would be used during the construction period. Storage of liquids such as degreasers, solvents, lubricants and paints would be managed to prevent pollution of controlled waters. Construction activities, including the management of oils and other potentially hazardous substances (if required) would be undertaken to ensure compliance with the Water Pollution (Jersey) Law 2000.

10.61 The method statement for the construction works would be submitted to SoJ for consultation prior to works commencing.

Residual effects from construction

10.62 Following the mitigation discussed above, the magnitude of the impact of surface water drainage flooding from construction on St Aubin's Bay and the public sewers is considered **neutral**. Therefore, the significance of the effect is considered to be neutral.

Assessment of Effects – Operation

10.63 Potential effects arising from the operation of the proposed JFH have been identified based on the plans provided. Potential changes to the baseline conditions have been established and the potential effects assessed. Mitigation measures have been identified where appropriate and the residual impact assessed.

Tidal features

10.64 The risk of tidal flooding of the developed JFH is considered within the FRA in Appendix G-1. The tidal flooding model analysed a 1 in 200 year with an allowance for climate change and a 1 in 1000 year present day scenario. It analysed the amount of water which would overtop the sea defences in this event and where it would flow within St Helier.

10.65 Modelling results show that in a 1 in 200 year plus climate change event, there would be flooding on Gloucester Street, which reaches the south west corner of the main hospital, to a level of 8.2m AOD. This is 1.8m below the building threshold level and therefore the hospital would not be affected. The basement would be sealed to ensure no water ingress, and therefore plant in the basement would also be protected.

10.66 The existing ground level of Westaway is above the flood levels of the two events modelled. The impact magnitude on the hospital and Westaway due to tidal flooding is considered neutral, and therefore the overall significance is considered to be **neutral**.

Surface water drainage

10.67 It is proposed to separate the foul and surface water produced by the proposed sites, and new connections will be required to the DfI owned surface water sewers. As both sites are currently impermeable, the overall flow is not anticipated to increase. The details of the connections and the proposed flows are discussed in the FRA in Appendix G-1.

10.68 In their scoping response, the DfI stated that separation of surface water and foul is required, with surface water drainage required to connect to a system draining to the foreshore. The surface water sewer on Gloucester Street currently connects to the foreshore, and is the only sewer in the vicinity of the hospital which does so. Therefore, surface water drainage from the sites should connect to this sewer where possible. There are different options for achieving this for both sites, which are discussed further in the FRA in Appendix G-1.

Foul drainage

10.69 There are foul drainage sewers on Kensington Place, Newgate Street, Gloucester Street and Savile Street. The FRA in Appendix G-1 outlines the proposed foul flows from the two sites. It is likely that the foul flows from both sites will remain similar to their existing flows, as the gross floor area remains similar. The DfI have confirmed within their scoping consultations that the existing foul drainage network has capacity to take flows from the proposed developments. Therefore, the magnitude of the impact is considered neutral, and the significance of the effect on the existing foul drainage network arising from proposed development is **neutral**.

Mitigation for operation effects

Tidal features

10.70 In order to allow for modelling confidence intervals, an additional freeboard of 0.6m should be allowed between the highest water level in 1 in 1000 year event and the finished floor level The minimum threshold for the buildings should therefore be 8.8m above Jersey Datum. The threshold level for the Jersey Future Hospital buildings is currently proposed to be at 10.m above Jersey Datum, which is 1.2m above the minimum threshold. This will reduce risk of flooding in an extreme event. The existing ground level at Westaway lie approximately 12m above Jersey Datum, which is above the minimum threshold level.

10.71 The basement level of the Main Site will be below the extreme flood level. Therefore, the basement should be sealed, with no openings below the threshold level to ensure water cannot enter the basement.

10.72 Therefore, the residual risk from tidal flooding is considered **neutral**.

Surface water drainage

10.73 Infiltration has been considered for the main site, but due to the high groundwater table and the low level basements within the site, this is not plausible. The footprint for the scheme is also highly constrained, which means that there is not sufficient space to implement more ‘green’ solutions such as swales and attenuation basins.

10.74 Infiltration has also been considered for the Westaway Site. The development footprint and proposed underground services provide constraints on the area available for infiltration and this may not prove to be a plausible solution.

10.75 In areas of highway and car parking, the use of oil separators would be considered and would be used as advised by SoJ to protect surface water sewers from oil and petrol spillages from vehicles.

10.76 With these mitigation measures in place, the magnitude of potential impact is considered neutral. Therefore, the significance of residual flooding risk and contamination from surface water drainage is considered **neutral**.

Foul Drainage

10.77 Opportunities for reducing the risk of flooding in foul drainage are limited due to the foul drainage flows which are determined by the size of the buildings. However, as the drainage strategy will separate foul and surface water drainage for the development, the magnitude of potential impact is neutral, and therefore the residual effect on the foul drainage network is considered **neutral**.

Residual impact and significance

10.78 Following incorporation of the proposed mitigation, including the waterproofing of the basement of the main hospital and setting the threshold level at 0.6m above the extreme flood event, the residual effect of construction and operation on tidal and fluvial features is considered **neutral**.

10.79 Following the incorporation of appropriate construction pollution protection measures and the use of petrol interceptors where required, the residual risk of flooding and contamination from surface water drainage is considered **neutral**.

10.80 Following appropriate construction measures and proper connection, the residual impact on the foul drainage network is considered **neutral**.