A17.0 Flood risk

A17.1 Methodology

The topography of the land surface at the location of the proposed scheme has naturally sloping gradients and is high with respect to the prevailing tidal levels. There is also inclusion of storm and surface water drainage and a piped sewage/foul water network as part of the basis of design for the proposed scheme. Due to these factors, flood risk is considered to be negligible and, as such, no specific modelling for flood risk assessment has been undertaken. Instead, a qualitative assessment of the potential risk of flooding to, and as a result of the construction of, the proposed scheme has been presented in this section of the EIS. This approach aligns with that set out in the Environmental Scoping Report (**Ref. 4**).

The assessment methodology used for determining the environmental impacts is provided in **Section A6** of this report.

A17.2 Baseline conditions and consideration of flood risk

A17.2.1 Topography

Freely available online topographic data indicates that ground levels slope from south to the north in the area of the proposed scheme.

Approximately 500m to the west of the proposed scheme footprint, the ground rises to approximately 46ft ASL and continues to rise in elevation moving further west towards Stanley. The ground reaches its highest point in the area at a point known as Sapper Hill, which sits at an elevation of approximately 138ft ASL.

Within the immediate vicinity of the proposed scheme footprint, the topographic level varies but remains several metres above the level of the Highest Astronomical Tide (HAT).

A17.2.2 Fluvial flood risk

Reviews of satellite imagery indicate that there are no river watercourses in the vicinity of the proposed scheme footprint and, therefore, it is concluded that there is no risk of fluvial flooding.

A17.2.3 Surface water, groundwater and sewer/foul water flood risk

The general topography of the area suggests that surface water will drain northwards before discharging directly into Stanley Harbour. There is a pond in close proximity to the proposed access road which is used to supply water for irrigation. This pond will not be directly altered by the proposed scheme. The proposed scheme will however temporarily interact with the flow of water in and out of the irrigation pond during construction of the access road (as the proposed access road will travel over the drainage channel that feeds the irrigation pond). The contractor will work with Stanley Growers during the construction phase to ensure that water can continue to be abstracted from the pond for irrigation purposes.

No groundwater sources of potential flooding have been identified.

Sewage resultant from vessels using FIPASS is presently collected by trucks and taken off site.

A17.2.4 Coastal flood risk

Given its location, coastal flooding is the main source of potential flood risk to the area around the vicinity of the proposed scheme. However, assessment of potential for flooding from the coast (derived from www.floodmap.net)

indicates no realistic likelihood for the land at the location of the proposed scheme to experience coastal flooding. This is corroborated by no known records of coastal flooding of this land.

Consideration of baseline tidal levels (presented in **Table 17.1**) confirms a low tidal range characteristic of a micro-tidal environment and that the existing ground levels are well above these tidal levels.

Table 17.1 Tide levels

Level	Value (mCD)
Lowest astronomical tide (LAT)	0.0
Mean Low Water Springs (MLWS)	0.1
Mean Sea Level (MSL)	1.0
Mean High Water Springs (MHWS)	1.5
Highest astronomical tide (HAT)	2.0

The IPCC recommends various allowances for sea level rise depending on the effectiveness of efforts to control global warming. The proposed scheme assumes the RCP8.5 scenario (Representative Concentration Pathways 8.5 is the most pessimistic 'greenhouse gas emissions scenario') for the proposed design life of 50 years. The 50th percentile value yields a sea level rise under RCP8.5 of 400mm over this timespan. This has been factored into the design for the proposed scheme.

The sheltered location of the proposed scheme means that wave heights are low at the shoreline. An overtopping study has been completed for a deck level set at 4.0mCD and found this to be satisfactory. This includes the above tidal levels and allowance for sea level rise.

A17.3 Potential impacts during construction

A17.3.1 Fluvial flood risk

There is no risk of fluvial flooding during construction because there are no identified potential sources of such risk in the vicinity of the proposed scheme footprint. As such, **no impact** is predicted.

A17.3.1.1 Mitigation and residual impact

No mitigation measures are required. There would be **no residual impact**.

A17.3.2 Surface water, groundwater and sewer/foul water flood risk

There is no risk of groundwater flooding during construction because there are no identified potential sources of such risk in the vicinity of the proposed scheme. **No impact** is predicted.

It is envisaged that groundwater will be encountered during excavations on land given the groundwater levels recorded on-site during initial investigations. It should be noted that the scheme design has been amended to minimise the potential for interaction with the groundwater during construction; specifically, the level of the access road has been raised from the originally proposed level.

There is not anticipated to be any increase in surface water or sewer/foul water flood risk during construction as good site working practices would be embedded into the construction works. As such, **no impact** is predicted.

A17.3.2.1 Mitigation and residual impact

No mitigation measures are required. There would be **no residual impact**.

A17.3.3 Coastal flood risk

There is no realistic likelihood for the coastal land at the location of the proposed scheme to experience coastal flooding during construction due to the site's topographic level with respect to tidal level and wave conditions.

The works to be undertaken within Stanley Harbour will be influenced by tidal and wave processes, but the tidal regime is micro-tidal (low tidal range) and the wave heights at the location of the proposed scheme are low due to its sheltered location within Stanley Harbour. Conventional maritime engineering construction practices can readily accommodate the anticipated tidal and wave processes without undue risk of being affected by coastal flooding, or worsening coastal flood risk elsewhere along the adjacent shorelines. As a result, **no impact** is predicted.

A17.3.3.1 Mitigation and residual impact

No mitigation measures are required. There would be **no residual impact**.

A17.4 Potential impacts during operation

A17.4.1 Fluvial flood risk

There is no risk of fluvial flooding during operation because there are no potential sources of such risk in the vicinity of the proposed scheme. As such, **no impact** is predicted.

A17.4.1.1 Mitigation and residual impact

No mitigation measures are required. There would be **no residual impact**.

A17.4.2 Surface water, groundwater and sewage/foul water flood risk

There is no risk of groundwater flooding during operation because there are no identified potential sources of such risk in the vicinity of the proposed scheme. As such, **no impact** is predicted.

Wave overtopping analysis during the operational phase indicated a significant wave height of 1.0m in the operational case (1 in 1 year return period), and 1.8m in the extreme case (1 in 100 year event). The waves within the harbour are wind generated and so there is a correlation between windspeed and wave height. The critical 1 in 1 year return period wind is 24.4m/s from the north, which leads to a wave height of 1m. The critical 1 in 100 year return period wind is 35.7m/s form the north, which leads to a wave height of 1.8m. FIPASS currently stops operations at a windspeed of 15.4m/s. It can be concluded that operations on the port will have stopped due to the windspeed long before overtopping of the quay becomes a problem. The design of the quay includes features to make it resistant to damage from overtopping (including moving equipment away from the quay edge where possible, by having services in covered pits and by raising the ground floor level of buildings above the level of the surrounding quay).

There is potential for the presence of the proposed marine and landside infrastructure and the proposed access road to affect drainage patterns and locally affect surface water flood risk. However, the existing irrigation pond itself that is in close proximity to the alignment of the proposed access road will not be directly altered by the proposed scheme, although it could potentially be affected by surface water drainage from the proposed access road.

The design of the access road has taken into account the potential for risk of surface water flooding to the road and the effect that the road may have on existing surface and groundwater flow pathways. Suitable drainage measures have been incorporated into the design of the access road, including permeable surfacing and a highway drainage network feeding into a swale system.

Storm water drainage networks will consist of typical underground piped networks with sea outfalls designed to be above HAT or with sufficient design surcharge to outfalls. The piped system will be designed for a structural design life of 50 years, with flow velocities suitable for self-cleansing of sand and silt and with manholes positioned at regular intervals along each pipeline, and at junctions and changes of direction. Oil separators will be installed at each network prior to discharge (as a pollution prevention measure) and each outfall will be fitted with a non-return valve to prevent seawater from entering the network. Surface water falling onto the quay will drain to a slot drain running on the southern side of the quay structure, with discharge via an oil interceptor into the sea.

There is potential for vessels and landside buildings to affect sewage/foul water disposal patterns and locally affect sewage/foul water flood risk. However, as detailed in **Section A4.4.3**, domestic sewage resulting from the proposed scheme will be conveyed into package treatment plants through an underground piped network prior to discharge into the harbour (a considerable improvement over the current practices on FIPASS where raw sewage flows directly into the harbour). It should also be noted that the proposed system for discharge includes alarms and controls for monitoring to minimise the risk of sewage being discharged into the harbour. Sewage resultant from vessels using the proposed scheme will be collected by trucks and taken off site, mirroring the present day arrangement for vessels using FIPASS.

These design considerations reduce to acceptable levels any potential for surface water or sewage/foul water flooding of the proposed scheme during operation, or for the proposed scheme to worsen surface water or sewage/foul water flood risk elsewhere during operation. In summary, **no impact** is predicted.

A17.4.2.1 Mitigation and residual impact

No mitigation measures are required. There would be **no residual impact**.

A17.4.3 Coastal flood risk

There is no realistic likelihood for the coastal land at the location of the proposed scheme to experience coastal flooding during operation due to the site's topographic level with respect to tidal level and wave conditions.

The marine works will be influenced by tidal and wave processes during their operation, but the tidal regime is micro-tidal (low tidal range) and the wave heights at the location of the proposed scheme are low due to its sheltered location within Stanley Harbour. Numerical modelling has demonstrated that there will be no increases in tidal levels or wave heights due to the proposed scheme during its operation.

The risk of coastal flooding to the marine elements of the proposed scheme has been minimised through design. The quay has a deck level of 4m CD at its seaward face, reducing to around 3.4m CD at the landward face. This level has been set taking into account local tidal conditions at the location of the proposed scheme, along with consideration of sea level rise of its 50 year design life and assessment of overtopping due to local wind-generated waves. In summary, **no impact** is predicted.

A17.4.3.1 Mitigation and residual impact

No mitigation measures are required. There would be **no residual impact**.