

# **IMMINGHAM EASTERN RO-RO TERMINAL**



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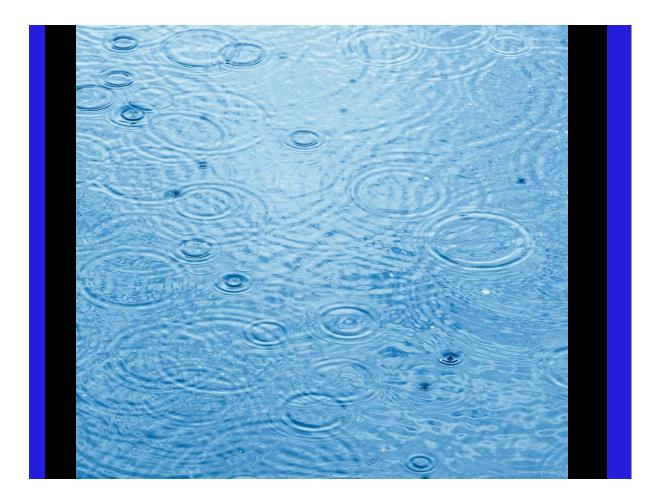
# Jacobs

# **Drainage Strategy**

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Associated British Ports

Immingham Eastern Ro-Ro Terminal 10 February 2023



# Jacobs

#### Drainage Strategy

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## **Executive summary**

Jacobs Engineering has been commissioned by Associated British Ports (ABP) to compile a Drainage Strategy to support the DCO application associated with the proposal to construct a new roll-on/roll-off facility within the Port of Immingham.

A strategy has been developed considering both the existing and proposed infrastructure, together with the logistics associated with operating the terminal, and in accordance with relevant design and constructions guidance and regulations. This has involved the development of three separate surface water drainage networks, corresponding to the three landside development areas, and separated foul provisions.

As per guidance from the local operating authorities, existing drainage outfalls and associated infrastructure, such as the lift and pumping stations, have been reused. It is proposed that any redundant drainage infrastructure, generally comprising conveyance pipework, is to be abandoned. Due to the increased size of the impermeable catchment area within each development site, the existing conveyance networks do not have adequate capacity to sufficiently drain the developments.

Three new surface water drainage networks comprising:

- appropriate diameter conveyance pipework,
- catchpits,
- gullies,
- channel drainage,
- extensive geocellular storage,
- and control structures,

are proposed to serve the numerous identified catchment areas. The structure and location of the components within these networks have been located considering the operational activities of the facility.

Separate foul water provisions are being promoted; the layout and functionality of these shall be subject to development during further design stages.

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## Acronyms and abbreviations

ABP	Associated British Ports
AEP	Annual Exceedance Probability
BGS	British Geological Survey
СС	Climate Change
DCG	Design and Construction Guidance
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
FRMS	Flood Risk Management Strategy
IDB	Internal Drainage Board (North East Lindsey Drainage Board)
IL	Invert Level
LLFA	Lead Local Flood Authority
LPA	Local Dianning Authority
	Local Planning Authority
m AOD	Metres Above Ordnance Datum Newlyn
m AOD NPPF	
	Metres Above Ordnance Datum Newlyn
NPPF	Metres Above Ordnance Datum Newlyn National Planning and Policy Framework
NPPF PEIR	Metres Above Ordnance Datum Newlyn National Planning and Policy Framework Preliminary Environmental Information Report

## Introduction

## 1.1 Background

1.1.1 Jacobs Engineering was commissioned by Associated British Ports to compile a Drainage Strategy to support the DCO application associated with the proposal to construct a new roll-on/roll-off facility within the Port of Immingham, which is located on the south bank of the Humber Estuary.

The facility will comprise:

- on the marine side:
  - o a new jetty infrastructure with up to three berths,
- on the land side:
  - o improved hardstanding,
  - a Terminal Building and associated Workshops,
  - o a Fuel Station and Gatehouses,
  - UK Border Force Facilities
  - and an internal site bridge which will cross over existing port infrastructure, including an ABP controlled railway track and Robinson Road.
- 1.1.2 The terminal will be designed to service the embarkation and disembarkation of principally commercial and automotive traffic, and thus the improved areas of hardstanding will be designated waiting and storage areas associated with the facility operations. The site of the new terminal falls within the eastern part of the Port which is located entirely within the administrative boundary of North-East Lincolnshire.

## 1.2 Objective of the Report

1.2.1 This report has been compiled to describe the surface and foul water drainage strategies associated with the landside development of a concept design. The strategies have been sufficiently developed to support the DCO application and consider the existing and proposed infrastructure, together with the logistics associated with operating the terminal. This report details the applicable design standards and policies, and key design criteria that have been applied in developing a technically viable and compliant concept drainage strategy.

## 1.3 National Planning Policy

1.3.1 In accordance with the National Planning Statement for Ports (NPSfP) and the National Planning and Policy Framework (NPPF), which encompasses various Planning Practice Guidance (PPG) documents, surface water runoff shall be managed using sustainable drainage systems, unless there is clear evidence that these are inappropriate and shall give consideration to the treatment of pollutants and silt to protect contaminants within surface water runoff from entering surrounding watercourses.

## 1.4 Design Standards, Reference & Policy

1.4.1 The following design standards, technical guidance and policy documentation were referenced during the development of this drainage strategy:

[Ref. 1] CIRIA C753 – The SUDS Manual, 2015

[Ref. 2] National Planning Statement for Ports, 2012

- [Ref. 3] National Planning Policy Framework, 2021
- [Ref. 4] Planning Practice Guidance: Flood Risk and Coastal Change, 2022

[Ref. 5] Design and Construction Guidance, Version 2.0, 2020

[Ref. 6] National Highways 'Design Manual for Roads and Bridges' (DMRB)

[Ref. 7] BS EN 752:2017, Drain and sewer systems outside buildings, BSI

[Ref. 8] Guidance: Flood Risk Assessments, Climate Change Allowances – HM Government, 2016 (updated May 2022).

[Ref. 9] CIRIA C737 – Guide to Designing Geocellular Drainage System, 2018

[Ref. 10] Pollution Prevention Guidance (PPG3), 2006 (Withdrawn)

[Ref. 11] BS EN 858-1:2002 - Separator systems for light liquids (e.g. oil and petrol)

[Ref. 12] Environment Agency Flood Risk Standing Advice

[Ref. 13] The Flood and Water Management Act, 2010

#### **1.5** Sources of Information

#### 1.5.1 Environment Agency

- 1.5.1.1 The Environment Agency is the statutory consultee with regards to flood risk and planning. The Flood and Water Management Act 2010 ([Ref. 13) gives the Environment Agency a strategic overview role for all forms of flooding and coastal erosion, and they have a direct responsibility for the prevention, mitigation, and remediation of flood damage for main rivers and coastal areas. The Humber Flood Risk Management Strategy (FRMS) has been prepared by the Environment Agency and outlines their flood risk management strategy for the Humber Estuary. It makes recommendations aimed at ensuring that flood risk is managed in a sustainable way around the estuary and aims to ensure a good standard of protection from tidal flooding is maintained.
- 1.5.1.2 The Environment Agency has been consulted by ABP in relation to the Preliminary Environmental Information Report (PEIR) and advised with respect to Flood Defence and Drainage in February 2022. In principle the proposed development shall not compromise the flood defences, and any future works necessary to adapt to climate change, and access to and along the flood defences is required to be maintained.
- 1.5.1.3 Habrough Marsh Drain Outfall is maintained by the Environment Agency and access and working space is to be maintained to facilitate both maintenance and removal of the tidal flood gates. These flood gates protect the Habrough Marsh Drain against tidal inundation and form part of the coastal flood defence. The Habrough Marsh Drain is classified as an Ordinary Watercourse and thus the North East Lincolnshire Council (LLFA) is responsible for the overall management of local flood risk within the catchment; however, as the watercourse has been Scheduled, the Internal Drainage Board (IDB) is responsible for the maintenance and hydraulic performance of the Habrough Marsh Drain and its associated flood risk. The Environment Agency is also responsible for the issuance and subsequent compliance of Environmental Permits associated with the discharge of treated effluent / storm water via sea outfalls.

#### 1.5.2 North East Lincolnshire Council

1.5.2.1 North East Lincolnshire Council is the Local Planning Authority (LPA) and Lead Local Flood authority (LLFA) and thus has responsibility for local flood risk, which includes surface water runoff, groundwater and Ordinary Watercourses. The North East Lincolnshire Strategic Flood Risk Assessment (SFRA), 2010 was produced to provide the information needed by the planning authority to take flood risk into account when making land use allocations and determining planning applications in accordance with the NPPF ([Ref. 3).

#### 1.5.3 Internal Drainage Board (North East Lindsey Drainage Board)

1.5.3.1 Habrough Marsh Drain is classified as an Ordinary Watercourse but has been Scheduled by the Board which uses its permissing powers to maintain it. The IDB has been consulted by ABP in relation to the Preliminary Environmental Information Report (PEIR) and they subsequently advised with respect to functionality of Habrough Marsh Drain and its associated flood risk in February 2022.

- 1.5.3.2 The IDB advised that the Habrough Marsh Drain is a gravity system with a defended outfall structure which discharges into the Humber Estuary within the bounds of the Port. The Drain is impounded during periods of high tide; however, to facilitate in the control of the water levels, a sluice enables water to be transferred to the drainage channel located to the south of the Port. The sluice links the Habrough Marsh Drain to the Immingham Pumped Drainage System enabling the transfers of flows during periods when pumping capacity is not fully optimised (Appendix C2). The IDB, however, emphasised that high water levels within the Habrough Marsh Drain are considered a potential flood risk, and the operational water levels are observed to be nearing capacity when the runoff associated with high order rainfall events coincides with high tide levels in the Humber Estuary; it is acknowledged that this situation will only be exacerbated through the impact of climate change.
- 1.5.3.3 The IDB is also responsible for the issuance and subsequent compliance of Land Drainage Consent associated with the discharge of treated effluent / storm water into the drain, and hence is aware that elements of the proposed development site are served by existing surface water drainage infrastructure which discharges directly into the Habrough Marsh Drain. The IDB has advised that as the development is located on a brownfield site, the surface water discharge that is associated with any re-development will be expected to be reduced to 70% of the existing "actual" discharge rate.

#### 1.5.4 Anglian Water

1.5.4.1 Anglian Water are responsible for the disposal of wastewater and the supply of potable water in North East Lincolnshire, and thus the town of Immingham and the wider area. The Port's wastewater infrastructure within the development site is known to include several Package Treatment Plants, and a dedicated Treated Effluent Pumped Sea Outfall which discharges into the Humber Estuary. These assets are not adopted by Anglian Water and are maintained directly by the Port of Immingham.

## Site Overview

#### 2.1 Location

- 2.1.1 The proposed roll-on/roll-off facility is to be constructed within the Port of Immingham, which is located on the south bank of the Humber Estuary.
- 2.1.2 The roll-on/roll-off terminal is to be located within the eastern extent of the Port, approximately 2.4 km north-east of the town of Immingham, and will be served by a new jetty, pontoons, and associated finger piers to be constructed in open waters adjacent to the existing jetties within the Humber Estuary.
- 2.1.3 The Ordnance Survey National Grid Reference for the centre of the site is TA 19976 16154. Refer to DCO drawing B2429400-JAC-00-ZZ-DR-ZZ-0101 for the Site Location Plan.

#### 2.2 Existing Landside Development

- 2.2.1 The proposed roll-on/roll-off terminal is to be constructed within areas of the Port which are currently used to store bulk commodities such as solid fuels and ores, as well as ro-ro freight being handled from in river jetties. The storage areas are accessed via established infrastructure within the Port and are subdivided by ABP controlled railway sidings. These areas are typically located adjacent to Operational Sheds and Engineering Workshops which complement the operations within the Port.
- 2.2.2 The existing storage areas are partially paved, and to ensure serviceability these sub-catchments are served by positive drainage systems which either discharge to the Habrough Marsh Drain or directly to the Humber Estuary or Immingham Dock via dedicated pumped outfalls.
- 2.2.3 Strategic infrastructure is present in the development site including package treatment plants and associated treated effluent pumping stations, as well as dedicated storm water pumping stations.

#### 2.3 Proposed Landside Development

- 2.3.1 The proposal comprises an operational terminal designed to service the embarkation and disembarkation of principally commercial and automotive traffic associated with the proposed roll-on/roll-off facility, together with a limited designated area to store shipping containers. The terminal will comprise extensive areas of paved hardstanding which will be delineated to create designated waiting and storage areas and marshalling lanes; the storage areas will be accessed via controlled gated access points located adjacent to existing port infrastructure.
- 2.3.2 The terminal will be developed within the bounds of the existing port, thus will be spilt into three areas, namely the Northern, Southern and Western operational yards. To facilitate traffic movements between the terminal, and the marine side ro-ro approach jetty, it is proposed to construct an overbridge over Robinson Road and the ABP controlled railway sidings.
- 2.3.3 The existing cargo handling areas will be regraded to facilitate surface water drainage; the site grading shall consider the levels of the existing infrastructure located around the perimeter of the site and the safe working parameters of any operating plant or equipment. The operations within the yards will be facilitated through the provision of the following buildings which will be constructed within the bounds of the development site:
  - Terminal Building (Southern Yard)
  - Customer Welfare Building (accompanied freight marshalling area, Southern Yard)
  - Workshop and Fuel Station / Gatehouse (Southern Yard)
  - UK Border Force Customs Building and supporting infrastructure, including Immigration PCP Booths and Marshalling Lanes, Cyclamen Portal, Secondary Examination Building, Holding Facility, and Inspection Areas (Southern Yard)
- 2.3.4 The total development site is approximately 36.4 Ha which is subdivided as follows:
  - Northern Yard 6.0 Ha

- Southern Yard 20.8 Ha
- Western Yard 9.6 Ha
- 2.3.5 Refer to DCO drawings B2429400-JAC-00-ZZ-DR-ZZ-0202 to 0206 for the proposed development General Arrangements.

## 2.4 Topography

- 2.4.1 Site ground levels used to develop the drainage strategy have been based on resolution, open source Lidar data from <a href="https://environment.data.gov.uk/DefraDataDownload/?Mode=survey">https://environment.data.gov.uk/DefraDataDownload/?Mode=survey</a>; the site is relatively flat with typical levels varying between +4 and +6 m AOD, which is predominately associated with historic development, including the interlinking railways, and its associated utilisation.
- 2.42 The site is classified as low-lying in relation to tidal water levels. The banks of the Habrough Marsh Drain, which is located to the east of the Port, are similar to the operational level of the cargo handling areas within the Port, however, the drain is protected against tidal inundation through the provision of tidal gates.

## 2.5 Geology & Hydrogeology

- 2.5.1 Open-source data from the British Geological Survey (BGS) shows that the geology underlying Immingham Port typically comprises a bedrock of Cretaceous shallow-marine Chalk which is overlain by superficial Tidal Flat Deposits, formed of shallow-marine Clay and Silt from the Quaternary period. The wider Port site straddles Chalk from two Formations, the Burnham Chalk Formation and the Flamborough Chalk Formation; the development site is located within the Flamborough Formation.
- 2.5.2 Borehole data from the BGS (trial borehole 17, 1948) suggests that the site stratigraphy consists of topsoil and muds to a depth of around 30 ft (9 m), after which a relatively shallow layer of Peat, Sand and Pebbles may be found, and below which several layers of varying Clays extend to a depth of almost 200 ft (60 m).
- 2.5.3 Geotechnical investigations undertaken within the bounds of the development site, by GD Pickles Ltd in 2020, confirm that the site is underlain by Made Ground, appearing to typically comprise imported construction or industrial waste consistent with historic land reclamation. Beneath the Made Ground are Tidal Flat Deposits, comprising cohesive clay soils and silt to a depth of approximately 10 m below ground level. The Tidal Flat Deposits overlie Boulder Clay comprising stiff brown sandy clay. Moreover, the nature of the underlying substrata appears to influence the groundwater regime; perched water bodies were observed in the southern area of the site within the Made Ground, at a depth of between 1-2 m below ground level. Groundwater was also observed below the Boulder Clay within a layer of dense Sands and Gravels at an approximate depth of 30 m.
- 2.5.4 The general ground conditions suggest that the permeability of the substrata will be low, which when combined with the presence of a high groundwater table, limits the opportunity to discharge surface water runoff from areas of hardstanding to the underlying groundwater regime using drainage structures that promote infiltration.. Further geotechnical investigation will be undertaken to facilitate the development of the design.

#### 2.6 Environmental, Archaeological & Contamination

- 2.6.1 In accordance with Planning Policy, potential sources of contamination and items of historical reference which could affect the underlying groundwater regime are required to be considered when developing the drainage strategy to support the requirements of the proposed developed. The historic use of the site would suggest that there is risk of contamination within the underlying Made Ground and subsoils.
- 2.6.2 Due to the nature of the underlying substrata and associated groundwater regime a full appraisal of the historic use of the site has not been undertaken on the basis that drainage structures that promote infiltration are not deemed appropriate.

## 2.7 Catchment Hydrology

- 2.7.1 The area adjacent to the development site features a network of drainage ditches which aid in the conveyance of surface water runoff and pluvial flows into the Humber Estuary; the extent of the drainage ditch network is presented in Appendix A.
- 2.7.2 The Habrough Marsh Drain is located adjacent to the Port and bounds the development site to the south and east. The drain is classified by the Environment Agency as an Ordinary Watercourse and flows in an easterly direction before discharging into the Humber Estuary. The drain is defended from tidal inundation through the provision of flood gates which are integral to the flood defence structure constructed along the Humber Estuary.
- 2.7.3 There is a drainage channel located to the south of the Port linking the Habrough Marsh Drain to the Immingham Pumped Drainage System, via a sluice. This can be opened when there is spare pump capacity, enabling the transfer of fluvial flows to enter the pumped catchment and providing relief to the Habrough Marsh Drain.
- 2.7.4 The Habrough Marsh Drain historically aids in the drainage of elements of the Port and there are several outfalls located along the length of the drain directly to the east of the port's boundary and immediately upstream of the defended outfall into the Humber Estuary. These outfalls currently serve several positive drainage systems installed within the Port to drain areas of impermeable hardstanding which form the Cargo Handling Areas.
- 2.7.5 Based on a high-level review of topographical mapping, and drainage records provided by ABP, it is clear that an open ditch passed through the southeast corner of the Port which was culverted under the railway and Robinson Road before it discharged into a tributary of the Habrough Marsh Drain. This open ditch has been backfilled and subsequently replaced with a dedicated pipe network serving the site. The network conveys runoff from a surface water drainage system serving an area of semi-impermeable hardstanding located in the southeast corner of the Port, as well as roof drainage from Shed 26.

## Surface Water Drainage

#### 3.1 Surface Water Management Overview

- 3.1.1 An appropriately developed drainage strategy is a principal planning consideration to ensure developments are effectively and sustainably drained; surface water runoff is captured, and its quantity and quality controlled in a manner that ensures any alteration of natural surface water flow patterns through the development site do not result in an increased flood or pollution risk elsewhere in the catchment.
- 3.1.2 The strategy shall consider the transfer of flood risk associated with pluvial flooding and where appropriate fluvial flooding within the downstream receiving catchment and will thus be developed with respect to the satisfactory collection, control, treatment and discharge of surface water runoff as reflected in the guidance and non-statutory technical standards for SuDS.
- 3.1.3 The development is to be undertaken on a brownfield site and the IDB has been consulted and agreed to permit a discharge rate that is limited to 70% of the actual runoff from the predeveloped catchment; this approach will aid in the management of flood risk in the receiving watercourse catchment.

#### 3.2 Design Criteria

#### 3.2.1 Overview

- 3.2.1.1 The design criteria detailed below follow best practice as stipulated under Planning Policy and align with the redevelopment of predeveloped sites.
- 3.2.1.2 The design standard relating to the surface water drainage for the areas of hardstanding and associated buildings is the Design and Construction Guidance (2020) ([Ref. 5) and BS EN 752:2017 ([Ref. 7), whilst for the surface water drainage associated with the highway bridge the design standard is the National Highways 'Design Manual for Roads and Bridges' (DMRB) ([Ref. 6).

#### 3.2.2 Discharge Hierarchy

- 3.2.2.1 The SuDS Manual (2015) ([Ref. 1) specifies a hierarchy of techniques that should be considered for drainage discharge and has been consulted to establish the most suitable approach for the proposed site. Surface water runoff should be discharged to a source that is as high up the following hierarchy as possible:
  - 1. Re-use (rainwater harvesting / greywater recycling)
  - 2. Infiltration
  - 3. To a surface water body (e.g. ordinary watercourse)
  - 4. To a surface water sewer, highway drain, or other drainage system
  - 5. To a combined sewer.
- 3.2.2.2 To inform the development of an appropriate drainage strategy and enable an assessment of all potential discharge options, as required by both the NPSfP ([Ref. 2) and NPPF ([Ref. 3), reference has been made to British Geological Mapping, the existing surface water drainage systems and associated outfalls, and the proximity of watercourses and drains. The following sections assess the hierarchy in order of priority:

#### <u>Re-use</u>

3.2.2.3 The vast majority of the development site is to be paved for vehicular trafficking purposes. The quality of the runoff would therefore be inappropriate for re-use on the site due to the risk of hydrocarbon and suspended sediment contamination. It is therefore not proposed to re-use surface water runoff from the development site.

#### **Infiltration**

3.2.2.4 Due to the cohesive nature of the underlying sub-strata and high perched groundwater levels (see Section 2.5), infiltration drainage is not considered appropriate and has thus not been promoted, in part, or as a main means of discharging the rainfall induced runoff from the development site. It is intended that attenuation storage features are lined to prevent the ingress of perched groundwater, which would otherwise render the storage provision ineffective.

#### To a surface water body

- 3.2.2.5 Where positively drained, all surface water runoff within the site boundary is discharged to an existing surface water body, either to the Habrough Marsh Drain, the Humber Estuary or to Immingham Dock. It is therefore proposed to discharge runoff from the development site to the same water bodies. The positive drainage networks serving the existing site are privately maintained and are located entirely within the Immingham Port boundary prior to their outfall to the associated water body. It is proposed to discharge via existing outfalls and surface water drainage infrastructure, therefore achieving an indirect discharge to a surface water body, without increasing flood risk from sewers outside of the site boundary.
- 3.2.2.6 The existing drainage located within the bounds of the development site itself is deemed to be hydraulic deficient in relation to the requirements of the proposed development, and thus will largely be abandoned and replaced with new to align with the proposed pavement grading.
- 3.2.2.7 The existing outfall configurations are as detailed below:
  - Habrough Marsh Drain:
    - The surface water runoff from the northeast and southeast sections of the Cargo Handling Areas (Catchments A and D, see drawing B2357300 - 01 - 05 - 11) currently discharge under gravity to headwall structures located on the west bank of the Habrough Marsh Drain; these headwalls and the associated upstream pipework located outside of the Port boundary could be retained for reuse subject to:
      - A full structural CCTV of the pipework.
      - A non-destructive assessment of the headwall structure.
      - A topographical Survey of the outfall pipework and associated headwall structure.
      - The consent of the IDB Ordinary Watercourse.
  - Combined Effluent / Storm Water Pumping Station:
    - The surface water runoff from the southwest section of the Cargo Handling Area (Catchment A, see drawing B2357300 01 05 12) currently discharges under gravity to the Pumping Station which has been designed to accommodate both the treated effluent from an adjacent biodisc package treatment plant and stormwater runoff collected within the Cargo Handling Area, and the catchment located to the north of Robinson Road. Subject to the following, the pumping station could be used to aid in the discharge of surface water collected within the development site directly to the Humber Estuary:
      - The spare capacity within the pumping station and associated rising main.
      - The consent of the Environment Agency with respect to the Environmental Permit.
      - Availability of space within the proposed Yard to accommodate attenuation facilities.
  - Storm Water Pumping Station:
    - The surface water runoff from the western section of the Cargo Handling Area (Catchment A, see drawing B2357300 01 05 19) currently discharges under gravity to a relatively new surface water lift station that discharges into a dedicated surface water pumping station which aids in the conveyance of storm water into Immingham Dock. Subject to the following, the surface water pumping station could be used to aid in the conveyance of surface water collected within the development site directly to Immingham Dock and associated Humber Estuary:

- The spare capacity within the lift station and associated rising main.
- The consent of the Environment Agency with respect to the Environmental Permit.
- Availability of space within the proposed Yard to accommodate attenuation facilities.

#### To a surface water sewer, highway drain, or other drainage system or to a combined sewer.

3.2.2.8 As it is possible to discharge to a surface water body, which is preferable with respect to the discharge hierarchy, discharging to a surface water sewer, highway drain, other drainage system or a combined sewer do not need to be considered.

#### 3.2.3 Discharge Criteria

- 3.2.3.1 To inform the planning of the development proposal and in particular the development of an associated drainage strategy, the IDB was consulted in relation to the Preliminary Environmental Information Report (PEIR) in February 2022. The consultation acknowledged that the Habrough Marsh Drain serves areas of hardstanding in the Port, however, due to the potential high water levels within the Habrough Marsh Drain, which will only be exacerbated through the impact of climate change, it was stipulated by the IDB that existing surface water outfalls shall only be permitted to discharge up to 70% of the actual runoff from the associated catchment.
- 3.2.3.2 The discharge methodology promoted within this strategy will thus mimic the existing arrangements for an appropriate range of rainfall events, including an allowance for climate change, whereby the runoff will be discharged at the specified controlled rate to the Habrough Marsh Drain, or into the Humber Estuary or Immingham Dock via existing pumped sea outfalls.
- 3.2.3.3 The proposed discharge criteria are based on pre-development baseline assessments; these shall be subject to an appropriate climate change allowance and are outlined in Table 1.

Outfall Location	1 in 1 year discharge	1 in 30 year discharge	1 in 100 year discharge
Habrough Marsh Drain	70% of existing modelled 1 in 1 year rate	70% of existing modelled 1 in 30 year rate	70% of existing modelled 1 in 100 year rate
Immingham Dock	No greater than existing	No greater than existing	No greater than existing
Humber Estuary	No discharge restrictions	No discharge restrictions	No discharge restrictions

#### Table 1: Proposed Discharge Criteria

#### Humber Estuary N

Discharae rate limits

#### **3.2.4 Hydraulic Performance**

3.2.4.1 The hydraulic design parameters applied in the development of the surface water drainage strategy are outlined as follows:

#### 3.2.4.1 Collector systems

- 3.2.4.1.1 The collector system is to comprise gullies located in the valleys within the pavement; these gullies will be placed at an appropriate spacing, which will align with the serviceable catchment. The spacing of gullies shall ensure a negligible surface water profile on the pavement during low order rainfall events.
- 3.2.4.1.2 Due to the proposed utilisation of the site, it is considered acceptable to permit short term ponding in the vicinity of the gullies during high intensity rainfall events, however, the spacing shall be sufficient to not result in flooding outside of the site boundary during short-duration and high-intensity 1 in 100-year (+CC) design storm events.

#### 3.2.4.2 Carrier systems

- 3.2.4.2.1 The surface water drainage system is designed in accordance with DCG (2020) ([Ref. 5), and thus is in compliance with the following criteria:
  - No surcharge for the 1 year (+CC) return period.

- No flooding for the 30 year (+CC) return period.
- 3.2.4.2.2 The building roof drainage shall align with the Building Regulations and thus be in compliance with the following criteria:
  - The gutter and rainwater downpipes, which shall be positively connected with the carrier drainage pipework, shall accommodate the runoff associated with a 1 in 10 year (+CC) design storm event.
  - Any exceedance flows shall be permitted to cascade down the building's envelope onto the hardstanding where it will be intercepted by the surface water drainage system.

#### 3.2.4.3 On-Site Flood Risk

- 3.2.4.3.1 The surface water drainage system shall be designed to comply with the following criteria in accordance with site-specific design criteria required by the Port Operator:
  - No flooding from the carrier drainage system for events up to the 1 in 30 year (+CC) return period.
  - Any flooding during the 1 in 100 year (+CC) design storm event shall be retained within the site in appropriate surface storage areas, not pose a risk to people or property, and be able to quickly drain away after the peak of the design storm event has passed.
  - The collector system shall be designed to ensure standing water is contained within the pavement channel; standing water depths up to 100 mm, or an acceptable level for operational activities, are permitted for limited periods.
  - No flooding in the vicinity of the Terminal and UK Border Force Buildings will be permitted for events up to 1 in 100 year (+CC) design storm event.

#### 3.2.4.4 Off-Site Flood Risk

- 3.2.4.4.1 To ensure compliance of Planning Policy the design shall comply with the following criteria:
  - Pluvial flows up to the 1 in 100 year (+CC) design storm event shall be retained on site.

#### 3.2.5 Climate Change

- 3.2.5.1 Projections of future climate change in the UK indicate more frequent, short duration, high intensity rainfall and frequent periods of long duration rainfall. The guidance included in the NPPF ([Ref. 3) and PPG ([Ref. 4) recommends the effects of climate change are considered when developing drainage strategies for new development or redevelopment; the recommended precautionary sensitivity ranges for peak rainfall intensities are outlined in the Flood Risk Assessments: Climate change allowance guidance published by HM Government, May 2022 ([Ref. 8)
- 3.2.5.2 The development proposal comprises an operational terminal designed to service the embarkation and disembarkation of principally commercial and automotive traffic associated with the proposed roll-on/roll-off facility; this facility is to promote an engineered design standard of 75 years to align with the lifetime of a non-residential development as per PPG ([Ref. 4), thus the recommended national precautionary sensitivity ranges for peak rainfall intensities will be applied accordingly.
- 3.2.5.3 To account for the potential effects of climate change, a climate change allowance has been included for design storms in accordance with "Flood risk assessments: climate change allowances", HM Government, 2022 ([Ref. 8). The Guidance states that for assets with a development design lifetime of between 2061 and 2100, the central allowance of the 2070s Epoch should be used. The central allowances for the 2070s Epoch for the Louth Grimsby and Ancholme Management Catchment are as follows:
  - 3.3% AEP (1 in 30-year return period) 25%
  - 1% AEP (1 in 100-year return period) 25%

#### 3.2.6 Surcharged Outfall Conditions

- 3.2.6.1 The drainage strategy has been developed based on the following outfall conditions:
  - Discharge into the Humber Estuary via existing Combined Effluent / Storm Water Pumping Station:
    - The performance of the pumping station has not been assessed; a free discharge into the pumping station's wetwell has been assumed. It is assumed that the pumping station has been designed to operate under surcharged outfall conditions and therefore will not impact on the gravity-driven elements of the network. This approach shall be further developed in the next stage of design.
  - Discharge into Immingham Dock via existing Surface Water Pumping Station:
    - The performance of the pumping station has not been assessed; a free discharge into the associated lift station's wetwell has been assumed. It is assumed that the pumping station has been designed to operate under surcharged outfall conditions and therefore will not impact on the gravity-driven elements of the network. This approach shall be further developed in the next stage of design.
  - Discharge into the Habrough Marsh Drain via existing gravity outfalls:
    - The Habrough Marsh Drain is subject to tidal interaction and during high tides the down stream flood gates are closed to prevent fluvial flooding. The water levels in the drain are monitored by the IDB, and although levels increase during the tidal cycle it is understood that the water remains within the banks. The drainage strategy has been developed to allow for the tidal cycle and application of surcharged conditions.
- 3.2.6.2 Sensitivity testing has been carried out to assess the hydraulic performance of the drainage networks with a gravity outfall, namely Northern Catchment A and Southern Catchment B and C (drawings B2357300 01 05 01 and 02 respectively), in periods of high water levels in the receiving watercourse (Habrough Marsh Drain). In lieu of a detailed understanding of the range of water levels or tidal influence within the Habrough Marsh Drain, the following sensitivity tests have been carried out:
  - Test against a surcharged outfall of +3.7 mAOD (equivalent to bank full with 300 mm freeboard)
  - Test against a surcharged outfall of +1.9 mAOD (equivalent to MHWN level in the Humber Estuary)
- 3.2.6.3 For each sensitivity test, the hydraulic models were run for a range of return periods up to and including the 1 in 30-year +CC event, for durations up to and including 1440 mins (24 hours), and on the assumption that water levels are unlikely to be this high for longer than 24 hours. The networks were not altered from the proposed case with no additional outfall structures, such as a flap valve, added; only the outfall conditions (i.e. water level) were changed. To ascertain if additional outfall structures (overflows) are needed in order to negate the inundation of the drainage system and ensure functionality of control structures, the interaction between the drainage system and fluvial flows in the Habrough Marsh Drain will be fully assessed during future design stages.

#### 3.2.7 Sustainable Drainage Systems (SuDS)

- 3.2.7.1 The utilisation of sustainable drainage features should be used where possible to provide the required levels of treatment in accordance with policy and best practice. However, for the following reasons, it is proposed to utilise a traditional gully inlet and piped positive drainage network in combination with underground storage facilities and proprietary treatment units:
  - The requirement to keep the drainage system as shallow as possible to negate surcharged conditions,
  - The lack of infiltration potential due to the underlying ground conditions, which comprise Clay and Made Ground, some of which may be contaminated such that infiltration could cause contaminant migration.

• The potential for high groundwater levels below the finished pavement levels and perched groundwater which could contain contaminants such that infiltration could cause contaminant migration.

#### 3.2.8 Pollution and Water Quality

- 3.2.8.1 In accordance with NPPF consideration is to be given to pollution control measures to mitigate the risk posed by potential contaminants within surface water runoff from entering local watercourses. Although withdrawn, PPG3 (2006) ([Ref. 10) has been referred to for the selection of appropriate pollution prevention measures in lieu of updated guidance.
- 3.2.8.2 Potential pollution sources include:
  - Motorised vehicles, such as Heavy Goods Vehicles, Tugs and Reachstackers trafficking the site.
  - Refuelling activities within the dedicated fuel station.
- 3.2.8.3 The proposed development site has been subdivided into two areas for the purposes of pollution control:
  - Operational Yards:
    - These areas fall under the PPG3 ([Ref. 10) category of "vehicle maintenance area, Goods Vehicle parking or vehicle manoeuvring and therefore shall be treated to Class 1 Full Retention Separator standards to BS EN 858 ([Ref. 11).
  - Fuel Station:
    - This area falls under the PPG3 ([Ref. 10) category of "retail fuel forecourts" and shall therefore be treated via a Full Retention Forecourt Separator designed in accordance with BS EN 858 ([Ref. 11). The designated refuelling area is required to be contained to capture any significant spillage. The form of containment shall be through the installation of a perimeter channel drain which will enable the storm runoff to drain under normal conditions.

#### 3.3 Existing Surface Water Drainage

#### 3.3.1 Northern Development Site

#### 3.3.1.1 Drainage Catchment

3.3.1.1.1 The northern development site comprises two distinct development areas, a northern area and a southern area as shown in Drawing B2357300-01-05-11. These areas have been subdivided into four drainage catchments within the site boundary, three in the north and one in the south. Further details on these drainage catchments are provided in Table 2.

**Table 2:** Development area drainage catchment information (from geotechnical survey information)Northern Development Site

Development Area	Drainage Catchment	Size (Ha)	Comments
Northern Area	Catchment N-A	0.813	Lean-mix concrete surface, graded towards an existing gully and pipe system, which discharges by gravity to the Habrough Marsh Drain
	Catchment N-B	-	Lean-mix concrete surface. Existing grading falls away from existing drainage systems and results in surface ponding. Considered not to

#### Drainage Strategy

Development Area	Drainage Catchment	Size (Ha)	Comments
			contribute to any existing drainage system
	Catchment N-C	-	-
Drury Ltd. Area	Catchment N-D	-	Catchment consists of building roof and impermeable hardstanding areas, which are collected by gullies and linear channels. Flows discharge to the Habrough Marsh Drain.

#### 3.3.1.2 Drainage System

- 3.3.1.2.1 Of the four drainage catchments identified in Table 2, available records show that only two include positive drainage systems, namely, Catchment N-A and Catchment N-D.
- 3.3.1.2.2 Catchment N-A is served by numerous drainage branches which connect into a carrier pipe. Although specific collector systems are not shown within the available records, it may be assumed runoff is intercepted by gullies. The collected runoff is then conveyed via a 525 mm diameter outfall which discharges into the Habrough Marsh Drain. This outfall is relatively close to the tidal flood gates, denoted by a headwall within the bank of the watercourse, and with an assumed invert level of approximately +0.879 mAOD.
- 3.3.1.2.3 Catchment N-D contains a number of buildings and is served by a combination of gullies, linear drainage channels, and building roof drainage. The building roof drainage comprises down pipes which appear to outfall to the ground surface, where runoff is then intercepted by the collector systems within the pavements. Some of the collected runoff is conveyed via a carrier drain that discharges into a local pumping station located in the vicinity of the south-western corner of Shed 6; the pumping station lifts the flows via a short section of rising main into a section of pipework that conveys the flows under gravity to an outfall structure constructed on the west bank of Habrough Marsh Drain.

#### 3.3.1.3 Proprietary Treatment Facilities and SuDS

3.3.1.3.1 Other than a separator located at the head of a drainage branch which joins the main carrier pipework in Catchment N-D, as detailed on drawing no. B2357300-01-05-11, there is no evidence in the provided drainage records of other proprietary or sustainable urban treatment facilities serving the existing surface water drainage system installed in Catchment N-A.

#### 3.3.1.4 Runoff Assessment

- 3.3.1.4.1 The performance of the existing drainage serving the predeveloped site has been assessed in relation to the contributing areas; this assessment will inform the allowable discharge rates for the proposed drainage strategy in accordance with the criteria outlined in Sections 3.2.3 and 3.2.4. As this network is to discharge to the Habrough Marsh Drain, the brownfield runoff rates as derived via hydraulic modelling shall be factored to comply with the requirement to reduce discharge rates by 30%. The assessment will not consider an allowance for climate change as the assessment is based on the current "actual" discharge rates.
- 3.3.1.4.2 As only enabling works are being proposed within the southern catchment area to facilitate the construction of the overbridge, and the existing paving is not being revised, it was not deemed necessary to assess the hydraulic performance of the existing surface water drainage system in Catchment N-D.

#### 3.3.1.5 Hydraulic Performance – Network Modelling

3.3.1.5.1 An assessment of the hydraulic performance of the existing surface water drainage system serving Catchment N-A was undertaken to quantify the actual runoff that discharges into Habrough Marsh Drain. The drainage assessment was conducted by simulating the existing surface water drainage system within the latest version of Innovyze's MicroDrainage suite of software. The simulations were run for the design storm events and input information as detailed below for both summer and winter rainfall profiles.

#### 3.3.1.5.1 Existing Surface Topography

3.3.1.5.1.1 The ground levels incorporated into the network model were based on record topographic survey data (drawing B2429400-JAC-00-ZZ-M2-ZZ-0001), where available; where topographic survey data was not available, LiDAR data was used.

#### 3.3.1.5.2 Existing Surface Permeability

3.3.1.5.2.1 For the purposes of assessing surface water runoff, all buildings and areas of impermeable hardstanding within the bounds of the redevelopment site that are contributing to the network have been assumed to be 100% impermeable. Based on the LiDAR data, the topography of areas adjacent to the network's catchment fall away from the area and have therefore been excluded from this assessment.

**Table 3:** Contributing surface areas used to model the existing surface water drainage system within the redevelopment site

Northern Development Area

Contributing Surface	PIMP	Area (Ha)
Roofs	100	0.000
Hardstanding (Surfaced)	100	0.813
Total	-	0.813

#### 3.3.1.5.3 Model Input Values

3.3.1.5.3.1 The input values applied to the model are detailed in Table 4. The values are consistent across the development site and therefore apply to each development area.

 Table 4: Notes on the design criteria and input values used to model the pre-development surface water

 drainage network in MicroDrainage

Northern, Southern and Western Development Areas

Model Design Criteria	Value(s)	Notes
Climate change	CC: 0%	Brownfield Runoff Assessment (does not consider an allowance for climate change as the assessment is based on the current "actual" discharge rates).
Design event	1, 30, and 100 years	Design events for 1 in 1, 30, 100 years have been used for modelling to determine allowable discharge rates.
Rainfall data	M5-60: 17 mm Ratio (R): 0.400	Rainfall data for the site location was obtained from the Flood Studies Report (FSR) and through the HR Wallingford online tool.
Volumetric Run-off Coefficient	Summer: 0.75 Winter: 0.84	Standard volumetric runoff coefficients of 0.75 and 0.84 were applied for the summer and winter respectively.
Global manhole headloss	0.5	Default software value
Pipe roughness	0.6 mm	Standard Colebrook-White roughness coefficient for surface water drainage design
MADD factor	2 m³/ha	Standard MADD factor for surface water drainage design for permeable areas.

Model Design Criteria	Notes
Existing Surface Topography	The ground levels incorporated into the network model were based on record topographic survey data where it was available; where topographic survey data was not available, open source LiDAR data was used ( <u>https://environment.data.gov.uk/DefraDataDownload/?Mode=survey).</u>

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Model Design Criteria	Notes
Outfall	All models were conducted with an assumed free discharge (hot start 0 mins and hot start level 0 mm). For sensitivity testing, surcharged conditions were tested as described in Sections 3.4.3.3.1 (North) and 3.4.4.3.1 (South).

#### 3.3.1.5.4 Model Output Files

- 3.3.1.5.4.1 The MicroDrainage model for the brownfield runoff assessment suggested that the existing peak discharge rates range between 83 and 228 l/s depending on the design storm return period. The simulation results are presented in Appendix B.
- 3.3.1.5.4.2 Three return periods were tested to correspond with the design criteria associated with the proposed redevelopment; the simulation results are shown in Table 5.

Table 5: Modelled existing surface water discharge ratesNorthern Development Site – Catchment N-A (model pipe reference \$1.006)

Design Storm Event (1: xx)	1 year	30 year	100 year
Modelled Discharge Rate (l/s)	83	193	228

#### 3.3.1.6 Allowable Discharge Rates

3.3.1.6.1 The allowable discharge rate promoted for the brownfield development site, which have been derived in accordance with the IDB's requirements as outlined in Sections 3.2.3 are shown in Table 6:

## Table 6: Allowable discharge rates (30% betterment)

Northern Development Site – Catchment N-A

Design Storm Event (1: xx)	1 year	30 year	100 year
Allowable Discharge Rate (l/s)	58.0	134.7	159.7

3.3.1.6.2 The allowable discharges rates are based on the evaluation of the limited site records; however, they are considered to be conservative and appropriate to form the basis of the drainage strategy.

#### 3.3.2 Southern Development Site

#### 3.3.2.1 Drainage Catchment

3.3.2.1.1 The southern development site comprises three distinct development areas as shown on drawing no B2357300-01-05-12; these areas have been subdivided into six drainage catchments. Further details of these drainage catchments are provided in Table 7.

#### Table 7: Development area drainage catchment information (from survey information)

Southern Development Site

Development Area	Drainage Catchment	Size (Ha)	Surfacing
Main Area	Catchment S-A	2.082	Deteriorated asphalt with a thin subbase over made ground. A proportion of this area appears to drain to the Combined Treated Effluent / Storm Water Pumping Station
	Catchment S-B	4.326	Mixture of: cement- stabilised Type 1 over made ground; 100-150 mm stone cover over a geotextile over made ground; soil heaps. Land drainage outfalls to Habrough Marsh Drain.

#### Drainage Strategy

Development Area	Drainage Catchment	Size (Ha)	Surfacing
	Catchment S-C	1.952	Impermeable hardstanding and roof areas associated with Shed 26, positively drained to the Habrough Marsh Drain
Eastern Satellite Area	Catchment S-D	Not positively drained	n/a
	Catchment S-E	Not positively drained	n/a
Northern Satellite Area	Catchment S-F	Not positively drained	n/a

#### 3.3.2.2 Drainage System

- 3.3.2.2.1 Of the six drainage catchments identified in Table 7, records suggest that only three include positive drainage systems, namely Catchment S-A, Catchment S-B and Catchment S-C.
- 3.3.2.2.2 Catchment S-A comprises sporadic yard gullies, which convey a proportion of this catchment to the Combined Treated Effluent / Storm Water Pumping Station. Outside of the proposed site boundary the gravity network is 450 mm diameter. Inside the proposed site boundary, the gravity system increases to 600 mm diameter suggesting that this section of pipework has been upsized to accommodate the runoff from within the existing site that is to be developed.
- 3.3.2.2.3 The pumping station comprises two pumps connected via a 300 mm delivery manifold. This delivery manifold discharges to an existing 600 mm rising main which discharges directly into the Humber Estuary via an in-river outfall structure. The outfall is subject to an Environmental Permit and is permitted to convey both treated wastewater effluent and treated or uncontaminated surface water runoff. The volume of treated effluent discharged into the Humber Estuary is restricted under the terms of the permit, though there is no restriction regarding the discharge of surface water runoff.
- 3.3.2.2.4 Catchment S-B is served by a surface water drainage system that has been installed along the length of an historic open drain that subdivided the site; the limited records show that the collector system comprises gullies which have been installed at heads of runs within the Cargo Storage Area. Site observations suggest that this network may also acts as a land drain, with evidence of filter media placed along the line of the pipework.
- 3.3.2.2.5 Catchment S-C serves the building footprint and an area of hardstanding adjacent to Shed 26 and discharges to the downstream end of Catchment S-B. The collected runoff is then conveyed via a 525 mm diameter outfall which passes under the road and railway network that serves the Port, prior to discharging into the Habrough Marsh Drain. This outfall is denoted by a headwall within the bank of the watercourse and has an assumed invert level of approximately +0.4 mAOD.

#### 3.3.2.3 Proprietary Treatment Facilities and SuDS

3.3.2.3.1 There is a requirement within the Environmental Permit that all surface water runoff that discharges into the Humber Estuary via the Combined Treated Effluent / Storm Water Pumping Station is treated or is uncontaminated, however, the provided records show no evidence of proprietary or sustainable drainage treatment facilities serving the existing surface water drainage system installed in the catchment. This is with exception to the runoff generated by Shed 26 in Catchment S-C; there is a separator serving runoff generated within the Shed 26 area.

#### 3.3.2.4 Runoff Assessment

3.3.2.4.1 The performance of the existing drainage serving the predeveloped site has been assessed in relation to the contributing areas; this assessment will inform the allowable discharge rates for the proposed drainage strategy in accordance with the criteria outlined in Sections 3.2.3 and 3.2.4.

#### Catchment S-A

3.3.2.4.2 The drainage within Catchment S-A discharges to the Humber Estuary and therefore is not subject to a postdevelopment discharge rate restriction (see Section 3.2.3). It is proposed to utilise the existing drainage system and pumping station to drain flows from the proposed development. The existing network has been assessed based on a high-level review of the spare network capacity, however, in lieu of undertaking a full assessment of the surface water network, the available capacity has been derived based on the difference between the full-bore capacity of the 450 mm diameter pipework immediately outside of the site boundary and the 600 mm diameter outfall pipe within the site boundary and that discharges into the pumping station's wetwell from the contributing catchment. The flows potentially discharged from the existing drainage system via the full bore 450 mm and 600 mm pipes were then compared to the pumping rates based on the pumps systems curves that are available within the records. The calculations are presented in Appendix B.

#### Catchments S-B and S-C

3.3.2.4.3 The drainage within Catchments S-B and S-C, that discharges via a common outfall into the Habrough Marsh Drain, has been assessed in a similar manner to the assessment undertaken for the northern catchment as detailed in Section 3.3.1.4. The brownfield runoff rates as derived via hydraulic modelling shall be factored to comply with the requirement to reduce discharge rates by 30%., The assessment will not consider an allowance for climate change as the assessment is based on the current "actual" discharge rates.

#### 3.3.2.5 Hydraulic Performance – Network Modelling

- 3.3.2.5.1 An assessment of the hydraulic performance of the existing surface water drainage system serving Catchments S-B and S-C was undertaken to quantify the actual runoff that discharges into Habrough Marsh Drain.
- 3.3.2.5.2 The drainage assessment was conducted by simulating the existing surface water drainage system within the latest version of Innovyze's MicroDrainage suite of software. The simulations were run for the design storm events with the following input information for both summer and winter rainfall profiles.

#### 3.3.2.5.1 Existing Surface Permeability

3.3.2.5.1.1 For the purposes of assessing surface water runoff, all buildings and areas of impermeable hardstanding within the bounds of the redevelopment site that are contributing to the network have been assumed to be 100% impermeable. Areas of cement-stabilised Type 1 over made ground, and areas of 100-150 mm stone cover over a geotextile over made ground have been assumed to be 30% impermeable.

**Table 8:** Contributing surface areas used to model the existing surface water drainage system within the redevelopment site

Southern Development Area

Contributing Surface	PIMP	Area (Ha)
Roofs	100	1.952
Hardstanding (Surfaced)	100	1.932
Hardstanding (Unbound Surfacing)	30	4.326
Total	-	6.278

#### 3.3.2.5.2 Model Input Values

3.3.2.5.2.1 The input values applied to the model are detailed in Table 4, found in Section 3.3.1.5.3. The values are consistent across the development site and therefore apply to each development area.

#### 3.3.2.5.3 Model Output Files

- 3.3.2.5.3.1 The MicroDrainage model for the brownfield runoff assessment suggested that existing peak discharge rates range between 153 and 283 l/s depending on the design storm return period. The simulation results are presented in Appendix B.
- 3.3.2.5.3.2 Three return periods were tested to correspond with the design criteria associated with the proposed redevelopment and the simulation results are shown in Table 9.

#### Drainage Strategy

 Table 9: Modelled existing surface water discharge rates

 Southern Development Site – Catchment S-A (model pipe reference \$1.007)

Design Storm Event (1: xx)	1 year	30 year	100 year
Modelled Discharge Rate (l/s)	153	238	283

#### 3.3.2.6 Allowable Discharge Rates

3.3.2.6.1 The allowable discharge rates promoted for the brownfield development proposal derived in accordance with the IDB's requirements as outlined in Section 3.2.3 are shown in Table 10:

 Table 10: Allowable discharge rates (30% betterment)

Southern Development Site – Catchment S-B and S-C

Design Storm Event (1: xx)	1 year	30 year	100 year
Allowable Discharge Rate (l/s)	106.4	165.9	198.1

3.3.2.6.2 The allowable discharges rates are based on the evaluation of the limited site records, however, are considered to be conservative and appropriate to form the basis of the drainage strategy. The available capacity within the Combined Treated Effluent / Storm Water Pumping Station, as detailed within the calculation presented with Appendix B, is summarised below in Table 11:

#### Table 11: Capacity Assessment

Southern Development Area – Catchment S-A

		Flow rate (l/s)	Velocity (m/s)
Incoming Network	450 mm dia (full bore)	142	-
	600 mm dia (full bore)	302	-
	Available Capacity	160	
Outgoing Network	Pump Capacity (Duty)	75	
	Manifold Pipe (300mm dia – Duty-assist pumping)	150	2

- 3.3.2.6.3 Considering the information in Table 11, it is possible to draw two conclusions in terms of limiting discharge rates:
  - The pipe-full flow from the external catchment is 142 l/s, with a pumping station capacity of 150 l/s. In order to retain the existing pumping station, discharge should be limited to 8 l/s.
  - The available capacity within the existing 600 mm diameter pipework on the gravity network is 160 l/s; in order to retain the existing gravity outfall into the existing wet well, discharge should be limited to 160 l/s. This philosophy would risk overloading the existing pumping station, which would necessitate the pumps to be upsized to accommodate the additional flow.
- 3.3.2.6.4 Restricting the discharge to 8 l/s would result in a significant volume of water needing to be stored within the network. Restricting discharge to 160 l/s would potentially require the existing Combined Treated Effluent / Storm Water Pumping Station to be upgraded to deliver a greater flow rate. The outfall is to the Humber Estuary and therefore increasing the pumping station's discharge flow rate will not affect flood risk in the receiving watercourse (Humber Estuary).
- 3.3.2.6.5 The existing pumping station delivers flows via a 300 mm diameter manifold pipe, which connects to a 600 mm rising main discharging into the Humber Estuary. It is therefore assumed that this 600 mm diameter rising main would have spare capacity to acceptable increased flows, which may additionally aid in the hydraulic performance of the existing main as flows, and therefore velocities, will be higher and help to mitigate the risk of solids settling out in the main over time.
- 3.3.2.6.6 It is therefore proposed to limit discharge to the existing wet well to 160 l/s.

## 3.3.3 Western Development Site

#### 3.3.3.1 Drainage Catchment

3.3.3.1.1 The western development site comprises one development area historically used for vehicle storage and parking, as shown on drawing no B2357300-01-05-19. This area can be subdivided into two drainage catchments. Unlike the other development areas, though, these catchments are not defined by physical features, boundaries, or topography, and are instead defined by the nature of the surfacing. Further details of these drainage catchments are provided in Table 12.

Table 12: Development area drainage catchment information (from geotechnical survey information)Western Development Site

Development Area	Drainage Catchment	Size (Ha)	Surfacing
Main Area	Catchment W-A	4.216	A mixture of impermeable asphalt surfacing and semi- permeable compacted fill. For the purposes of this assessment, only the impermeable asphalt surface area is reported. Area drains via a gravity drainage network to a pumping station discharging to Immingham Dock.
	Catchment W-B	0.364	A mixture of impermeable asphalt surfacing and semi- permeable compacted fill. For the purposes of this assessment, only the impermeable asphalt surface area is reported. Area is assumed to permit a degree of infiltration into the adjacent ground.

## 3.3.3.2 Drainage System

3.3.3.2.1 Catchment W-A comprises a daisy-chained pipe and gully arrangement running along the south-western side of the plot. The gullies collect runoff from the catchment and flows are conveyed through the piped system, via and existing separator, to a recently constructed surface water lift station on the north-eastern boundary of the site. The lift station conveys flows to the adjacent Storm Water Pumping Station which is served by a rising main which discharges directly into Immingham Dock.

#### 3.3.3.3 Proprietary Treatment Facilities and SuDS

3.3.3.1 The surface water drainage system serving the western development site has recently been updated and incorporates proprietary treatment facilities in the form of a separator upstream of the recently constructed surface water lift station. The location of this separator can be found in drawing B2357300-01-05-19.

#### 3.3.3.4 Runoff Assessment

3.3.3.4.1 The drainage within Catchment W-A discharges to Immingham Dock and therefore is not subject to a postdevelopment discharge rate restriction (see Section 3.2.3). It is proposed to utilise the existing drainage system and pumping station to drain flows from the proposed development, subsequently maintaining the existing peak discharge rate via the existing pumping station. It is proposed to control the flows into the pumping station by replacing the existing lift station with a deeper lift station of equivalent discharge rate. 3.3.3.4.2 In lieu of details of the existing lift station, an assessment has been made with regards to the capacity of the upstream gravity network that feeds it. The assessment has been made on the basis that the existing lift station's pump rate is expected to be approximately equivalent to the peak 1 in 1-year discharge rate from its contributing network. The assessment will not consider an allowance for climate change as the assessment is based on the current "actual" discharge rates.

#### 3.3.3.5 Hydraulic Performance – Network Modelling

3.3.3.5.1 An assessment of the hydraulic performance of the existing surface water drainage system serving Catchment W-A was undertaken to quantify the actual runoff that discharges into the lift station. The drainage assessment was conducted by simulating the existing surface water drainage system within the latest version of Innovyze's MicroDrainage suite of software. The simulations were run for the design storm events with the input values detailed below for both summer and winter rainfall profiles.

#### 3.3.3.5.1 Existing Surface Permeability

3.3.3.5.1.1 For the purposes of assessing surface water runoff, all buildings and areas of impermeable hardstanding within the bounds of the redevelopment site that are contributing to the network have been assumed to be 100% impermeable. In addition, all contributing permeable areas have been conservatively discounted from this assessment. In reality, the existing case flows will be greater as additional flows will contribute from these permeable areas.

## Table 13: Contributing surface areas used to model the existing surface water drainage system within the redevelopment site

Western Development Area

Contributing Surface	PIMP	Area (Ha)
Roofs	100	0.000
Hardstanding (Surfaced)	100	4.216
Total	-	4.216

#### 3.3.3.5.2 Model Input Values

3.3.3.5.2.1 The input values applied to the model are detailed in Table 4, found in Section 3.3.1.5.3. The values are consistent across the development site and therefore apply to each development area.

#### 3.3.3.5.3 Model Output Files

- 3.3.3.5.3.1 The MicroDrainage model for the brownfield runoff assessment suggested that the existing peak discharge rates range between 129.7 and 138.1 l/s depending on the design storm return period. The simulation results are presented in Appendix B.
- 3.3.3.5.3.2 Three return periods were tested to correspond with the design criteria associated with the proposed redevelopment; the simulation results are shown in Table 14.

 Table 14: Modelled existing surface water discharge rates

 Western Development Site – Catchment W-A (model pipe reference \$1.009)

Design Storm Event (1: xx)	1 year	30 year	100 year
Modelled Discharge Rate (l/s)	129.7	137.9	138.1

#### 3.3.3.6 Allowable Discharge Rates

The assessment has been made on the basis that the existing lift station's pump rate is expected to be approximately equivalent to the peak 1 in 1-year discharge rate from its contributing network. From Table 14, which shows a 1 in 1-year discharge rate of 129.7 l/s, it is proposed to limit the discharge from this catchment to a slightly lower value of 120 l/s, as summarised below in Table 15:

#### Drainage Strategy

#### Table 15: Allowable discharge rates (30% betterment)

Western Development Site – Catchment W-A

Design Storm Event (1: xx)	1 year	30 year	100 year
Allowable Discharge Rate (l/s)	120	120	120

The allowable discharges rates are based on the evaluation of the limited site records, however, are considered to be conservative and appropriate to form the basis of the drainage strategy.

### 3.4 Surface Water Drainage Strategy

#### 3.4.1 Introduction

- 3.4.1.1 A drainage strategy has been developed to support the proposed terminal development, giving consideration to the legislative requirements, operational layout, existing site drainage and associated outfall arrangements, pollution risk, and the allowable discharge rates as advised by the IDB.
- 3.4.1.2 The development site has been subdivided into the following areas due the complexities of the existing Port layout, and thus independent drainage strategies have been developed accordingly:
  - Site-Wide Activities
  - Northern Development Area
  - Southern Development Area
  - Western Development Area
- 3.4.1.3 The strategy encompasses the grading of the pavement within the development areas, flood risk mitigation and quality improvements to ensure the transfer of flows into the receptor do not have a negative impact on the environment.
- 3.4.1.4 The provision of suitable storage on site to mitigate the flood risk resulting from the development of the site will be a key component of the evolution of the site development layout. The provision of large volumes of attenuation within an operational port is challenging, and thus storage options which comprise buried structures is favoured to surface storage features such as detention basins.

#### 3.4.2 Site-Wide Activities

#### 3.4.2.1 Site Grading

- 3.4.2.1.1 The existing Cargo Handling Areas shall be regraded to ensure the new terminal areas are effectively drained and that surface water runoff, generated through the creation of significant areas of impermeable hardstanding, is retained within the bounds of the development during all design storm events prior to being treated and discharged appropriately.
- 3.4.2.1.2 The grading of the areas of hardstanding supporting the facility has been undertaken with due regard to the functionality of the facility and has aided in the positioning of drainage collection facilities within the various sub-catchments. The gradients promoted align with the finished surfacing materials to ensure the effective runoff of surface water to negate ponding, and the potential for ice forming on the surface during the colder winter months.
- 3.4.2.1.3 The grading layout ensures that all areas of hardstanding in general fall away from the envelope of any buildings and that the new pavement levels tie-in with existing topography to negate the transfer of surface water runoff outside the development boundary. Due to the level of the infrastructure located around the perimeter of the site, which is in general at a level of approximately +5 mAOD, and the intent to discharge the runoff generated within the area via existing infrastructure, it is envisaged that ground levels will be raised. The pavement grading has been aligned to suit the allocated trailer parking and container stacking layout, whilst the proposed gradients typically range between 1 in 60 and 1 in 100 in accordance with BS EN

752:2017 ([Ref. 7). The grading typically promotes a ridge and valley arrangement, with both the ridges and the valleys located away from vehicle parking spaces.

- 3.4.2.1.4 The UK Border Force Examination Buildings incorporate flush thresholds to enable free access to vehicles subject to examination.
- 3.4.2.1.5 The ABP controlled railway tracks are typically lower than the proposed areas of hardstanding which have been graded to fall away from the tracks to ensure the paving is effectively drained. A new level crossing will facilitate vehicular movements and the grading layout promotes appropriate approach alignments.
- 3.4.2.1.6The site grading across the Development Area is detailed on drawing no B2357300 01 05 08.

#### 3.4.2.2 Collector systems

- 3.4.2.2.1 The collector system is to comprise gullies located in the valleys within the pavement; these gullies will be placed at an appropriate spacing, which will align with the serviceable catchment. The spacing of gullies shall ensure a negligible surface water profile on the pavement during low order rainfall events.
- 3.4.2.2.2 Due to the proposed utilisation of the site, it is considered acceptable to permit short term ponding in the vicinity of the gullies during high intensity rainfall events, however, the spacing shall be sufficient to not result in flooding outside of the site boundary during short-duration and high-intensity 1 in 100-year (+CC) storm events. The spacing of gullies will be carried out during detailed design and have been shown indicatively on drawings B2357300 01 05 01, 02 and 09. The gullies will be connected to a number of lateral branches, typically comprising 225 mm diameter pipework; these shall have a minimum cover of 900 mm.

# 3.4.2.3 3.4.2.2.3 Channel drains will be placed in remote areas of hardstanding to facilitate connectivity with the main conveyance drainage, and across level building thresholds which have been provided to enable free access to vehicles subject to UK Border Force examination. Storage Structures

- 3.4.2.3.1 To accommodate the extensive storage volumes with the networks, which are required to balance the flows within the drainage systems during the design events, the strategy includes for the provision of geocellular storage crates. Where feasible, these shall be constructed under the trailer parking areas and be of sufficient long term strength to withstand the anticipated loading. The position of these crates has been selected to ensure that the capacity offered by the 95% void ratio is maximised, whilst chambers shall be constructed either side of the geocellular crates to enable the central distribution pipe to be efficiently maintained. To prevent infiltration and minimise the potential of groundwater mixing, the crates will additionally be lined with an impermeable membrane.
- 3.4.2.3.2 Development specific details for the promoted storage structures are provided in the following area specific strategies with their indicative locations shown in drawings B2357300 01 05 01, 02 and 09 for the northern, southern, and western areas respectively. The crate configurations will be further developed during detailed design.

#### 3.4.2.4 Hydraulic Performance – Network Modelling

3.4.2.4.1 The surface water drainage system serving the areas of hardstanding within each development were modelled using the latest version of Innovyze's MicroDrainage suite of software. Input values used in the MicroDrainage models are shown in Table 16 for the design criteria. Input values regarding the contributing surfaces for the individual development areas are detailed within the following area specific sections.

#### 3.4.2.4.1 Proposed Surface Topography

- 3.4.2.4.1.1 Ground levels used for the development of the network models were based on the proposed pavement levels for the new development areas and existing topographical survey data, as represented by Lidar for areas outside of the development sites.
- 3.4.2.4.1.2 A general arrangement of the proposed site grading for all development areas is detailed in Drawing No B2357300 01 05 08, which is presented in Appendix A.

#### 3.4.2.4.2 Proposed Surface Permeability

3.4.2.4.2.1 For the purposes of assessing surface water runoff, all buildings and areas of impermeable hardstanding within the bounds of the redevelopment site have been assumed to be 100% impermeable.

#### 3.4.2.4.3 Model Input Values

3.4.2.4.3.1 The input values applied to the model are detailed in Table 16.

# Table 16: Notes on the design criteria and input values used to model the post-development surface water drainage network in MicroDrainage

Northern Catchment

Model Design Criteria	Value(s)	Notes
Discharge rate and attenuation	North: See Table 18 South: See Table 21Table 23 West: See Table 26	<ul> <li>North: 30% betterment on current "actual" peak discharge rates.</li> <li>South: Catchment S-A – Control to not exceed available capacity within existing gravity inlet to wetwell</li> <li>South: Catchments S-B and S-C – 30% betterment on current "actual" peak discharge rates</li> <li>West: Limit flows to pump rate from existing lift station</li> </ul>
Climate change	CC: 25%	See section 3.2.5, 'Climate Change'
Design event	1, 30, and 100 years	-
Rainfall data	M5-60: 17 mm Ratio (R): 0.400	Rainfall data for the site location was obtained from the Flood Studies Report (FSR) and through the HR Wallingford online tool.
Volumetric Run-off Coefficient	Summer: 0.75 Winter: 0.84	Standard volumetric runoff coefficients of 0.75 and 0.84 were applied for the summer and winter respectively.
Minimum velocities	0.8 m/s	The gradients specified typically promote a minimum velocity at full bore of 0.8 m/s to ensure self- cleansing, whilst maintaining a positive connection to outfalls.
Pipe size	150 mm (Minimum)	A minimum pipe size of 150 mm diameter has been used for conveyance within carrier pipework.
Depth of cover and pipe depths	1.2 m (minimum)	A minimum cover depth of 1.2 m has been maintained where possible to provide adequate protection to the pipes and avoid any clashes with existing and proposed utilities. Where this is not possible, an absolute minimum depth of cover of 0.9 m has been applied.
Chambers	1200 mm diameter	Access chambers have been sized in accordance with Design and Construction Guidance (2020) ([Ref. <b>5</b> ) to facilitate maintenance.
Global manhole headloss	0.5	Default software value
Pipe roughness	0.6 mm	Standard Colebrook-White roughness coefficient for surface water drainage design

#### 3.4.2.5 Proprietary Pollution Prevention Facilities

- 3.4.2.5.1 Due to the operational nature of the development sites, it is proposed to install Class 1 Full Retention Separators; these separators are designed to achieve a discharge concentration of less than 5 mg/litre of oil under standard test conditions prior to discharge to a watercourse, and thus meet the legislative requirements.
- 3.4.2.5.2 The separators will be installed in the downstream sections of the drainage systems to ensure the entirety of the development sites are effectively treated. Due to capacity limitations of the proprietary separators, a number of separators have been specified across the network. The location of the separators will facilitate access for regular maintenance and thus ensure the long term performance of the proprietary treatment facilities. Indicative locations are shown on drawings in drawings B2357300 01 05 01, 02 and 09 for the northern, southern, and western areas respectively.
- 3.4.2.5.3 In addition, the fuel station, located within the southern network, is proposed to be protected by the inclusion of a perimeter drain discharging via a Class 1 Full Retention Forecourt Separator, which has 7600 litres capacity to deal with a significant spillage.

#### 3.4.3 Northern Development Area

#### 3.4.3.1 Main Conveyance Drainage System

- 3.4.3.1.1 The drainage conveyance system is to comprise pipework ranging between 225 to 900 mm diameter. The downstream section of the conveyance drain shall connect into the existing 525 mm diameter outfall pipework within the bounds of the development site. This outfall discharges via an existing headwall structure located on the west bank of the Habrough Marsh Drain; the invert level is assumed to be +0.879 mAOD.
- 3.4.3.1.2 The pipework is typically installed with a depth of cover of between 1.2 and 2.7 m and is supported by appropriately sized catchpits installed at intervals no greater than 90 m in accordance with the DCG, Version 2.0, 2020 ([Ref. 5).

#### Flow Control

- 3.4.3.1.3 To ensure compliance of the allowable discharge rates for the assessed design storm events, as discussed with the Internal Drainage Board, it is proposed to construct a Flow Control Chamber upstream of the point of connection with the existing outfall. This chamber will incorporate two orifice plates at different levels, designed to limit the varying pass forward flows for all storm events. The diameters of the orifice plates were established through an iterative process within MicroDrainage:
  - 170 mm diameter orifice plate at +1.400 mAOD (utilised for all storm events)
  - 208 mm diameter orifice plate at +2.565 mAOD (utilised during the 1 in 30 year and higher order design storm events)
- 3.4.3.1.4 The flow control chamber will be in an accessible location to facilitate maintenance; the provision of a bypass arrangement shall be assessed during detailed design as the risk of exceedance flows being transferred to the Habrough Marsh Drain in relation to the upstream catchment should a blockage occur will be required to be evaluated.

#### Storage Structures

- 3.4.3.1.5 To accommodate the extensive storage volumes with the network, the strategy includes for the provision of geocellular storage crates as detailed in Section 3.4.2.3. Quick storage estimate calculations using the Source Control module of MicroDrainage show that up to 3000 m<sup>3</sup> of storage would be required to accommodate rainfall during a 1 in 100 year storm event within the northern development area.
- 3.4.3.1.6 Within the model, approximately 1300 m<sup>3</sup> of storage has been provided via geocellular crating, with additional storage provided within the network pipework. This extensive volume of crating has been located throughout the network to create ten separate storage areas and ensure the individual storage volumes are fully utilised. A minimum cover depth of 1.5 m to the top of the geocellular crating has been maintained throughout, with the height of the crate volumes therefore ranging between 0.3 and 1.5 m dependent on the

depth of the drainage network at their location. Accordingly, the base level of the separate storage volumes also varies between +3.2 and +1.8 mAOD.

3.4.3.1.7 A general arrangement of the proposed drainage system is detailed in Drawing No B2357300 - 01 - 05 - 01, which is presented in Appendix A.

#### 3.4.3.2 Contributing Areas & Runoff Assessment

- 3.4.3.2.1 It is standard practice to assess both existing and proposed runoff from the contribution areas within a brownfield development site to inform the drainage design with regards to the application of SuDS and the management of discharged flow rates; this may be as a result of a change in land designation, change in catchment area where the site is currently positively drained, or the inclusion of climate change.
- 3.4.3.2.2 The development site is in part currently served by a positive drainage system which discharges to the Habrough Marsh Drain; it is proposed to retain the outfall, and thus the runoff from the existing drainage system has been assessed and the allowable discharge rates for all design storm events are detailed in Section 3.2.3. The runoff assessment associated with the proposed catchment area and permeable subcatchments is detailed below.

#### Proposed Catchment Area

- 3.4.3.2.3 The proposed development site covers an area of approximately 4.735 ha, which is to be paved with an impermeable material; there are no buildings within this catchment.
- 3.4.3.2.4 Details of the contributing areas is summarised in Table 17 and detailed in Drawing B2357300 01 05 11.

Table 17: Contributing surface areas used to model the proposed surface water drainage system withinthe redevelopment site

Northern Development Area

Contributing Surface	PIMP	Area (Ha)
Impermeable	100	4.735
Semi-permeable	30	0.0
Permeable	20	0.0

#### Runoff Rate Assessment

3.4.3.2.5 An assessment of pre and post development discharge rates has been undertaken based on the requirements of the Internal Drainage Board; the derived allowable discharge rate are detailed in Section 3.3.1.6 and are replicated in Table 18 below.

 Table 18: Allowable discharge rates (30% betterment)

 Northern Development Site – Catchment N-A

Design Storm Event (1: xx)	1 year	30 year	100 year
Allowable Discharge Rate (l/s)	58.0	134.7	159.7

#### 3.4.3.3 Hydraulic Performance - Model Output

3.4.3.3.1 The drainage networks have been modelled using the latest version of Innovyze's MicroDrainage suite of software. The simulation results are presented in Appendix B with a summary of the modelled discharge rates presented in Table 19.

## Table 19: Hydraulic performance compared with respect to the design criteria Northern Development Site – Catchment $N_{-A}$

Northern Development Site – Catchment N-A

Design Storm Event (1: xx)	1 year	30 year	100 year
Allowable Discharge Rate (l/s)	58.0	134.7	159.7
Model Output (l/s)	57.1	127.2	154.9

3.4.3.3.2 The simulation results demonstrate that the drainage system adequately meets the hydraulic design criteria outlined in Sections 3.2.3 and 3.2.4. The results show no surcharging within the network with the exception of immediately upstream of the flow control, for the 1 in 1 year return period event, including a 25% allowance for climate change. The results also show no flooding resulting from a 1 in 30 year return period event, including a 25% (Central) allowance for climate change. The results also show no flooding resulting from a 1 in 30 year return period event, including a 25% (Central) allowance for climate change. The system has also been checked against the 1 in 100 year return period event, including a 25% (Central) allowance for climate change, and has been found to fulfil the requirements of the stipulated design criteria. No flooding is observed for this event and therefore no further calculation is required to determine the extent of surface flooding.

#### 3.4.3.3.1 Sensitivity Testing

- 3.4.3.3.1 Sensitivity testing has been carried out to assess the hydraulic performance of the drainage networks with a gravity outfall in periods of high water levels in the receiving watercourse (Habrough Marsh Drain). For each sensitivity test, the model was run for a range of return periods up to and including the 1 in 30-year +CC event, for durations up to and including 1440 mins (24 hours), on the assumption that water levels are unlikely to be this high for longer than 24 hours. The sensitivity testing showed:
  - +3.7 mAOD surcharged outfall level (head from IL of 2.821 m)
    - Northern Catchment N-A showed no flooding for events up to and including the 1 in 25-year event. Flooding began to appear for the 30-year event.
  - +1.9 mAOD surcharged outfall level (head from IL of 1.021 m)
    - Northern Catchment N-A showed no flooding for all events up to and including the 30-year event

#### 3.4.3.4 Exceedance Flows

- 3.4.3.4.1 The surface water network is designed to ensure that the development is free from flooding for all events up to the 1 in 30 year event, +25% climate change allowance in accordance with the requirements of Design and Construction Guidance, Version 2.0, 2020 ([Ref. 5). The model has also been used to assess the flood extents for all events up to the 1 in 100 year event, +25% climate change to inform flood depths within the compound to ensure operations are not impaired; no flooding occurs for the 1 in 100 year event, +25% climate change.
- 3.4.3.2.2 In the event of a storm event in excess of the design return period, or in the event or a blockage in the network, flood waters will be retained within the bounds of the development site due to the pavement grading. Once this storage volume is exceeded, flood water will overtop the envelope of the catchment and be intercepted by adjacent surface water drainage networks, or the Habrough Marsh Drain. A full appraisal shall be undertaken during detailed design using the digital terrain mode; this is required to satisfy the requirements of PPG ([Ref. 4) where surface water flooding is deemed to be a Design Flood Event.

#### 3.4.4 Southern Development Area

#### 3.4.4.1 Main Conveyance Drainage System

3.4.4.1.1 The conveyance drainage system is sub-divided into two drainage systems due to the extent of the catchment.

#### Drainage Catchment S-A

3.4.4.1.2 The drainage system serving the western sub-catchment is to discharge into the existing Combined Treated Effluent / Storm Water Pumping Station and is to comprise a positive drainage conveyance system comprising 225 to 600 mm diameter pipework. The downstream section of the conveyance drain shall connect into the existing 600 mm diameter main inlet pipe located to the north of the pumping station's wetwell.

#### Flow Control

- 3.4.4.1.3 As outlined in Section 3.3.2.6, it is proposed to restrict the discharge from Catchment S-A into the existing gravity wetwell inlet pipework to a combined 160 l/s, for all return periods. This is on the basis that the available capacity within the existing 600 mm diameter pipework on the gravity network is 160 l/s. This philosophy would risk overloading the existing pumping station. It is therefore proposed to upsize the existing Combined Treated Effluent / Storm Water Pumping Station to accommodate the additional flow. Since the outfall is to the Humber Estuary, increasing the pumping station's discharge flow rate will not affect flood risk in the receiving watercourse (Humber Estuary). The existing pumping station delivers flows via a 300 mm diameter manifold pipe, which is assumed to connect to a 600 mm rising main discharging into the Humber Estuary. It is therefore assumed that this 600 mm diameter rising main would have spare capacity to acceptable increased flows, which may additionally aid in the hydraulic performance of the existing main as flows and therefore velocities will be higher, helping to mitigate the risk of solids settling out in the main over time.
- 3.4.4.1.4 To ensure the inflow does not exceed the capacity of the existing gravity inlet pipe to the pumping station it is proposed to install two Flow Control Chambers upstream and either side of the point of connection with the existing inlet pipe. These chambers will incorporate hydrobrakes designed to limit pass forward flows for all storm events, the combined flow not exceeding the allowable discharge rate determined in Section 3.3.2.6:
  - Hydrobrake at +2.421 mAOD, limiting flows to 110 l/s, for the eastern side of the Catchment S-A network
  - Hydrobrake at +2.666 mAOD, limiting flows to 50 l/s, for the western side of the Catchment S-A network
- 3.4.4.1.5 The chambers will be in accessible locations to facilitate maintenance. The provision of a bypass arrangement shall be assessed during detailed design as the risk of flooding the wetwell in relation to the upstream catchment should a blockage occur will be required to be evaluated.
- 3.4.4.1.6 The pipework installed within each catchment is typically installed with a depth of cover of between 0.9 and 2.4 m and is supported by appropriately sized catchpits installed at intervals no greater than 90 m in accordance with the Design and Construction Guidance, Version 2.0, 2020 ([Ref. 5).

#### Drainage Catchments S-B and S-C

3.4.4.1.7 The drainage system serving the eastern sub-catchment is to discharge into the Habrough Marsh Drain and is to comprise a positive drainage conveyance system comprising 225 to 900 mm diameter pipework. The downstream section of the conveyance drain shall connect into the existing 525 mm diameter outfall pipework within the bounds of the development site. This outfall discharges via an existing headwall structure located on the west bank of the Habrough Marsh Drain; the invert level is assumed to be +0.4 mAOD.

#### <u>Flow Control</u>

- 3.4.4.1.8 To ensure compliance of the allowable discharge rate as discussed with the Internal Drainage Board it is proposed to construct a Flow Control Chamber upstream of the point of connection with the existing outfall. This chamber will incorporate a 300 mm diameter orifice plate at +0.575 mAOD that is designed to limit pass forward flows for all storm events. The chamber will be in an accessible location to facilitate maintenance; the provision of a bypass arrangement shall be assessed during detailed design as the risk of exceedance flows being transferred to the Habrough Marsh Drain in relation to the upstream catchment should a blockage occur will be required to be evaluated.
- 3.4.4.1.9 Due to space constraints, two intermediate flow control chambers have been added at strategic points within the network. Both control chambers incorporate a single hydrobrake to limit flows to the downstream network and to reduce the surcharging within the network where the existing Shed 26 drainage converges, to avoid detrimentally affecting the performance of the Shed 26 drainage network. Upstream of each intermediate control chamber, the balance of flow is proposed to be stored within buried geocellular storage crates. The hydrobrakes have been detailed as follows:
  - Hydrobrake at +1.530 mAOD, limiting flows to 50 l/s from the proposed network serving south of Shed 26
  - Hydrobrake at +3.004 mAOD, limiting flows to 5 l/s from the proposed network serving the fuelling station area north of Shed 26

3.4.4.1.10 The pipework installed within each catchment is typically installed with a depth of cover of between 1.2 and 3.2 m and is supported by appropriately sized catchpits installed at intervals no greater than 90 m in accordance with the Design and Construction Guidance, Version 2.0, 2020 ([Ref. 5).

#### Storage

- 3.4.4.1.11 To accommodate the storage volumes with the two catchment networks, the strategy includes for the provision of geocellular storage crates as detailed in Section 3.4.2.3. Quick storage estimate calculations using the Source Control module of MicroDrainage suggest that around 3500 m<sup>3</sup> of storage would be required within the Catchments to accommodate rainfall during a 1 in 100 year storm event.
- 3.4.4.1.12 This volume of storage has been provided through five individual geocellular crate structures, located across the two networks and separated to ensure their volumes are fully utilised. Of these structures, two are in Catchment S-A, one is in Catchment S-B, and two are in Catchment S-C.
- 3.4.4.1.13 Within Catchment S-A, a minimum cover depth of 1.3 m to the top of the crating has been maintained with the height of the crate volumes at 0.9 m to suit the comparatively shallow depth of the pumped drainage network; the base level of the two structures does not go below +2.4 mAOD.
- 3.4.4.1.14 The gravity network within Catchments S-B and S-C is however generally deeper, allowing for deeper crate heights from 0.3 to 1.8 m. Accordingly, a minimum cover depth of 1.5 m to the top of the geocellular crating could be maintained whilst the base levels of the structures ranging from +3.0 to +0.5 mAOD.

#### 3.4.4.2 Contributing Areas & Runoff Assessment

- 3.4.4.2.1 It is standard practice to assess both existing and proposed runoff from the contribution areas within a brownfield development site to inform the drainage design with regards to the application of SuDS and the management of discharged flow rates; this may be as a result of a change in land designation, change in catchment area where the site is currently positively drained, or the inclusion of climate change.
- 3.4.4.2.2 The conveyance drainage system is sub-divided into two drainage systems due to the extent of the catchment as outlined in Section 3.4.4.1.

#### Drainage Catchment S-A

- 3.4.4.2.3 The development site is in part currently served by a positive drainage system. However, due to the extent of the catchment, limited drainage has been installed and none currently discharges into the Combined Pumping Station.
- 3.4.4.2.4 It is proposed to upgrade the pump sets serving the Combined Pumping Station, and thus the allowable discharge rates for all design storm events are detailed in Section 3.3.2.6. The runoff assessment associated with the proposed catchment area and the associated impermeable and permeable sub-catchments is detailed below.

#### Proposed Catchment Area

- 3.4.4.2.5 The proposed development site covers an area of approximately 3.588 ha, which is to be paved with an impermeable material; there are a number of buildings within this catchment, which will also be impermeable.
- 3.4.4.2.6 Details of the contributing areas is summarised in Table 20 and detailed in Drawing B2357300 01 05 02.

## Table 20: Contributing surface areas used to model the proposed surface water drainage system withinthe redevelopment site

Southern Development Area – Catchment S-A

Contributing Surface	PIMP	Area (Ha)
Impermeable	100	3.588
Semi-permeable	30	0.0
Permeable	20	0.0

#### Runoff Rate Assessment

3.4.4.2.7 An assessment of pre and post development discharge rates has been undertaken based on the spare capacity within the existing gravity inlet to the Combined Treated Effluent / Storm Water Pumping Station; the derived allowable discharge rate are detailed in Section 3.3.2.6.

### Table 21: Allowable discharge rates

Southern Development Site – Catchment S-A

Design Storm Event (1: xx)	1 year	30 year	100 year
Allowable Discharge Rate (l/s)	160	160	160

### Drainage Catchments S-B and S-C

- 3.4.4.2.8 The development site is in part currently served by a positive drainage system which discharges to the Habrough Marsh Drain; it is proposed to retain the outfall, and thus the runoff from the existing drainage system has been assessed and the allowable discharge rates for all design storm events are detailed in Section 3.3.2.6.
- 3.4.4.2.9 The runoff assessment associated with the proposed catchment area and the associated impermeable and permeable sub-catchments is detailed below.

### Proposed Catchment Area

- 3.4.4.2.10 The proposed development site covers an area of approximately 12.850 ha, which is to be paved with an impermeable material; there are a number of buildings within this catchment, which will also be impermeable.
- 3.4.4.2.11 Details of the contributing areas is summarised in Table 22 and detailed in Drawing B2357300 01 05 11.

 Table 22: Contributing surface areas used to model the proposed surface water drainage system within

 the redevelopment site

Southern Development Area – Catchments S-B and S-C

Contributing Surface	PIMP	Area (Ha)
Impermeable	100	12.850
Semi-permeable	30	0.0
Permeable	20	0.0

### **Runoff Rate Assessment**

3.4.4.2.12 An assessment of pre and post development discharge rates has been undertaken based on the requirements of the Internal Drainage Board; the derived allowable discharge rate are detailed in Section 3.3.2.6 and are replicated in Table 23 below.

### Table 23: Allowable discharge rates (30% betterment)

Southern Development Site – Catchments S-B and S-C

Design Storm Event (1: xx)	1 year	30 year	100 year
Permitted Discharge Rate (l/s)	106.4	165.9	198.1

## 3.4.4.3 Hydraulic Performance - Model Output

3.4.4.3.1 The drainage networks have been modelled using the latest version of Innovyze's MicroDrainage suite of software. The simulation results are presented in Appendix B with a summary of the modelled discharge rates presented in Table 24.

# Table 24: Hydraulic performance compared with respect to the design criteria Carthern Davidson of the Cathern and C. Davidson of Catherna and C

Southern Development Site – Catchments S-B and S-C

Design Storm Event (1: xx)	1 year	30 year	100 year
Allowable Discharge Rate (l/s)	106.4	165.9	198.1
Model Output (l/s)	93.0	165.3	189.4

### Catchment S-A

- 3.4.4.3.2 The simulation results demonstrate that the drainage system adequately meets the hydraulic design criteria outlined in Sections 3.2.3 and 3.2.4. The results show no surcharging within the proposed network for the 1 in 1 year return period event, including a 25% allowance for climate change. The results also show no flooding resulting from a 1 in 30 year return period event, including a 25% (Central) allowance for climate change.
- 3.4.4.3.3 The system has also been checked against the 1 in 100 year return period event, including a 25% (Central) allowance for climate change and has been found to fulfil the requirements of the stipulated design criteria. Small volumes of flooding are observed for this event at various locations predominantly at heads of runs. The largest volume of flooding within the proposed network is 5.272 m<sup>3</sup> in pipe 8.000. This volume of flooding corresponds to a depth of flooding of 34 mm across the 46 m length of valley. At a 1 in 100 pavement gradient, this flooded area would have a total width of 6.8 m. Flooding is predominantly reported during short duration, high intensity storm events as a direct result of conveyance capacity restrictions in the pipework. As such, this flooding will quickly drain down after the storm's peak has passed.

### Catchments S-B and S-C

- 3.4.4.3.4 The simulation results demonstrate that the drainage system adequately meets the hydraulic design criteria outlined in Sections 3.2.3 and 3.2.4. The results show no surcharging within the proposed network for the 1 in 1 year return period event, including a 25% allowance for climate change. Flooding is noted in pipe 26.000, which is the existing connection from Shed 26, which is not to be modified as part of the works. The flow controls within the network have been strategically located such that the hydraulic performance of pipe 26.000 is not detrimentally impacted by the works. The results also show no flooding resulting from a 1 in 30 year return period event, including a 25% (Central) allowance for climate change. As with the 1 in 1 year results, flooding is noted in pipe 26.000.
- 3.4.4.3.5 The system has also been checked against the 1 in 100 year return period event, including a 25% (Central) allowance for climate change and has been found to fulfil the requirements of the stipulated design criteria. Small volumes of flooding are observed for this event at various locations predominantly at heads of runs. The largest volume of flooding within the proposed network is 8.144 m<sup>3</sup> in pipe 11.000. This volume of flooding corresponds to a depth of flooding of 36 mm across the 62 m length of valley. At a 1 in 100 pavement gradient, this flooded area would have a total width of 7.25 m. Flooding is predominantly reported during short duration, high intensity storm events as a direct result of conveyance capacity restrictions in the pipework. As such, this flooding will quickly drain down after the storm's peak has passed. Flooding is again noted in pipe 26.000 during this event, which is the existing connection from Shed 26, which is not to be modified as part of the works.

## 3.4.4.3.1 Sensitivity Testing

- 3.4.4.3.1.1 Sensitivity testing has been carried out to assess the hydraulic performance of the drainage networks with a gravity outfall in periods of high water levels in the receiving watercourse (Habrough Marsh Drain). For each sensitivity test, the model was run for a range of return periods up to and including the 1 in 30-year +CC event, for durations up to and including 1440 mins (24 hours), on the assumption that water levels are unlikely to be this high for longer than 24 hours. The sensitivity testing showed:
  - +3.7 mAOD surcharged outfall level (head from IL of 3.292 m)
    - Southern Catchments S-B and S-C showed no flooding for all events up to and including the 30-year event
  - +1.9 mAOD surcharged outfall level (head from IL of 1.592 m)
    - $\circ$  Southern Catchments S-B and S-C showed no flooding for all events up to and including the 30-year event

### 3.4.4.4 Exceedance Flows

3.4.4.4.1 The surface water network is designed to ensure that the development is free from flooding for all events up to the 1 in 30 year event, +25% climate change allowance in accordance with the requirements of DCG, Version 2.0, 2020 ([Ref. 5). The model has also been used to assess the flood extents for all design storm events up to the 1 in 100 year event, +25% climate change to inform flood depths within the compound to ensure operations are not impaired; small volumes of flooding occur for the 1 in 100 year event, +25% climate change, all of which are contained within the pavement valleys as intended.

3.4.4.4.2 In the event of a storm event in excess of the design return period, or in the event or a blockage in the network, flood waters will be retained within the bounds of the development site due to the pavement grading. Once this storage volume is exceeded, flood water will overtop the envelope of the catchment and be intercepted by adjacent surface water drainage networks, or the adjacent railway track. A full appraisal shall be undertaken during detailed design using the digital terrain model; this is required to satisfy the requirements of PPG ([Ref. 4) where surface water flooding is deemed to be a Design Flood Event.

# 3.4.5 Western Development Area

## 3.4.5.1 Main Conveyance Drainage System

3.4.5.1.1 The drainage system serving the catchment is to discharge into the existing Stormwater Pumping Station and is to comprise a positive drainage conveyance system comprising 225 to 1200 mm diameter pipework. The downstream section of the conveyance drain shall discharge into the inlet to a proposed lift station which is served by a small section of rising main that lifts the flows into the storm water pumping station. The proposed lift station is to replace the existing lift station on a like-for-like basis in terms of pumping rates on the basis that the downstream stormwater pumping station is capable of dealing with this inflow. The lift station is required to be replaced due to the vertical alignment of the proposed conveyance drainage which is deeper than the existing drainage arrangement.

Flow Control

3.4.5.1.2 To ensure the inflow does not exceed the capacity of the like-for-like replacement lift station, the pumping capacity has been estimated and used as the allowable discharge rate (see Section 3.3.3.6). To control flows to the allowable discharge rate it is proposed to construct a Flow Control Chamber upstream of the lift station. This chamber will incorporate a hydrobrake at +0.792 mAOD and limit the pass forward flow to 120 l/s. Excess flows conveyed in the drainage system are required to be stored within the network.

Storage

- 3.4.5.1.3 To accommodate the extensive storage volumes with the network, the strategy includes for the provision of geocellular storage crates as detailed in Section 3.4.2.3. Quick storage estimate calculations using the Source Control module of MicroDrainage show that up to around 4000 m<sup>3</sup> of storage would be required to accommodate rainfall during a 1 in 100 year storm event within the northern development area.
- 3.4.5.1.4 Within the model, approximately 3000 m<sup>3</sup> of storage has been provided via geocellular crating. This extensive volume of crating has been located throughout the network to create three separate storage areas and ensure the individual storage volumes are fully utilised. A minimum cover depth of 1.4 m to the top of the geocellular crating has been maintained throughout, with the height of the crate volumes therefore ranging between 0.3 and 1.2 m dependent on the depth of the drainage network at their location. Accordingly, the base level of the separate storage volumes also varies between +3.0 and +2.0 mAOD.
- 3.4.5.1.5 The pipework installed within the catchment is typically installed with a depth of cover of between 1.2 and 3.8 m and is supported by appropriately sized catchpits installed at intervals of no greater than 90 m in accordance with the DCG, Version 2.0, 2020 ([Ref. 5).
- 3.4.5.1.6 A general arrangement of the proposed drainage systems is detailed in Drawing No B2357300 01 05 09, which is presented in Appendix A.

# 3.4.5.2 Contributing Areas & Runoff Assessment

- 3.4.5.2.1 It is standard practice to assess both existing and proposed runoff from the contribution areas within a brownfield development site to inform the drainage design with regards to the application of SuDS and the management of discharged flow rates; this may be as a result of a change in land designation, change in catchment area where the site is currently positively drained, or the inclusion of climate change.
- 3.4.5.2.2 The development site is in part currently served by a positive drainage system, however, due to the extent of the catchment limited drainage has been installed; all runoff is discharged to the stormwater lift station.

3.4.5.2.3 It is proposed to maintain the flows rate from the lift station; the allowable discharge rates for all design storm events are detailed in Section 3.3.3.6. The runoff assessment associated with the proposed catchment area and the associated impermeable and permeable sub-catchments is detailed below.

### Proposed Catchment Area

3.4.5.2.4 The proposed development site covers an area of approximately 9.570 ha, which is to be paved with an impermeable material; there are no buildings within this catchment. Details of the contributing areas is summarised in Table 25 and detailed in B2357300 - 01 - 05 - 09.

# Table 25: Contributing surface areas used to model the proposed surface water drainage system within the redevelopment site

Western Development Area

Contributing Surface	PIMP	Area (Ha)
Impermeable	100	9.570
Semi-permeable	30	0.0
Permeable	20	0.0

### Runoff Rate Assessment

3.4.5.2.5 An assessment of pre and post development discharge rates has been undertaken based on maintaining the existing pump rate for the replacement lift station; the derived allowable discharge rate are detailed in Section 3.3.3.6.

### Table 26: Allowable discharge rates

Western Development Site

Design Storm Event (1: xx)	1 year	30 year	100 year
Allowable Discharge Rate (l/s)	120	120	120

## 3.4.5.3 Hydraulic Performance - Model Output

3.4.5.3.1 The drainage networks have been modelled using the latest version of Innovyze's MicroDrainage suite of software. The simulation results are presented in Appendix B with a summary of the modelled discharge rates presented in Table 27

### Table 27: Hydraulic performance compared with respect to the design criteria

Western Development Site

Design Storm Event (1: xx)	1 year	30 year	100 year
Allowable Discharge Rate (l/s)	120	120	120
Model Output (l/s)	119.5	119.5	119.5

- 3.4.5.3.2 The simulation results demonstrate that the drainage system adequately meets the hydraulic design criteria outlined in Sections 3.2.3 and 3.2.4. The results show no surcharging within the network with the exception of immediately upstream of the flow control, for the 1 in 1 year return period event, including a 25% allowance for climate change. The results also show no flooding resulting from a 1 in 30 year return period event, including a 25% (Central) allowance for climate change.
- 3.4.5.3.3 The system has also been checked against the 1 in 100 year return period event, including a 25% (Central) allowance for climate change and has been found to fulfil the requirements of the stipulated design criteria. Small volumes of flooding are observed for this event at various locations predominantly at heads of runs. The largest volume of flooding within the proposed network is 7.766 m<sup>3</sup> in pipe 7.000. This volume of flooding corresponds to a depth of flooding of 60 mm across the 22.378 m length of valley. At a 1 in 100 pavement gradient, this flooded area would have a total width of 12 m. Flooding is predominantly reported during short duration, high intensity storm events as a direct result of conveyance capacity restrictions in the pipework. As such, this flooding will quickly drain down after the storm's peak has passed.

## 3.4.5.4 Exceedance Flows

- 3.4.5.4.1 The surface water network is designed to ensure that the development is free from flooding for all events up to the 1 in 30 year event, +25% climate change allowance in accordance with the requirements of DCG, Version 2.0, 2020 ([Ref. 5). The model has also been used to assess the flood extents for all events up to the 1 in 100 year event, +25% climate change to inform flood depths within the compound to ensure operations are not impaired; small volumes of flooding occur for the 1 in 100 year event, +25% climate change, all of which are contained within the pavement valleys as intended.
- 3.4.5.4.2 In the event of a storm event in excess of the design return period, or in the event or a blockage in the network, flood waters will be retained within the bounds of the development site due to the pavement grading. Once this storage volume is exceeded, flood water will overtop the envelope of the catchment and be intercepted by adjacent surface water drainage networks, or the adjacent railway track. A full appraisal shall be undertaken during detailed design using the digital terrain model; this is required to satisfy the requirements of PPG ([Ref. 4) where surface water flooding is deemed to be a Design Flood Event.

# 3.5 Enabling Works

- 3.5.1 The existing Drury Ltd. site does not fall under the development scope. However, although no new drainage infrastructure is being proposed, to enable the construction of the proposed overbridge foundations, two sections of the existing surface water drainage network will need relocating. These sections are located at either end of the bridge structure.
- 3.5.2 For the northern end of the bridge structure, enabling works are to include:
  - The abandonment and demolition of one existing manhole;
  - The abandonment and demolition of one existing surface water pumping station (pumped manhole);
  - The abandonment and demolition of a section of existing pipework, including some carrier pipework and portions of multiple connections;
  - The construction of new pipework, providing connection between the remaining existing pipework and continuing the conveyance of collected runoff within the wider network;
  - The construction of four new manholes, to connect the new pipework into the existing network, continue the conveyance of collected runoff within the wider network, and provide maintenance access;
  - The construction of a new like-for-like pumping station (pumped manhole), to replace and replicate the existing station;
  - The construction of a new rising main, to replace and replicate the existing rising main connection.
- 3.5.3 For the southern end of the bridge structure, enabling works are to include:
  - The abandonment and demolition of one existing manhole;
  - The abandonment and demolition of a section of existing pipework, including some carrier pipework and an existing connection;
  - The construction of new pipework, to replicate an existing connection and continue the conveyance of collected runoff within the wider network;
  - The construction of two new manholes, to connect the new pipework into the existing network and continue the conveyance of collected runoff within the wider network;
  - The construction of one new inspection chamber, to provide maintenance access.

### 3.5.4 These works are detailed in Drawing B2357300 01 - 05 - 07, which is presented in Appendix A.

# Foul Water Drainage Strategy

- 4.1 The development proposal includes for the construction of buildings and facilities as detailed below:
  - Terminal Building
  - Customer Welfare Building
  - Workshop and Fuel Station
  - UK Border Force Customs Building and supporting infrastructure, including Immigration PCP Booths and Marshalling Lanes, Cyclamen Portal, Secondary Examination Building, Holding Facility, and Inspection Areas
  - Workshop and Office buildings for Malcom West Forklifts
  - Substation
  - Frequency Converter Building for Shore Power System
- 4.2 There are numerous buildings within the Port and it is assumed that these are served by dedicated wastewater drainage systems which are not adopted or served by a public sewerage system, and thus are the responsibility of the Port. Based on available records the wastewater drainage systems discharge to package treatment plants or cesspits. The treated effluent is conveyed to Pumping Stations that discharge to the Humber Estuary whilst the cesspits will require emptying via tanker. The Combined Treated Effluent / Stormwater Pumping Station in the bounds of the development site is subject to an Environmental Permit which limits the daily volume of treated effluent that is discharged into the Humber Estuary.
- 4.3 It is proposed to provide wastewater infrastructure to support the buildings; however, the layout and functionality shall be subject to development during detailed design. The proposed strategy is to treat the wastewater local to the building via a package treatment plant and convey the treated effluent to one of the combined pumping stations that discharge the treated effluent directly to the Humber Estuary, or to the Habrough Marsh Drain via the proposed surface water drainage networks. The increase in the volume of treated effluent discharged into the Humber Estuary will be subject to the agreement of the Environment Agency, and similarly any discharge into the Habrough Marsh Drain shall be subject to the consent of the IDB.
- 4.4 Indicative drainage arrangements associated with the buildings or facilities that incorporate welfare facilities are shown on Drawing No. B2357300 01 05 04 which is presented in Appendix A.

# Conclusion

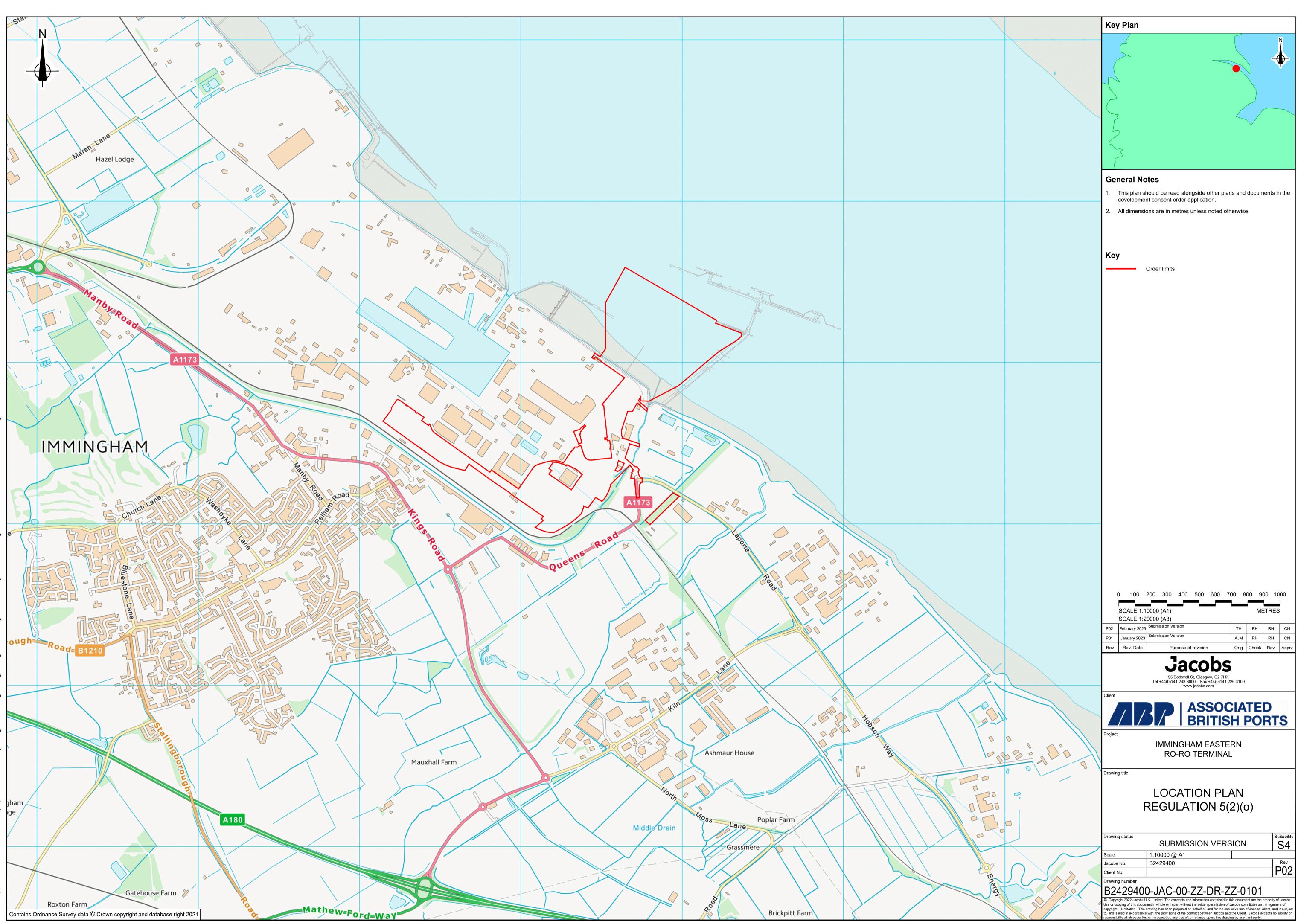
- 5.1 Jacobs has been commissioned to compile a Drainage Strategy associated with the construction of a new rollon/roll-off facility within the Port of Immingham, located on the south bank of the Humber Estuary. A strategy comprising the following elements has therefore been developed to support the DCO application and considers the existing and proposed infrastructure, together with the logistics associated with operating the terminal:
  - **Design**: The surface water drainage network has been developed in accordance with Design and Construction Guidance (2020) ([Ref. 5), Building Regulations, Planning Policy and Climate change guidance published by HM Government in May 2022 ([Ref. 8). Additional site-specific criteria relating to the allowable presence and impact of flooding have also been considered.
  - **SuDS**: Due to the underlying ground conditions, potentially high groundwaters, and potential presence of contaminants, SuDS features have not been deemed appropriate for the development.
  - **Grading**: Grading of the development Yards has been undertaken with due regard to the functionality of the facilities and ensures the effective runoff and collection of surface water. Additionally, the layout ensures that new pavement levels tie-in with existing topography and the railway level crossing is retained. The grading typically promotes a ridge and valley arrangement.
  - **Collector systems**: The collector system is to comprise highway gullies located in the valleys within the pavement, the spacings of which will be carried out during detailed design with due consideration for flow widths and ponding depth in relation to the functionality of the facility. Channel drains will be placed in remote areas of hardstanding to facilitate connectivity with the main conveyance drainage, and across level building thresholds which have been provided to enable free access to vehicles subject to UK Border Force examination.
  - **Conveyance**: A positive drainage conveyance system comprising 225 to 900 mm diameter pipework is being promoted, typically installed with a minimum cover depth of 0.9 m and supported by appropriately sized catchpits.
  - Discharge rates and flow control: The existing discharge arrangements are to be mimicked for an appropriate range of rainfall events (1, 30 and 100 years), including an allowance for climate change. For outfalls into the Habrough Marsh Drain, the IDB have stipulated a 30% betterment in relation to the 'actual' existing discharge. To ensure compliance, the construction of a Flow Control Chamber upstream of each network's outfall is being promoted. Flows are being controlled using hydrobrakes and orifice plates as deemed appropriate.
  - **Outfalls**: As per guidance form the IDB, existing surface water outfalls have been utilised for all development areas. All of these ultimately discharge into the Humber Estuary, via either the Habrough Marsh Drain or Immingham Dock.
  - **Proprietary pollution prevention**: Due to the operational nature of the development sites, it is proposed to install a number of Class 1 Full Retention Separators across the surface water drainage network to ensure appropriate and effective treatment. In addition, the Fuel Station is proposed to be contained by the inclusion of a perimeter drain and Class 1 Forecourt Separator.
  - **Storage**: To accommodate the extensive storage volumes required with the network, the strategy includes for the provision of geocellular storage crates located to facilitate full utilisation and constructability. The geocellular storage crates shall be of sufficient long term strength to withstand the anticipated loads and be lined to prevent groundwater interaction.
  - Exceedance flows: The northern catchment remains free from flooding during the 1:100 year design storm event, +25% CC. Small volumes of flooding have however been shown to occur within the Southern and Western catchments. These flood volumes are contained within the catchment, within the pavement valleys, as per design. During extreme events in excess of the design period, runoff will overtop the catchment envelope and be intercepted by adjacent drainage infrastructure.
  - Foul water: The development proposal includes for the construction of a number of General and Operational Buildings. It is proposed to provide wastewater infrastructure to support the buildings

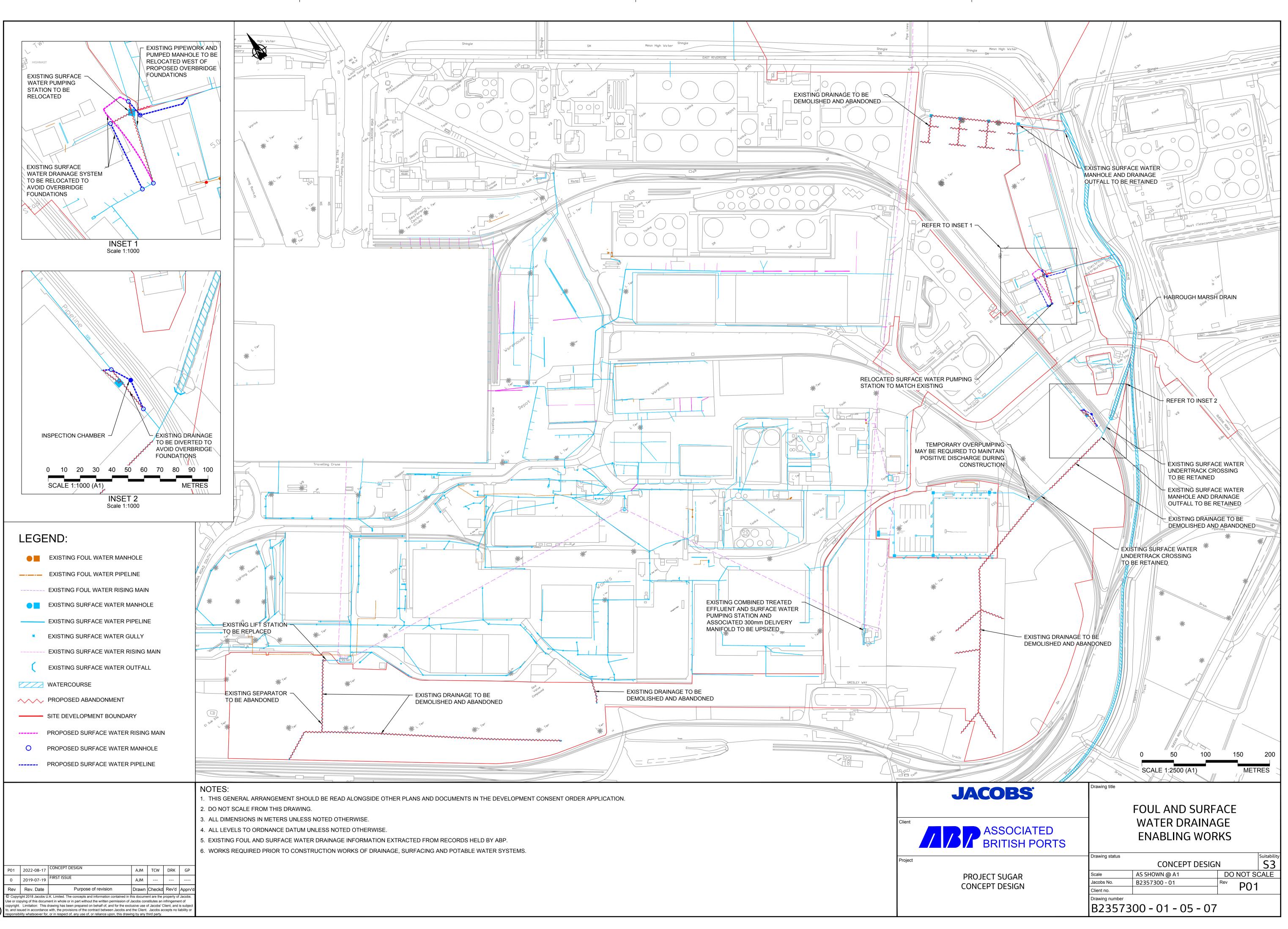
incorporating welfare facilities, however, their layout and functionality shall be subject to development during detailed design.

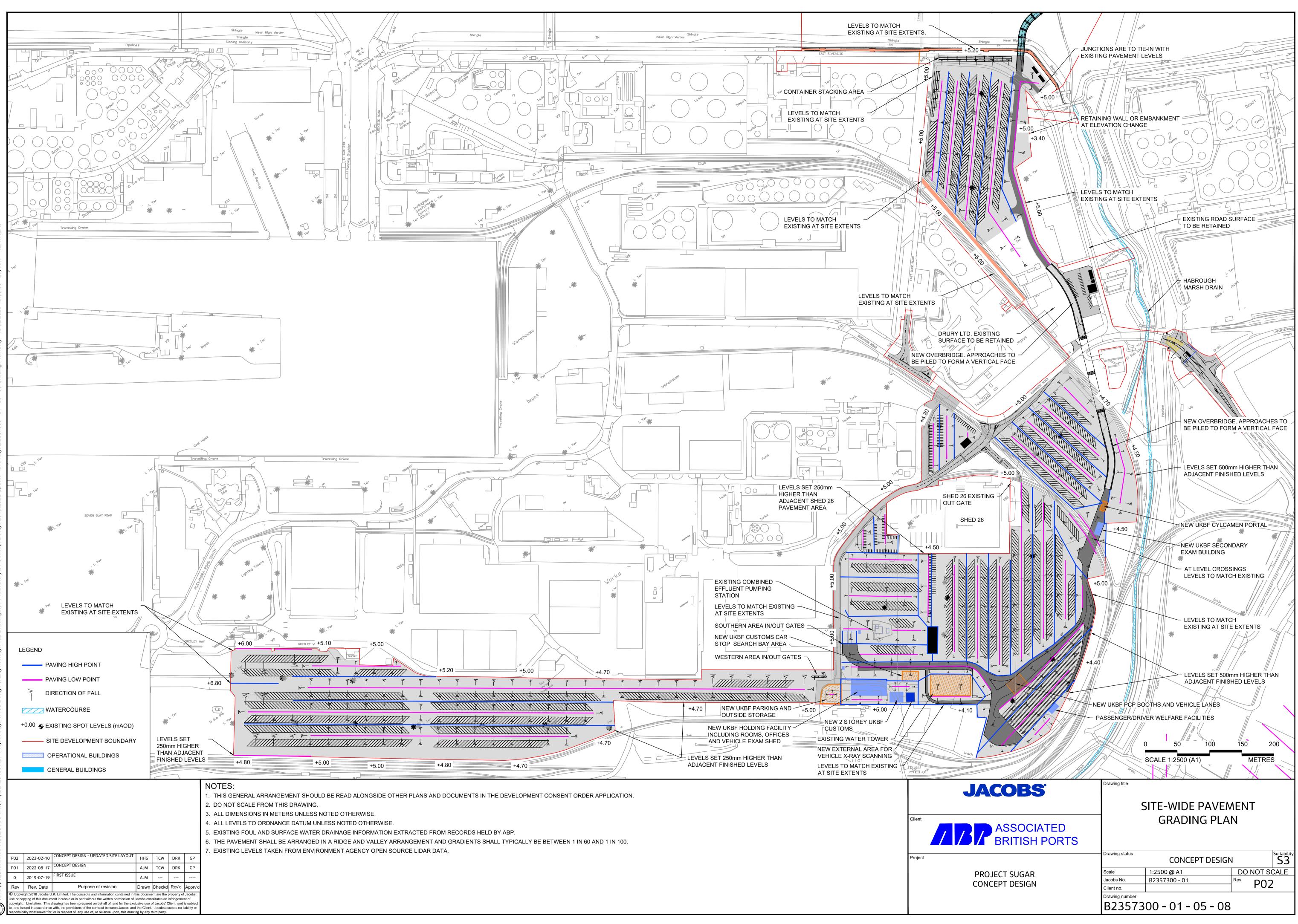
5.2 The hydraulic performance of the promoted drainage proposals has been computationally modelled and demonstrate that the drainage system adequately meets the hydraulic design criteria as detailed.

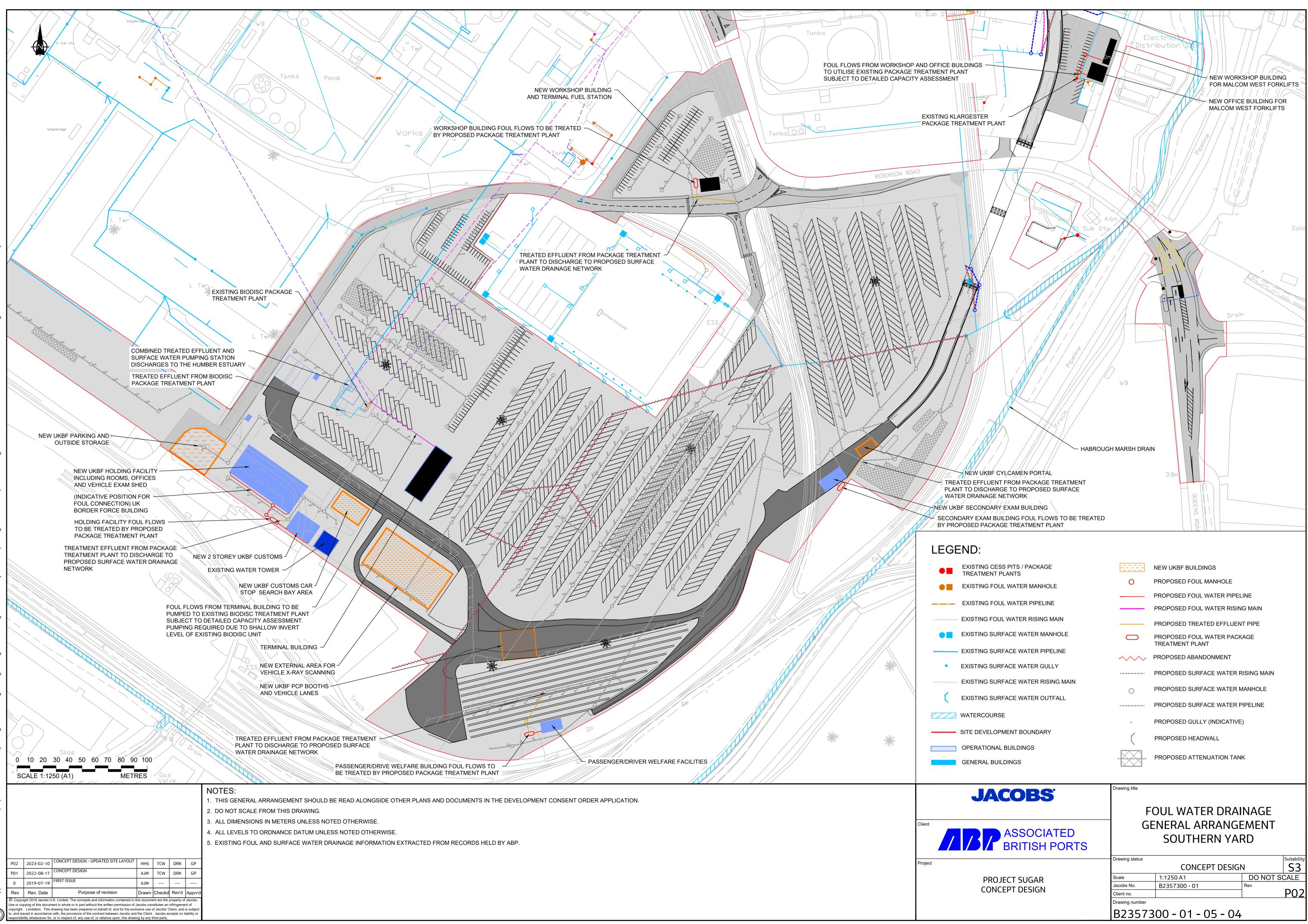
# **Appendix A. Drawings**

- A1 Site Location Plan B2357400 JAC 00 ZZ 0101 General Arrangements
- A2 Enabling Works B2357300 01 05 07
- A3 Grading Plan B2357300 01 05 08
- A4 Foul Water B2357300 01 05 04
- A5 Northern Yard: Existing B2357300 01 05 011
- A6 Southern Yard: Existing B2357300 01 05 012
- A7 Western Yard: Existing B2357300 01 05 019
- A8 Northern Yard: Proposed B2357300 01 05 01
- A9 Southern Yard: Proposed B2357300 01 05 02
- A10 Western Yard: Proposed B2357300 01 05 09



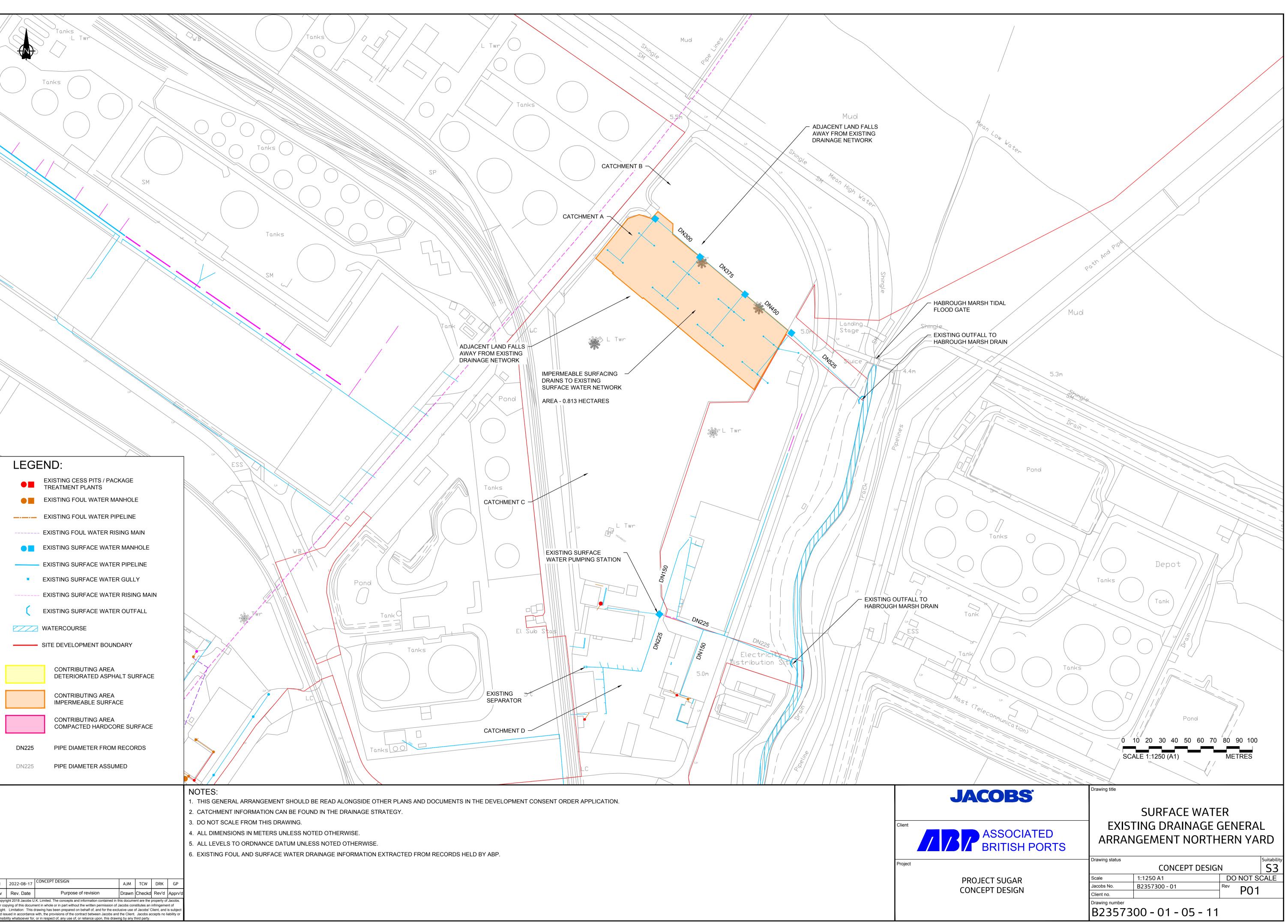




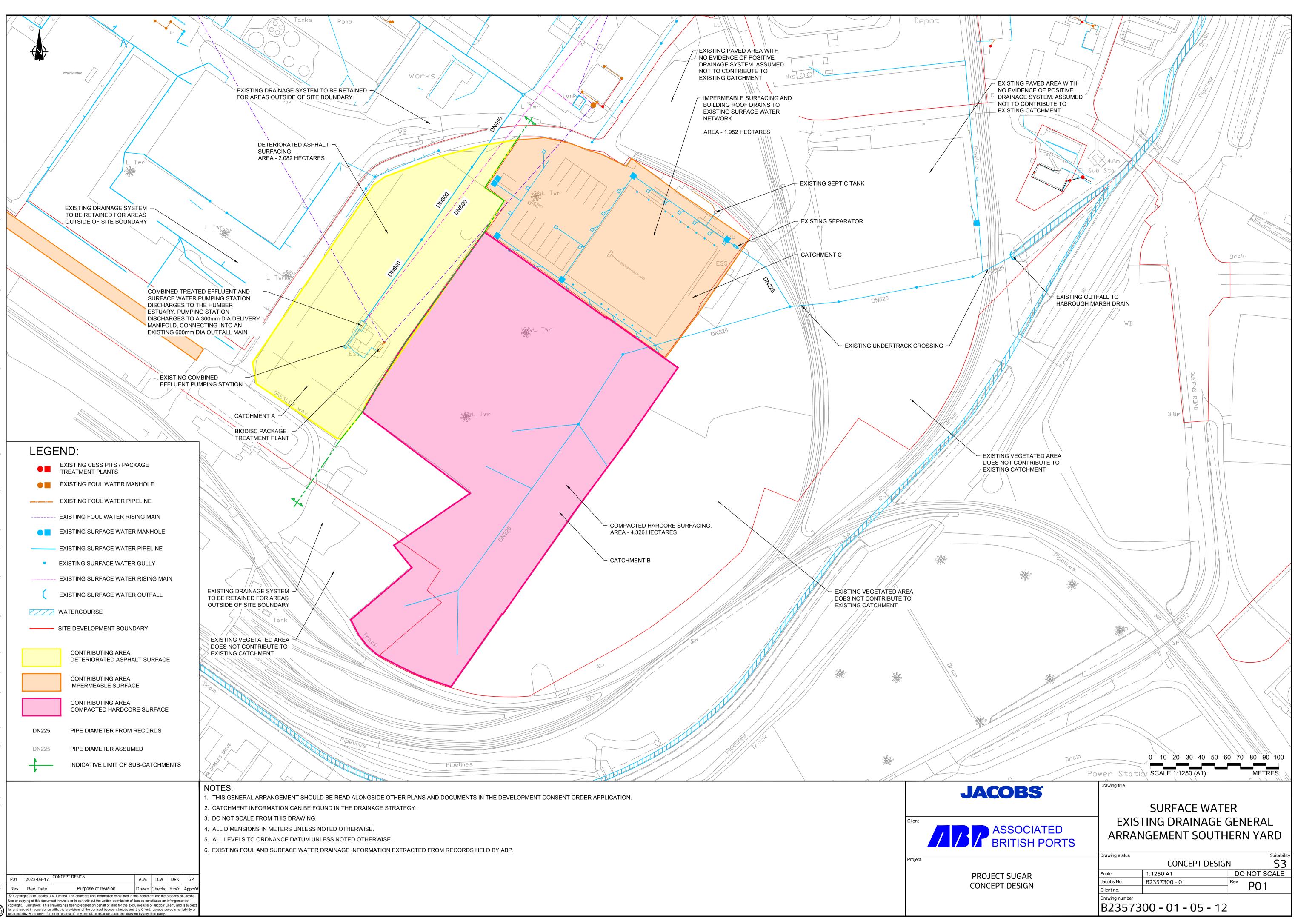


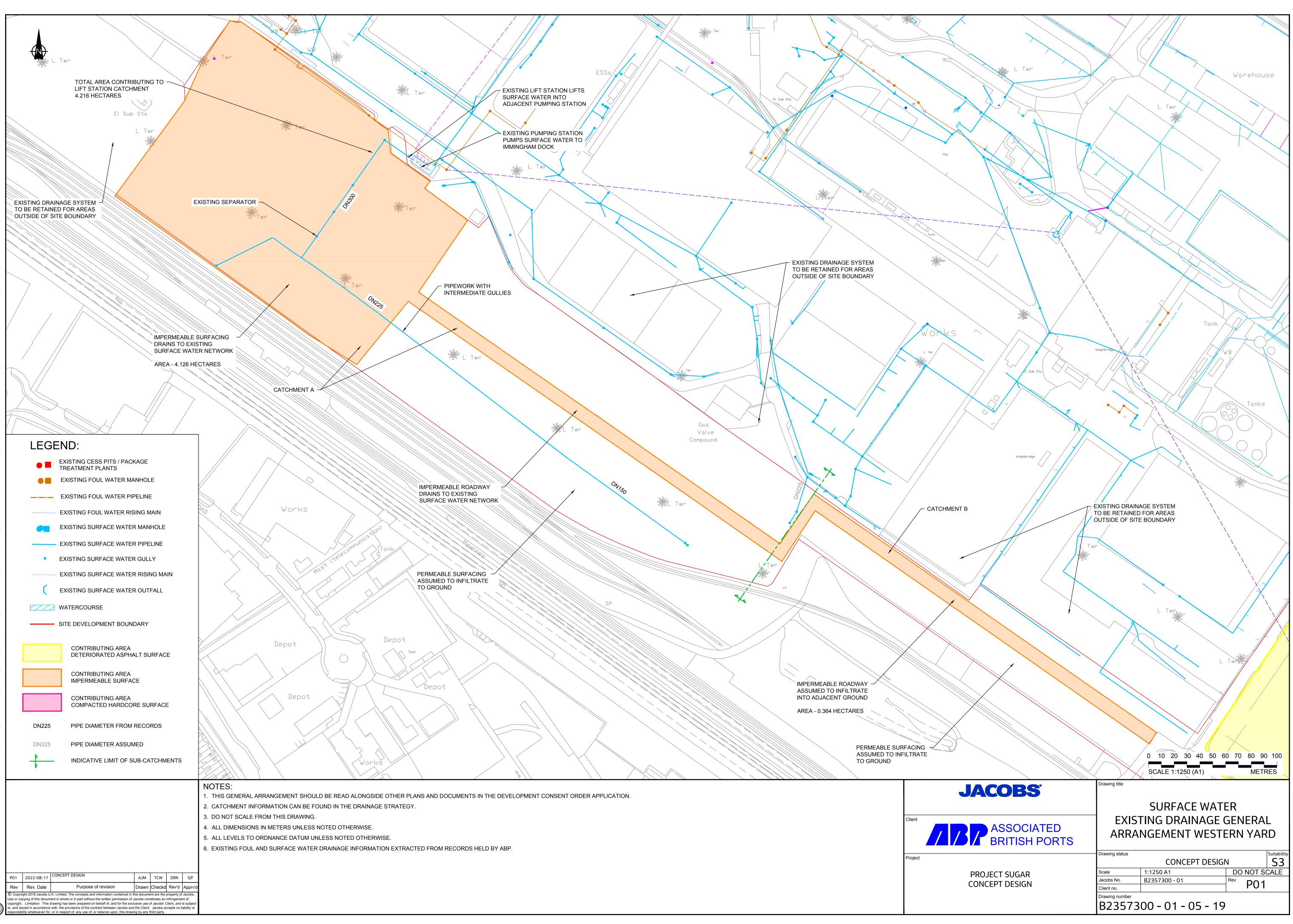
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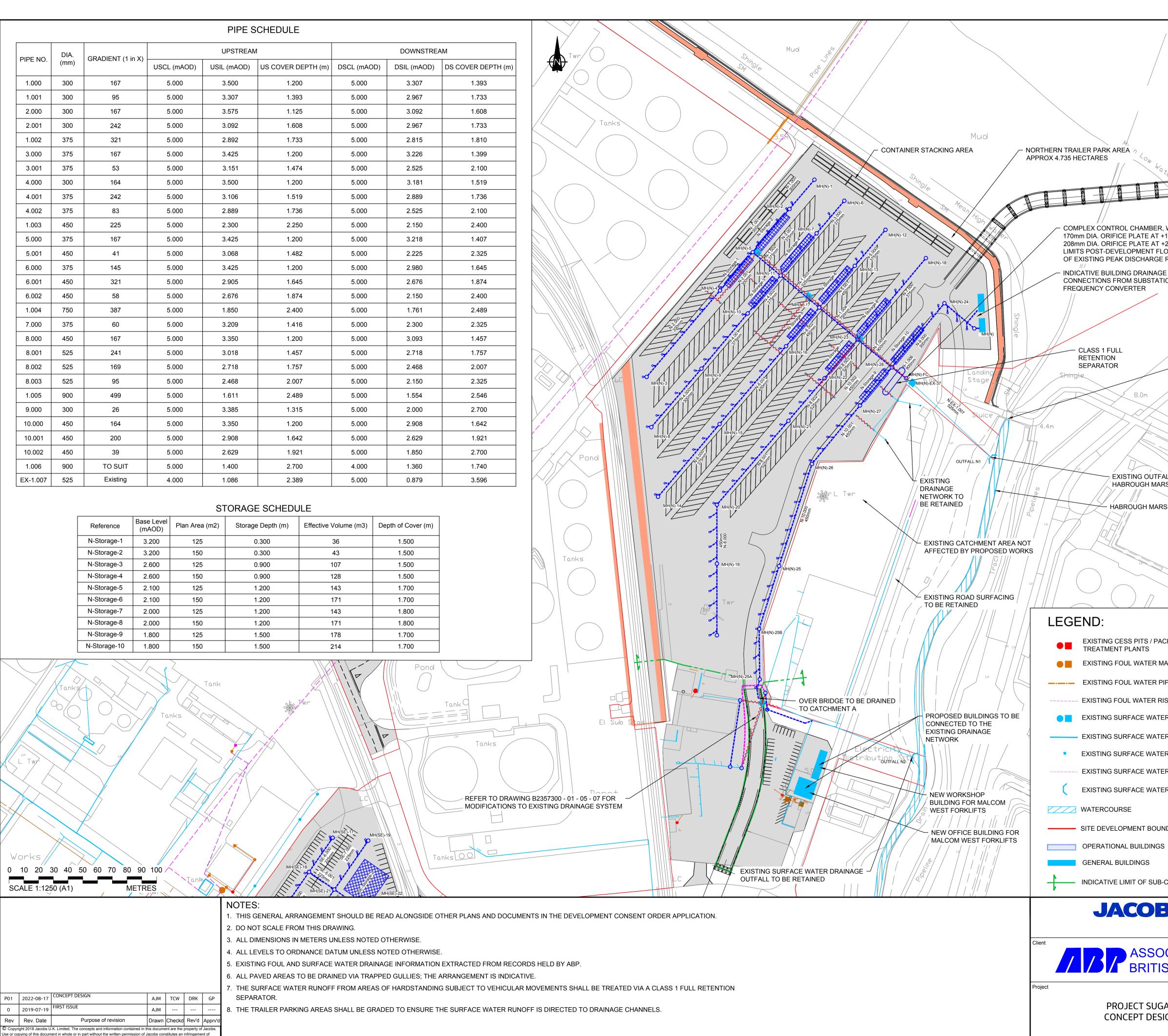
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	DIA.			UPSTREAM	1		DOWNSTRE	λM
PIPE NO.	(mm)	GRADIENT (1 in X)	USCL (mAOD)	USIL (mAOD)	US COVER DEPTH (m)	DSCL (mAOD)	DSIL (mAOD)	DS COVER DEPTH (m
1.000	300	167	5.000	3.500	1.200	5.000	3.307	1.393
1.001	300	95	5.000	3.307	1.393	5.000	2.967	1.733
2.000	300	167	5.000	3.575	1.125	5.000	3.092	1.608
2.001	300	242	5.000	3.092	1.608	5.000	2.967	1.733
1.002	375	321	5.000	2.892	1.733	5.000	2.815	1.810
3.000	375	167	5.000	3.425	1.200	5.000	3.226	1.399
3.001	375	53	5.000	3.151	1.474	5.000	2.525	2.100
4.000	300	164	5.000	3.500	1.200	5.000	3.181	1.519
4.001	375	242	5.000	3.106	1.519	5.000	2.889	1.736
4.002	375	83	5.000	2.889	1.736	5.000	2.525	2.100
1.003	450	225	5.000	2.300	2.250	5.000	2.150	2.400
5.000	375	167	5.000	3.425	1.200	5.000	3.218	1.407
5.001	450	41	5.000	3.068	1.482	5.000	2.225	2.325
6.000	375	145	5.000	3.425	1.200	5.000	2.980	1.645
6.001	450	321	5.000	2.905	1.645	5.000	2.676	1.874
6.002	450	58	5.000	2.676	1.874	5.000	2.150	2.400
1.004	750	387	5.000	1.850	2.400	5.000	1.761	2.489
7.000	375	60	5.000	3.209	1.416	5.000	2.300	2.325
8.000	450	167	5.000	3.350	1.200	5.000	3.093	1.457
8.001	525	241	5.000	3.018	1.457	5.000	2.718	1.757
8.002	525	169	5.000	2.718	1.757	5.000	2.468	2.007
8.003	525	95	5.000	2.468	2.007	5.000	2.150	2.325
1.005	900	499	5.000	1.611	2.489	5.000	1.554	2.546
9.000	300	26	5.000	3.385	1.315	5.000	2.000	2.700
10.000	450	164	5.000	3.350	1.200	5.000	2.908	1.642
10.001	450	200	5.000	2.908	1.642	5.000	2.629	1.921
10.002	450	39	5.000	2.629	1.921	5.000	1.850	2.700
1.006	900	TO SUIT	5.000	1.400	2.700	4.000	1.360	1.740
EX-1.007	525	Existing	4.000	1.086	2.389	5.000	0.879	3.596

Reference	Base Level (mAOD)	Plan Area (m2)	Storage Depth (m)	Effective Volume (m3)	Depth of Cover (m)
N-Storage-1	3.200	125	0.300	36	1.500
N-Storage-2	3.200	150	0.300	43	1.500
N-Storage-3	2.600	125	0.900	107	1.500
N-Storage-4	2.600	150	0.900	128	1.500
N-Storage-5	2.100	125	1.200	143	1.700
N-Storage-6	2.100	150	1.200	171	1.700
N-Storage-7	2.000	125	1.200	143	1.800
N-Storage-8	2.000	150	1.200	171	1.800
N-Storage-9	1.800	125	1.500	178	1.700
N-Storage-10	1.800	150	1.500	214	1.700



opyright. Limitation: This drawing has been prepared on behalf of, and for the exclusive use of Jacobs' Client, and is subjec o, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or esponsibility whatsoever for, or in respect of, any use of, or reliance upon, this drawing by any third party.

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Reference	Base Level (mAOD)	Plan Area (m2)	Storage Depth (m)	Effective Volume (m3)	Depth of Cover (m
N-Storage-1	3.200	125	0.300	36	1.500
N-Storage-2	3.200	150	0.300	43	1.500
N-Storage-3	2.600	125	0.900	107	1.500
N-Storage-4	2.600	150	0.900	128	1.500
N-Storage-5	2.100	125	1.200	143	1.700
N-Storage-6	2.100	150	1.200	171	1.700
N-Storage-7	2.000	125	1.200	143	1.800
N-Storage-8	2.000	150	1.200	171	1.800
N-Storage-9	1.800	125	1.500	178	1.700
N-Storage-10	1.800	150	1.500	214	1,700

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	0	PROPOSED FOUL MANHOLE
ACKAGE		PROPOSED FOUL WATER PIPELINE
MANHOLE		PROPOSED FOUL WATER RISING MAIN
		PROPOSED TREATED EFFLUENT PIPE
PIPELINE	$\bigcirc$	PROPOSED FOUL WATER PACKAGE
RISING MAIN		TREATMENT PLANT
ER MANHOLE	$\sim \sim$	PROPOSED ABANDONMENT
ER PIPELINE		PROPOSED SURFACE WATER RISING MAIN
ER GULLY	0	PROPOSED SURFACE WATER MANHOLE
ER RISING MAIN		PROPOSED SURFACE WATER PIPELINE
ER OUTFALL	•	PROPOSED GULLY
	(	PROPOSED HEADWALL
NDARY	-	PROPOSED ATTENUATION TANK
S	$\bigcirc$	PROPOSED CLASS 1 FULL RETENTION SEPARATOR

Drawing title

# INDICATIVE LIMIT OF SUB-CATCHMENTS

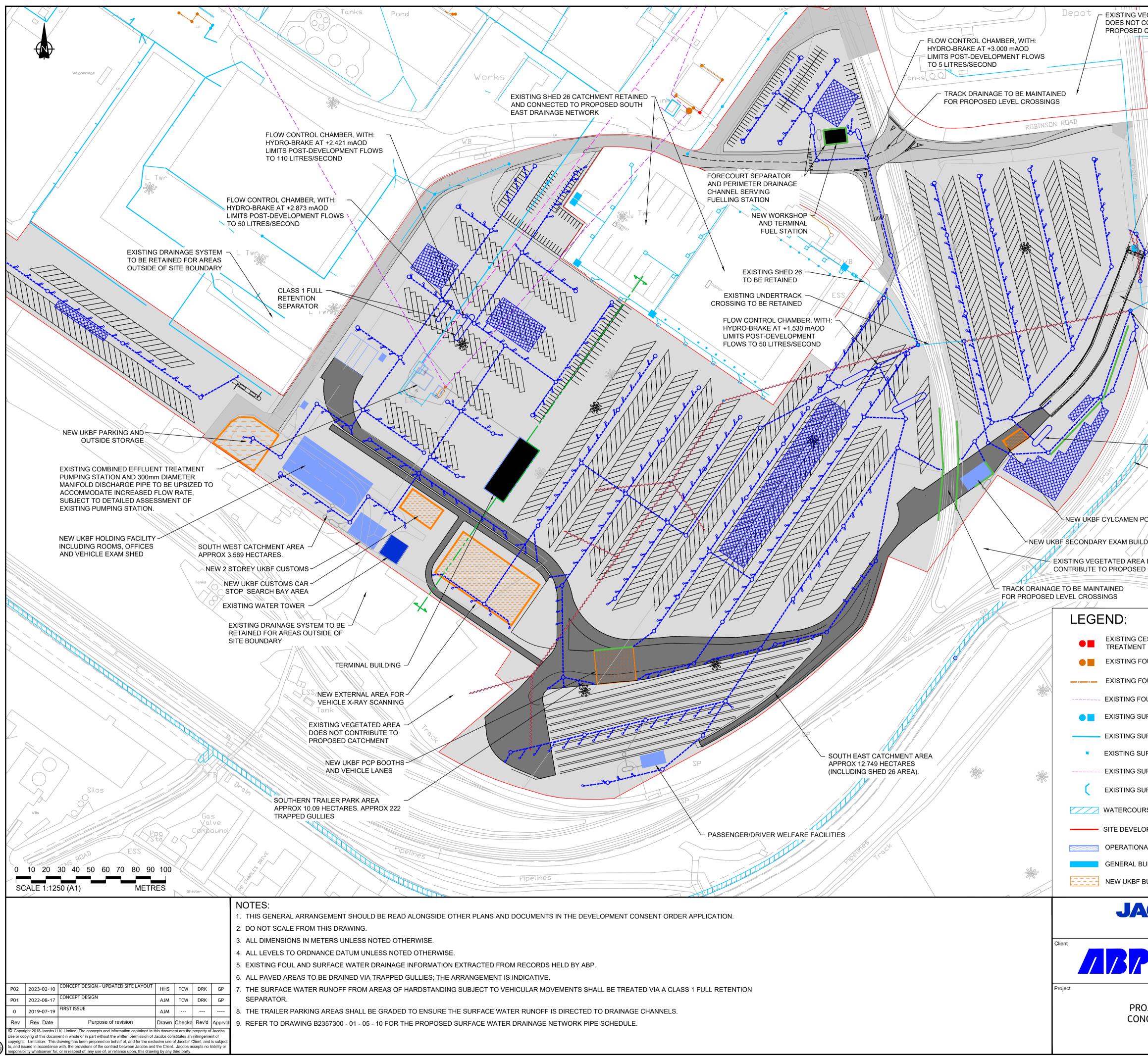
# **JACOBS**

AS	SOCIATED
BRI	TISH PORTS

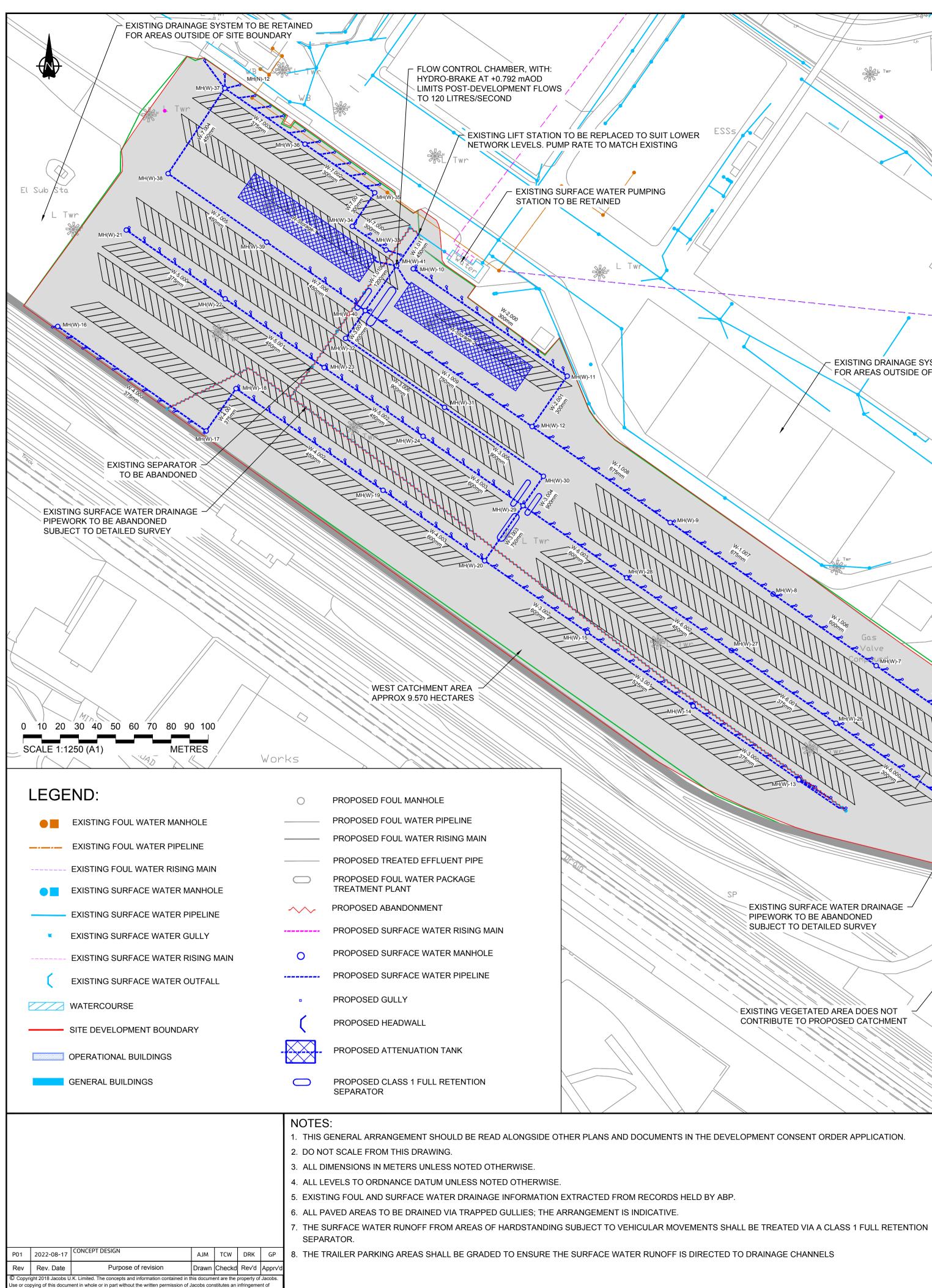
# PROJECT SUGAR CONCEPT DESIGN

# SURFACE WATER DRAINAGE GENERAL ARRANGEMENT NORTHERN YARD

Drawing status				Suitability
	CONCEPT DESIG	N		<b>S</b> 3
Scale	1:1250 A1	DC	NOT S	CALE
Jacobs No.	B2357300 - 01	Rev	P01	
Client no.			PUT	
Drawing number				
B23573	800 - 01 - 05 - 01			



VEGETATED AREA CONTRIBUTE TO CATCHMENT			
DRAINS TO NORTHERN CATCHMENT A BRIDGE HIGH POINT DRAINS TO S	4.6m		LP
CHMENTS BAND C	MING 82357	300 - 01 - 05 - 07 FOR	
MODIFICATIONS	TO EXISTIN	IG DRAINAGE SYSTEM	Drain
EXISTING UNE CROSSING TO OVER BRIDGE TO SOUTH EAS	TO BE RETAIN		
CLASS 1 FULL RETENTION SEPAR	TE AT +0.575 ENT FLOWS HARGE RATE	то 70%	
HABROUGH MARSH DRAIN		3.8m	
LDING A DOES NOT D CATCHMENT		RIAD	
		INDICATIVE LIMIT OF SUB-CATCHM	ENTS
ESS PITS / PACKAGE	0	PROPOSED FOUL MANHOLE	
IT PLANTS		PROPOSED FOUL WATER PIPELINE	E
OUL WATER MANHOLE		PROPOSED FOUL WATER RISING	MAIN
OUL WATER PIPELINE		PROPOSED TREATED EFFLUENT F	
OUL WATER RISING MAIN	$\bigcirc$	PROPOSED FOUL WATER PACKAG TREATMENT PLANT	iΕ
URFACE WATER MANHOLE	$\sim \sim$	PROPOSED ABANDONMENT	
		PROPOSED SURFACE WATER RISI	NG MAIN
	0	PROPOSED SURFACE WATER MAN	NHOLE
		PROPOSED SURFACE WATER PIPE	ELINE
URFACE WATER OUTFALL	D	PROPOSED GULLY	
RSE		PROPOSED CHANNEL DRAIN	
		PROPOSED HEADWALL	
		PROPOSED ATTENUATION TANK	
BUILDINGS	$\bigcirc$	PROPOSED CLASS 1 FULL RETENT SEPARATOR	ΓΙΟΝ
	Durania a titla		
<b>COBS</b>	Drawing title		
		URFACE WATER DR	
ASSOCIATED BRITISH PORTS	Drawing status	GENERAL ARRANGE SOUTHERN YAI	
	_	CONCEPT DESIG	N 53
OJECT SUGAR NCEPT DESIGN	Scale Jacobs No.	1:1250 A1 B2357300 - 01	DO NOT SCALE Rev P02
	Client no. Drawing numbe		<u> </u>
	B235	7300 - 01 - 05 - 02	



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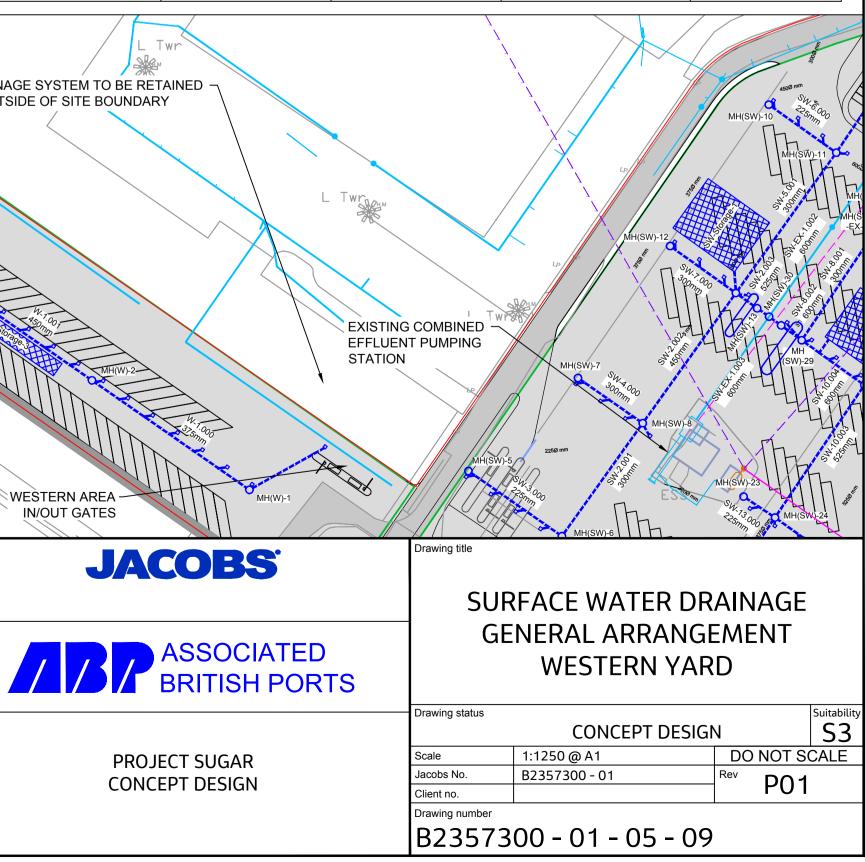
y whatsoever for, or in respect of, any use of, or reliance upon, this drawing by any third party

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						UPSTREAM	ESCHEDULE		DOWNSTREAM	
		PIPE NO.	DIA. (mm)	GRADIENT (1 in X)						
		_			USCL (mAOD)	USIL (mAOD)	US COVER DEPTH (m)	DSCL (mAO		DS Cover Depth (m)
		1.000	375	321	4.770	3.195	1.200	4.770	3.001	1.394
		1.001 1.002	450 525	500 502	4.770 4.770	2.926	1.394 1.518	4.770	2.802	1.518 1.642
VER ESSS		1.002	525	500	4.770	2.603	1.642	4.770	2.465	1.780
		1.004	600	492	4.770	2.390	1.780	4.770	2.239	1.931
	El Sub Sta	1.005	600	506	4.770	2.239	1.931	4.770	2.108	2.062
		1.006	600	501	4.770	2.108	2.062	4.770	1.973	2.197
		1.007	675	502	4.770	1.898	2.197	4.770	1.762	2.333
		1.008	675	500	4.770	1.762	2.333	4.770	1.580	2.515
	/ ), 🗶 (/	2.000	300	231	4.760	3.260	1.200	4.760	2.821	1.639
		2.001	300	200	4.760	2.821	1.639	4.770	2.650	1.820
		1.009 3.000	750 375	547 200	4.770 4.730	1.505 3.155	2.515	4.770	1.304 2.807	2.716 1.548
$\langle \rangle$		3.000	525	501	4.730	2.657	1.548	4.730	2.518	1.687
		3.002	600	278	4.730	2.442	1.688	4.730	2.191	1.939
		4.000	375	300	5.300	3.725	1.200	5.000	3.398	1.227
		4.001	375	300	5.000	3.398	1.227	5.000	3.298	1.327
		4.002	450	300	5.000	3.223	1.327	4.730	2.901	1.379
- EXISTING DRAINAGE SYSTEM		4.003	600	116	4.730	2.751	1.379	4.730	2.191	1.939
FOR AREAS OUTSIDE OF SIT		3.003	750	247	4.730	2.041	1.939	4.790	1.893	2.147
		5.000	375	335	5.950	3.290	2.285	5.500	3.095	2.030
		5.001	450	444	5.500	3.020	2.030	4.790	2.874	1.466
		5.002 5.003	450 600	500 220	4.790 4.790	2.874	1.466	4.790	2.743 2.297	1.597 1.893
		6.000	300	335	4.790	3.290	1.200	4.790	3.084	1.406
		6.001	375	444	4.790	3.009	1.406	4.790	2.854	1.561
		6.002	450	500	4.790	2.779	1.561	4.790	2.641	1.699
	t   🖌 🔪	6.003	600	154	4.790	2.491	1.699	4.790	2.043	2.147
		3.004	900	300	4.790	1.743	2.147	4.970	1.685	2.385
w)-9		3.005	900	502	4.970	1.685	2.385	4.970	1.555	2.515
	KK	3.006	900	502	4.970	1.550	2.520	4.970	1.420	2.650
4k; 00- 675mm		3.007	900	381	4.970	1.420	2.650	4.770	1.369	2.501
		7.000	300 300	231 230	4.760 5.350	3.260	1.200	5.350 5.100	3.163 3.078	1.887
MH(W)-8	TH /	7.001	300	230	5.100	3.078	1.722	5.400	2.853	2.247
		7.003	375	235	5.400	2.778	2.247	5.700	2.553	2.772
C C C C C C C C C C C C C C C C C C C		7.004	450	337	5.700	2.478	2.772	6.500	2.320	3.730
3 Cas	$> \setminus \lambda <$	7.005	450	311	6.500	2.320	3.730	5.950	2.111	3.389
MH(W)-27		7.006	450	311	5.950	2.111	3.389	4.770	1.902	2.418
		1.010	1200	502	4.770	0.854	2.716	4.760	0.792	2.768
		1.011	450	503	4.760	0.792	3.518	5.000	0.742	3.808
MH(W)26			$\checkmark$				STORAGE SCH			T
	BMH(W)-6			REFERENC	CE BASE LEVEL (n	nAOD) PLAN AF	REA (m2) STORAGE I	DEPTH (m) E	FFECTIVE VOLUME (m3)	DEPTH OF COVER (I
		/		W-Storage	-1 2.000	12	85 1.2	00	1465	1.560
	Martin Contract			W-Storage		12	80 1.2	00	1459	1.560
MH(W)-13				W-Storage	-3 3.000	20	0.3	00	57	1.470
	MH(W)-25				//			7		
the second se		W)-5				LTwr				and the second s
		and a second sec			RAINAGE SYSTEM TO			Υ,		
			W.1.003		OUTSIDE OF SITE B					ABOUT 5.0
					$\langle$					MH(SW)-10 SOMM
			МН(И	/)-4						MH(SŴ)-1
SP SP			UIN ~~	<u> </u>				. /		A CONTRACTOR
EXISTING SURFACE WATER DRAINAGE				W.1.005			L Twr			
SUBJECT TO DETAILED SURVEY			1						MH(SW)-12	
				MIN MH(W		_ /			LP SOUTH S	
	/				H. 1.00-				<u> </u>	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
		Trac							Sold Sold Sold Sold Sold Sold Sold Sold	S
EXISTING VEGETATED AREA DOES NOT						MH(W)-2	STATION		MH(SW)-7 54	4 (SW)-29
CONTRIBUTE TO PROPOSED CATCHMENT					MIN				300mmm	Shegar HIII
						h. 1900			MH(SW)	-8
		$\langle \rangle \rangle$	$\langle / \rangle$				- te	MHISWAS	225Ø mm	The .
		$\langle \rangle$				<b>X 1 1 1 1 1 1</b>		, , , , , , , , , , , , , , , , , , ,		
						MIDA -	And a state of the	A Bo	A AND A	MH(SW)-23
					WESTERN ARE		MH(W)-1			MH(SW)-23 MH(SW)-23 MH(SM)
					WESTERN ARE IN/OUT GATE				К3 000 55 25 ст. С.	MH(SW)-23 SU: 13. 235mm MH(SW)-2
THE DEVELOPMENT CONSENT ORDER APPLICATION.					IN/OUT GATE			Drawing title	43.900 55 50 € 55 50 € 55 57 50 € 55 50 € 55 50 € 55 57 50 € 55 50 € 50	MH(SW)-23 SU: 13 2-35mm, 900 Str. MH(SW)-24

Client

roject



		GRADIENT		UPSTREAM			I
PIPE No.	DIA. (mm)	(1 IN X)	USCL (mAOD)	USIL (mAOD)	US COVER DEPTH (m)	DSCL (mAOD)	
							-
1.000	300	379	4.740	3.240	1.200	4.740	
1.001	375	343	4.740	3.073	1.292	4.740	
1.002	600	434	4.740	2.750	1.390	4.830	
2.000	300	213	4.830	3.330	1.200	4.830	
2.001	375	273	4.830	2.972	1.483	4.830	
1.003	600	499	4.830	2.602	1.628	4.830	
3.000	300	301	4.830	3.330	1.200	4.830	
3.001	450	500	4.830	3.057	1.323	4.830	
3.002	525	500	4.830	2.871	1.434	4.830	
1.004	750	500	4.830	2.370	1.710	5.000	
4.000	300	301	4.830	3.330	1.200	4.830	
4.001	450	500	4.830	3.061	1.319	4.830	
4.002	525	502	4.830	2.879	1.426	4.830	
4.003	525	295	4.830	2.772	1.533	4.915	
5.000	300	250	4.400	3.100	1.000	4.700	
5.001	300	250	4.700	3.037	1.363	4.915	
4.004	525	204	4.915	2.700	1.690	5.000	
1.005	750	504	5.000	2.320	1.930	4.830	
6.000	225	261	4.930	3.505	1.200	4.930	
7.000	225	183	4.930	3.505	1.200	4.930	
6.001	225	185	4.930	3.351	1.354	4.930	
8.000	225	260	4.820	3.395	1.200	4.820	
9.000	225	173	4.820	3.395	1.200	4.820	
6.002	300	95	4.820	3.165	1.355	4.970	
6.003	375	500	4.970	3.004	1.591	4.985	
6.004	375	500	4.985	2.943	1.667	5.000	
10.000	225	200	4.970	3.545	1.200	5.000	
6.005	375	500	5.000	2.876	1.749	5.000	
6.006	375	500	5.000	2.742	1.883	4.580	
11.000	375	397	4.450	2.875	1.200	4.450	
11.001	450	369	4.450	2.640	1.360	4.450	
12.000	300	262	4.450	2.950	1.300	4.450	
12.000	375	329	4.450	2.708	1.367	4.450	
11.002	525	252	4.450	2.427	1.498	4.580	
13.000	375	219	4.550	2.975	1.200	4.580	
13.001	375	298	4.580	2.675	1.530	4.580	
13.002	450	300	4.580	2.530	1.600	4.580	
14.000	225	261	4.580	3.155	1.200	4.580	
14.001	300	376	4.580	2.913	1.367	4.580	
11.003	675	503	4.580	2.136	1.769	4.580	
15.000	225	261	4.580	3.155	1.200	4.580	
15.001	300	376	4.580	2.913	1.367	4.580	
16.000	300	371	4.580	2.947	1.333	4.580	
11.004	825	495	4.580	1.919	1.836	4.750	
11.004	825	495	4.750	1.883	2.042	4.750	
11.006	825	500	4.750	1.708	2.217	4.650	
17.000	225	200	4.580	2.600	1.755	4.580	
18.000	225	200	4.580	3.155	1.200	4.580	
17.001	225	200	4.580	2.272	2.083	4.650	
11.007	825	504	4.650	1.589	2.236	4.615	
19.000	225	261	4.580	3.155	1.200	4.580	
19.001	300	261	4.580	2.987	1.293	4.580	
19.002	300	379	4.580	2.820	1.460	4.580	
20.000	225	194	4.580	3.155	1.200	4.580	
20.001	300	266	4.580	2.937	1.343	4.580	
19.003	300	178	4.580	2.705	1.575	4.580	
21.000	525	313	4.550	2.745	1.280	4.680	
21.001	525	103	4.680	2.636	1.519	4.580	
19.004	600	500	4.580	2.212	1.768	4.580	
19.005	750	500	4.580	1.930	1.900	4.580	
19.006	750	351	4.580	1.798	2.032	4.750	
22.000	300	300	4.550	3.050	1.200	4.550	
22.001	375	350	4.550	2.850	1.325	4.550	
22.002	450	504	4.550	2.674	1.426	4.550	
23.000	375	301	4.550	2.975	1.200	4.550	
23.001	375	300	4.550	2.805	1.370	4.550	
23.002	450	500	4.550	2.590	1.510	4.550	
22.003	450	500	4.550	2.477	1.623	4.565	
22.003	525	499	4.565	2.322	1.718	4.580	
22.005	525	501	4.580	2.246	1.809	4.580	
22.006	600	501	4.580	2.053	1.927	4.580	
24.000	225	200	4.550	3.125	1.200	4.550	
24.001	300	275	4.550	2.874	1.376	4.700	
24.002	375	502	4.700	2.589	1.736	4.580	
25.000	300	250	4.400	3.100	1.000	4.580	
22.007	675	500	4.580	1.860	2.045	4.750	
	750	500	4.750	1.714	2.286	4.615	
19.007	450	496	4.615	1.530	2.635	4.580	
	525	490	4.580	1.471	2.584	4.830	
11.008							
11.008 EX-6.007	E 2 E	499	4.830	1.395	2.910	4.830	
11.008 EX-6.007 6.008	525	44.5	4.830	1.255	3.050	4.830	
11.008 EX-6.007 6.008 6.009	525	413			·	1 9 2 0	
11.008 EX-6.007 6.008 6.009 6.010	525 525	400	4.830	1.215	3.09	4.830	
11.008 EX-6.007 6.008 6.009 6.010 1.006	525 525 900	400 501	4.830	0.799	3.131	4.830	
11.008 EX-6.007 6.008 6.009 6.010 1.006 1.007	525 525 900 900	400 501 499	4.830 4.830	0.799 0.697	3.131 3.233	4.830 4.740	
11.008 EX-6.007 6.008 6.009 6.010 1.006	525 525 900	400 501	4.830	0.799	3.131	4.830	
11.008 EX-6.007 6.008 6.009 6.010 1.006 1.007	525 525 900 900	400 501 499	4.830 4.830	0.799 0.697	3.131 3.233	4.830 4.740	

P02 2023-02-10 CONCEPT DESIGN - UPDATED SITE LAYOUT HHS TCW DRK GP CONCEPT DESIGN AJM TCW DRK GP P01 2022-08-17 
 Rev
 Rev. Date
 Purpose of revision
 Drawn
 Checkd
 Rev'd
 Apprv'd

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1. DRAWING TO BE READ IN CONJUNCTION WITH DRAWING B2357300 - 01 - 05 - 02.

# PIPE SCHEDULE - SOUTH EAST

# STORAGE SCHEDULE - SOUTH EAST

REFERENCE	BASE LEVEL (mAOD)	PLAN AREA (m2)	STORAGE DEPTH (m)	EFFECTIVE VOLUME (m3)	DEPTH OF COVER (m)
SE-Storage-1	1.53	2500	1.5	3563	1.585
SE-Storage-2	3	500	0.3	143	1.67
SE-Storage-3	0.575	1250	1.8	2138	2.365

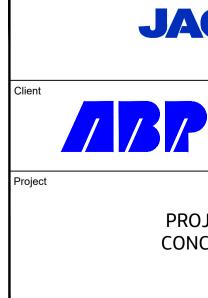
# STORAGE SCHEDULE - SOUTH WEST

REFERENCE	BASE LEVEL (mAOD)	PLAN AREA (m2)	STORAGE DEPTH (m)	EFFECTIVE VOLUME (m3)	DEPTH OF COVER (m)
SW-Storage-1	2.666	500	0.9	428	1.334
SW-Storage-2	2.421	700	0.9	599	1.579

# **PIPE SCHEDULE - SOUTH WEST**

		GRADIENT	UPSTREAM			DOWNSTREAM		
PIPE No.	DIA. (mm)	(1 IN X)	USCL (mAOD)	USIL (mAOD)	US COVER DEPTH (m)	DSCL (mAOD)	DSIL (mAOD)	DS COVER DEPTH (m)
EX-1.002	600	321	5.240	2.505	2.135	5.240	2.392	2.248
2.000	300	250	4.900	3.603	0.997	4.900	3.404	1.196
3.000	300	251	4.750	3.550	0.900	4.750	3.461	0.989
3.001	300	250	4.750	3.461	0.989	4.900	3.289	1.311
3.002	300	251	4.900	3.289	1.311	4.900	3.179	1.421
3.003	300	251	4.900	3.179	1.421	4.900	3.122	1.478
2.001	300	250	4.900	3.122	1.478	4.900	2.95	1.650
4.000	300	249	4.900	3.700	0.900	4.900	3.56	1.040
2.002	450	352	4.900	2.800	1.650	4.900	2.666	1.784
5.000	225	209	4.750	3.625	0.900	4.900	3.376	1.299
6.000	225	209	4.900	3.775	0.900	4.900	3.644	1.031
5.001	300	280	4.900	3.301	1.299	4.900	3.098	1.502
7.000	300	157	4.900	3.700	0.900	4.900	3.53	1.070
2.003	525	518	4.900	2.666	1.709	5.240	2.64	2.075
8.000	225	209	4.750	3.625	0.900	4.900	3.319	1.356
9.000	300	209	4.900	3.700	0.900	4.900	3.489	1.111
8.001	300	296	4.900	3.244	1.356	4.900	3.051	1.549
10.000	300	250	4.700	3.352	1.048	4.900	3.073	1.527
11.000	300	250	4.750	3.511	0.939	4.750	3.284	1.166
11.001	300	251	4.750	3.284	1.166	4.750	3.2	1.250
11.002	450	404	4.750	3.050	1.250	4.750	3.003	1.297
11.003	450	402	4.750	3.003	1.297	4.900	2.923	1.527
12.000	225	170	4.900	3.475	1.200	4.900	3.241	1.434
10.001	525	494	4.900	2.848	1.527	4.900	2.821	1.554
13.000	225	170	4.900	3.475	1.200	4.900	3.345	1.330
10.002	525	498	4.900	2.821	1.554	4.900	2.747	1.628
14.000	300	209	4.900	3.700	0.900	4.900	3.575	1.025
15.000	225	209	4.900	3.775	0.900	4.900	3.715	0.960
10.003	525	500	4.900	2.747	1.628	4.900	2.642	1.733
16.000	225	209	4.700	3.575	0.900	4.700	3.264	1.211
17.000	225	88	4.700	3.575	0.900	4.700	3.264	1.211
16.001	225	129	4.700	3.264	1.211	4.900	2.942	1.733
10.004	600	500	4.900	2.567	1.733	4.900	2.516	1.784
8.002	600	459	4.900	2.421	1.879	5.240	2.392	2.248
EX-1.003	600	315	5.240	2.392	2.248	5.240	2.26	2.380

	DS COVER DEPTH (m)
	1.292
	1.390
	1.628
	1.703
	1.710
	1.323
	1.545
	1.930
	1.319
	1.426
	1.691
	1.363
_	1.639
	1.828
	1.354
	1.354
	1.355
	1.355
	1.591
	1.667
	1.749
	1.883
	1.588
	1.360
	1.498
	1.498
	1.769
	1.530
	1.767
	1.367
_	1.483
	1.367
	1.483
$\square$	1.499
	2.042
	2.236
	2.083
_	2.197
	2.260
	1.293
	1.460
	1.575
	1.483
	1.768
	1.519
	1.768
	2.032
1	2.286
	1.325
	1.428
	1.370
	1.510
	1.623
	1.809
	1.927
	2.045
	1.376
	1.760
	1.317
+	2.265
	2.231
	2.910
1	3.050
	3.091 3.153
	3.153
	3.265
	1.428
	2.067
	2.007



COBS	Drawing title	RFACE WATER DR	AINAGE	
ASSOCIATED BRITISH PORTS		SCHEDULES SOUTHERN YA		
	Drawing status	CONCEPT DESIG		<sup>iitability</sup>
JECT SUGAR	Scale	1:1250 A1	DO NOT SCA	٨LE
CEPT DESIGN	Jacobs No.	B2357300 - 01	Rev P02	
	Client no.		PUZ	
	Drawing number			
	B23573	00 - 01 - 05 - 10		

# **Appendix B. Calculations**

# **B1** Combined Effluent Pumping Station Capacity Assessment

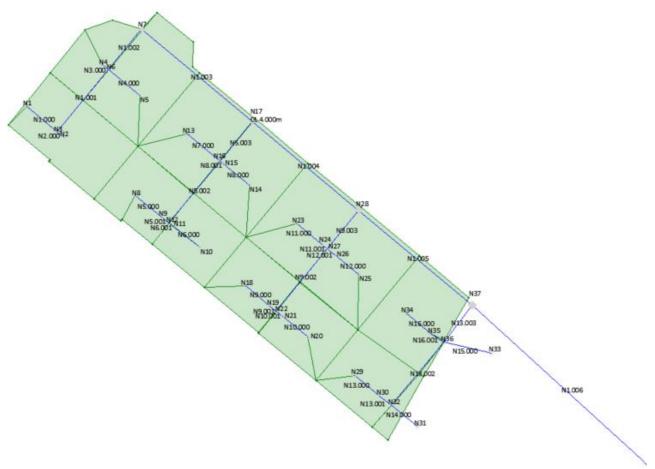
450mm diameter incoming gravity pipework

600mm diameter incoming gravity pipework

# MicroDrainage Model Outputs

# **B2 Northern Yard: Existing**

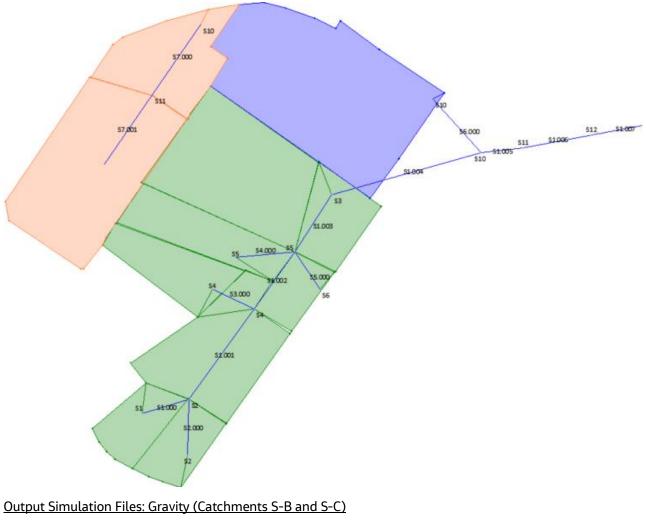
Network Schematic



**Output Simulation Files** 

# **B3 Southern Yard: Existing**

Network Schematic



Output Simulation Files: Pumped (Catchment S-A)

# **B4 Western Yard: Existing**

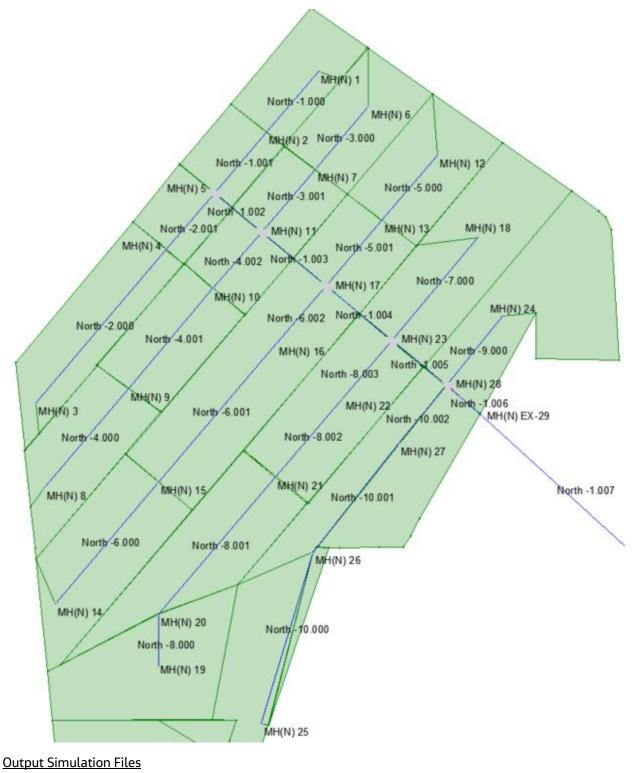
# Network Schematic



**Output Simulation Files** 

# **B5 Northern Yard: Proposed**

## Network Schematic



# Sensitivity Testing: Surcharged Outfall at +1.9 mAOD

# Sensitivity Testing: Surcharged Outfall at +3.7 mAOD

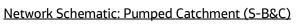
Drainage Strategy

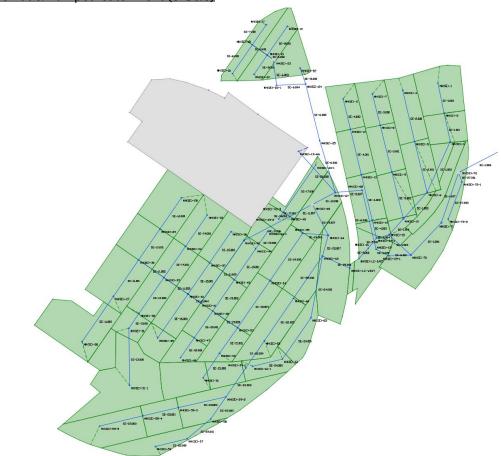
# **B6 Southern Yard: Proposed**

Network Schematic: Pumped Catchment (S-A)



Output Simulation Files





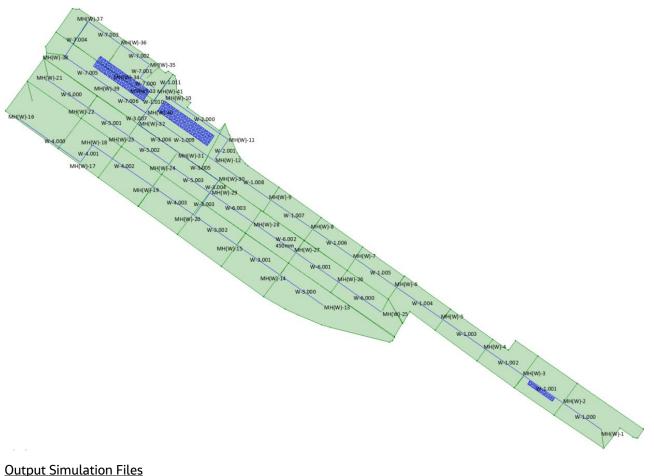
**Output Simulation Files** 

Sensitivity Testing: Surcharged Outfall at +1.9 mAOD

Sensitivity Testing: Surcharged Outfall at +3.7 mAOD

# **B7 Western Yard: Proposed**





**Output Simulation Files** 

JACOB	5				Calcula	ation title sheet
Project title:	Immingham Easte	ern Ro-Ro Te	rminal		Project code:	B2429300
Calculation title:	Combined Effluen	t Pumping S	Station Capacity Asse	ssment	Serial no:	
Project manager:	Claire Nicolson				No. of sheets:	1
Status:					Created by:	HHS
Schematic			Preliminary		Date:	5-Aug-22
Tender			Other (state)	Concent Design	Verified by:	тсw
Final for Construction			Other (state)	Concept Design	Date:	5-Aug-22
Levels of verification:					Approved by:	DRK
1 Self-check and ap	proval		3B Comparis	on with similar proven	Date:	17-Aug-22
	provar		designs a	nd approval	Computer analysis:	
2 Review and appre			External c	heck and internal	Yes: 🗆	No: 🛛
2 Review and appro	Jvai		4 approval		Program(s):	
3 Detailed check ar	d approval		5 Other ver Managem	ification as stated in the ient Plan		
3A Alternative calcul approval	ations and		N	umerical Check	Hardware:	
Contents (continue on cal	culation sheet if nec	essary)				

# NB: Calculations should state or refer to design input data and methodology

# CONTENTS AMENDMENT RECORD

Sheet(s)	Rev.	Date	Description	Created	Verified	Approved
ile Name:		Southern Catchment 450	Pipe Flow.xlsx			
Path:		\\uksfpp02\Water\we\Ur	ban Water Market Sectors\Urban Water UK\Projects\ABP Nordic\Working Folde	r\Drainage Strategy\N	ЛicroDrainage	
R-P04-02-IMS-P0001-F1	L					CALCULATION TITLE SHI

				( c	mhin	od Efflu	ent Pum	ning	Station	Cana	city	Created	hv:	нн	ç	Pr	oject		B2	4293	00
Calcu	ulatio	on title	e:	CC		eu Linu	Assess		Station	Capa	· L		by.		-	_	de:		D2	4293	00
												Date: Verified	by:	05/08/ TCV		_	rial no leet no			1	
Subje	ect:			45	50mm	diamet	er incon	ning g	gravity p	ipew	ork –	Date:	<u>Бу.</u>	05/08/		-	vision	-		P01	
																	Re	feren	ices/	/Res	sults
Th	is ca	alcula	tion	sheet ι	ises	the Col	ebrook	- Wh	ite forn	nula	to calcula	te pipe	flows	for full							
_											f downstre										
Сс	olebr	ook-V	Vhite	e Form	ula -							_	_			_		_	-		
L				/	2 [	200	<u>S)</u>		$K_{s}$	1	2.51v		_		++				-		
⊢	_	_		/	~~v	280	S L	8	3.70		$\frac{2.51v}{\sqrt{(2gL)}}$	$\overline{s})$	_			_			-		
	-	_						`		-	• `	. ,	_		$\left  \right $	_			-		
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g =	-	_	_	- C - C -		ration	(9.81m/	S <sup>2</sup> )		$\vdash$			-		++	-	$\vdash$	+	$\vdash$		
D :		-	_	ameter		_				-				++	++			+	+		
S =	=			ic Grac	<u> </u>			-		1					+			+	$\vdash$		
Ks	; =	_			_	ness (	0.6 for s	urfa	ce sew	ers a	and 1.5 for	foul se	wers t	ypically)	$\uparrow \uparrow$			+	$\square$		
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<u>Re</u>	sul	<u>ts -</u>						_		-			_		++	_			-		
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	5%	6		23	(	0.05	0.014	966	0.24	33	0.7473	<b>0</b> .	8943	142.2	323						
	10	%		45		0.1	0.028	584	0.3	73	3.0874	0.	8943	142.2	323						
	15			68		0.15	0.042		0.47		7.2473		8943	142.2	_						
	20			90		0.2	0.054		0.56		12.778		8943	142.2			$\square$	$\perp$	⊢		
	25			113		0.25	0.066		0.64		20.043		8943	142.2	-			_	⊢		
	30			135		0.3	0.076		0.70		28.266		8943	142.2		_		+-			
	35			158		0.35	0.087 0.096		0.76		38.010		8943 8043	142.2		_		+	+-		
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	60			270		0.6	0.124		0.95		95.192		8943	142.2	_	-	$\vdash$	+	$\vdash$		
	65			293		0.65	0.129		0.97		107.258		8943	142.2	_			+	$\vdash$		
1	70			315		0.7	0.133		0.99		118.295		8943	142.2	_			$\top$			
1	75	%		338	(	0.75	0.135	799	1.00	64	128.964	9 0.	8943	142.2	323						
1	80	%		360	1	0.8	0.136	887	1.01	14	137.953	.88 0.	8943	142.2	323						
	85	%		383	(	0.85	0.136	441	1.00	93	145.585	<b>64</b> 0.	8943	142.2	323						
	909	%		405	1	0.9	0.134	117	0.99	86	150.554	8 0.	8943	142.2	323						
	959	%		428	(	0.95	0.128	739	0.97	34	152.013	6 0.	8943	142.2	323						

JACOB	5				Calcula	ation title sheet
Project title:	Immingham Easte	ern Ro-Ro Te	rminal		Project code:	B2429400
Calculation title:	Combined Effluen	t Pumping S	Station Capacity Asses	ssment	Serial no:	
Project manager:	Claire Nicolson				No. of sheets:	1
Status:					Created by:	HHS
Schematic			Preliminary		Date:	5-Aug-22
Tender			Other (state)	Concent Design	Verified by:	тсw
Final for Construction			Other (state)	Concept Design	Date:	5-Aug-22
Levels of verification:					Approved by:	DRK
1 Self-check and a	proval		3B Compariso	on with similar proven	Date:	17-Aug-22
	provar		designs ar	nd approval	Computer analysis:	
2 Review and appr			4 External c	heck and internal	Yes: 🗆	No:
2 Review and appr	Jvai		4 approval		Program(s):	
3 Detailed check a	nd approval		5 Other ver Managem	ification as stated in the ient Plan		
Alternative calcu 3A approval	ations and		N	umerical Check	Hardware:	
Contents (continue on cal	culation sheet if nec	essary)				

# NB: Calculations should state or refer to design input data and methodology

# CONTENTS AMENDMENT RECORD

Sheet(s)	Rev.	Date	Description	Created	Verified	Approved
le Name:	I	Southern Catchment 600	Pipe Flow.xlsx		•	
ath:		\\uksfpp02\Water\we\Ur	ban Water Market Sectors\Urban Water UK\Projects\ABP Nordic\Working Fold	er\Drainage Strategy\I	MicroDrainage	
R-P04-02-IMS-P0001-F	1					CALCULATION TITLE S

				BS		iont Bumpin-	Station Care	city C	ated by:	HHS	Project	B2429300	0
Calc	ulati	on title	e:	C	mbined Em	ent Pumping Assessment	Station Сара		,	-	code:	B2429300	0
								Dat	e: ified by:	05/08/2022 TCW	Serial no: Sheet no:	1	
ubj	ect:			60	00mm diame	ter incoming g	ravity pipew	ork Dat	-	05/08/2022	Revision:	P01	
Γ											Refer	ences/Resu	ults
Tł	nis c	alcula	tion	sheet u	uses the Co	lebrook - Wh	ite formula	to calculate	pipe flows	for full			
ar	nd pa	artially	/ full	pipes a	assuming th	at there are i	no affects o	f downstrear	n controls				
C	oleb	rook-\	Vhite	e Form	ula -								_
	_			7	$2\sqrt{2aI}$		$K_{s}$	2.51v					_
-	_	_			2 <sub>V</sub> (2gL	$\overline{OS}$ $Log \left( \frac{1}{3} \right)$	$3.70^{-1}$	$\sqrt{2gDS}$	<u>)</u>				_
	+	_				~		• 、	. ,				_
V	_	Vel	ocity	/ (m/s)									-
g	_	_			cceleration	(9.81m/s <sup>2</sup> )							
D		_		ameter								+++	
s	-	Hyc	draul	lic Grad	lient								
K	s =	_				0.6 for surfac	ce sewers a	nd 1.5 for fo	ul sewers t	ypically)			
v	-	Kin	ema	tic Visc	osity of flui	b							
Da	ata i	inputs	<u></u>		Pipe Diam	eter	600	mm					_
-	-	_			Gradient		523						_
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	Perc Dep			epth of w (mm)	Proportional Depth	Hydraulic Radius	Velocity (m/s)	Flow (I/s)	Pipe full Velocity (m/s)	Pipe Full Capacity (l/s)			
	59	%		30	0.05	0.019531	0.2904	1.5349	1.0701	302.5636			-
	10	%		60	0.1	0.038112	0.4497	6.6174	1.0701	302.5636			
	15	%		90	0.15	0.055727	0.5739	15.2628	1.0701	302.5636			
	20			120	0.2	0.072355	0.6776	27.2779	1.0701	302.5636			
	25			150	0.25	0.087975	0.7667	42.3806	1.0701	302.5636		$\rightarrow$	
	30			180	0.3	0.102565	0.8443	60.2329	1.0701	302.5636		+++	_
	35			210	0.35	0.116095	0.9125	80.4761	1.0701	302.5636	+	+++	
	40			240	0.4	0.128536	0.9724	102.6982	1.0701	302.5636		+++	
	45 50			270 300	0.45 0.5	0.139851 0.15	1.025 1.0706	126.4868 151.3525	1.0701 1.0701	302.5636 302.5636		+++	_
	55			330	0.55	0.15	1.1098	176.8373	1.0701	302.5636		+++	_
	60			360	0.55	0.166587	1.1427	202.4067	1.0701	302.5636		+++	-
	65			390	0.65	0.172889	1.1693	227.4877	1.0701	302.5636			-
1	70			420	0.7	0.177741	1.1895	251.4635	1.0701	302.5636		+++	
1	75	%		450	0.75	0.181012	1.203	273.6424	1.0701	302.5636			
1	80	%		480	0.8	0.182516	1.2092	293.215	1.0701	302.5636			
1	85	%		510	0.85	0.18196	1.2069	309.1456	1.0701	302.5636			
1	90	%		540	0.9	0.178822	1.194	320.0257	1.0701	302.5636			
	95	%		570	0.95	0.171871	1.165	323.2386	1.0701	302.5636			
1	100	0%		600	1	0.15	1.0706	302.705	1.0701	302.5636			1

Jacobs Engineering Limited		Page 1
	Immingham Eastern	
	Ro-Ro Terminal	
	Northern Yard: Existing	_ Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainag
File Existing Model.MDX	Checked by Tom Watson	Dialitacy
nnovyze	Network 2020.1.3	
	N by the Modified Rational Method Criteria for Northern	
-	s STANDARD Manhole Sizes ECC	
Return Period (year: M5-60 (mr Ratio Maximum Rainfall (mm/h:	n) 17.000 Add Flow / Climate Cha R 0.400 Minimum Backdrop Her r) 50 Maximum Backdrop Her s) 30 Min Design Depth for Optimisat a) 0.000 Min Vel for Auto Design on	ight (m) 0.20 ight (m) 1.50 tion (m) 1.20 ly (m/s) 1.0
Desi	gned with Level Soffits	
Simulati	<u>on Criteria for Northern</u>	
Areal Reduction Factor Hot Start (mins) Hot Start Level (mm) Manhole Headloss Coeff (Global) Foul Sewage per hectare (1/s) Number of Input Hydro Number of Online Co	) 0 Inlet Coeffiec: ) 0 Flow per Person per Day (l/per/d ) 0.500 Run Time (m:	rage 2.000 ient 0.800 day) 0.000 ins) 60 ins) 1
Synth	etic Rainfall Details	
Rainfall Model Return Period (years) Region Eng M5-60 (mm) Ratio R	FSR Profile Type Su 30 Cv (Summer) O gland and Wales Cv (Winter) O 17.000 Storm Duration (mins) 0.400	).750 ).840

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Caccobb En	rine	ering I	imited					Page	2
	91110	cring i			Immingham Ea	stern		rage	2
•					-				
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Date 05/0	8/20	22			Designed by	Helen Hea	ather-Smit	<sup>zh</sup> Dcai	nage
File Exis	ting	Model.	MDX		Checked by I	om Watsor	ı	וטוט	nage
Innovyze					Network 2020	.1.3			
<u>1 year Re</u>	etur	n Perio	d Summ	ary of	Critical Res	sults by 1	Maximum L	evel (Ra	<u>nk 1)</u>
				<u>f</u>	or Northern				
					ulation Criter				
	A				.000 Additio				
				(mins) L (mm)			10m³/ha St let Coeffie	2	
Manhol	e Hea				.500 Flow per				
				(1/s) 0	-	F		,	
	Ν				phs 0 Number o				
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				Synthet	ic Rainfall De	etails			
		Rain	fall Mo		FSR		R 0.400		
			Reg	ion Engl	and and Wales	Cv (Summer	) 0.750		
			M5-60 (	mm)	17.000	Cv (Winter	) 0.840		
		Constant C		l Distanta Ma	····· · · · · · · · · · · · · · · · ·				
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		Duratio	Profile	. ,	15 20 60 12		Summer and		
		Duratio	Profile n(s) (mi	. ,	15, 30, 60, 12 720, 960, 14	0, 180, 24	0, 360, 480	, 600,	
		Duratio		. ,	15, 30, 60, 12 720, 960, 14	0, 180, 24 40, 2160, 3	0, 360, 480	, 600, 5760,	
R	eturi	Duratio	n(s) (mi	ins)		0, 180, 24 40, 2160, 3	D, 360, 480 2880, 4320, 7200, 8640,	, 600, 5760,	
R	eturi		n(s) (mi (s) (yea	ins) ars)		0, 180, 24 40, 2160, 3	0, 360, 480 2880, 4320, 7200, 8640, 1, 3	, 600, 5760, 10080	
P	eturi	n Period	n(s) (mi (s) (yea	ins) ars)		0, 180, 24 40, 2160, 3	0, 360, 480 2880, 4320, 7200, 8640, 1, 3	, 600, 5760, 10080 0, 100	
R	eturi	n Period	n(s) (mi (s) (yea	ins) ars)		0, 180, 24 40, 2160, 3	0, 360, 480 2880, 4320, 7200, 8640, 1, 3	, 600, 5760, 10080 0, 100	Water
ד ט <b>כ/</b> ו		n Period	n(s) (mi (s) (yea Change	ins) ars)	720, 960, 14	0, 180, 24 40, 2160, 3	0, 360, 480 2880, 4320, 7200, 8640, 1, 3	, 600, 5760, 10080 0, 100 , 0, 0	Water Level
	мн	n Period	n(s) (mi (s) (yea Change <b>Return</b>	ars) (%)	720, 960, 14 First (X)	0, 180, 24 40, 2160, 3	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0	, 600, 5760, 10080 0, 100 , 0, 0	
US/1 PN Nam	MH	n Period Climate Storm	n(s) (mi (s) (yea Change Return Period	<pre>ins) ars) (%) Climate Change</pre>	720, 960, 14 First (X)	0, 180, 24 40, 2160, 1 First (Y)	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m)
US/1 PN Nam	MH NE	n Period Climate <b>Storm</b> ö Winter	n(s) (mi (s) (yea Change Return Period	ins) ars) (%) Climate Change +0%	720, 960, 14 First (X)	0, 180, 24 40, 2160, 1 First (Y)	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	<b>Level</b> (m) 2.645
US/1 PN Nam N1.000 1 N2.000 1	MH Ne N1 15 N2 15	n Period Climate Storm 5 Winter 5 Summer	n(s) (mi (s) (yea Change Return Period 1 1	ins) ars) (%) Climate Change +0% +0%	720, 960, 14 First (X)	0, 180, 24 40, 2160, 1 First (Y)	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575
US/1 PN Nam N1.000 N2.000 N1.001	MH NE N1 15 N2 15 N3 15	n Period Climate <b>Storm</b> ö Winter	n(s) (mi (s) (yea Change Return Period	ins) ars) (%) Climate Change +0% +0% +0% +0%	720, 960, 14 First (X)	0, 180, 24 40, 2160, 3 First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	<b>Level</b> (m) 2.645
US/1 PN Nam N1.000 N2.000 N1.001 N3.000	MH NI 15 N2 15 N3 15 N4 15	Storm 5 Winter 5 Summer 5 Winter	n(s) (mi (s) (yea Change Return Period 1 1 1	ins) ars) (%) Climate Change +0% +0% +0% +0%	720, 960, 14 First (X) Surcharge	0, 180, 24 40, 2160, 3 First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000	MH NI 15 NI 15 NI 15 NI 15 NI 15 NI 15	Storm 5 Winter 5 Winter 5 Winter 5 Winter 5 Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1	<pre>ins) ars) (%) Climate Change +0% +0% +0% +0% +0% +0%</pre>	720, 960, 14 First (X) Surcharge	0, 180, 24 40, 2160, 3 First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000 N1.002 N1.003	MH N1 15 N2 15 N3 15 N4 15 N5 15 N5 15 N6 15 N7 15	Storm Storm Winter Winter Winter Winter Winter Winter Winter Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1 1 1 1 1 1	ins) ars) (%) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0%	720, 960, 14 First (X) Surcharge	0, 180, 24 40, 2160, 3 First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236 2.268 2.230 2.050
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000 N1.002 N1.003 N5.000	MH ME N1 15 N2 15 N3 15 N3 15 N5 15 N5 15 N6 15 N7 15 N8 15	Storm Storm Winter Winter Winter Winter Winter Winter Winter Winter Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1 1 1 1 1 1	ins) ars) (%) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0%	720, 960, 14 First (X) Surcharge	0, 180, 24 40, 2160, 3 First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236 2.268 2.230 2.050 2.639
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000 N1.002 N1.003 N5.000 N5.001	MH N1 15 N2 15 N3 15 N4 15 N5 15 N6 15 N6 15 N7 15 N8 15 N8 15 N9 15	Storm Storm Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1 1 1 1 1 1 1 1	<pre>ins) ars) (%) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	720, 960, 14 First (X) Surcharge	0, 180, 24 40, 2160, 3 First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236 2.268 2.230 2.050 2.639 2.586
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000 N1.002 N1.003 N1.003 N5.000 N5.001 N5.001 N6.000 N	MH N1 15 N2 15 N3 15 N4 15 N5 15 N6 15 N6 15 N7 15 N8 15 N8 15 N9 15	Storm 5 Winter 5 Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>ins) ars) (%) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	720, 960, 14 First (X) Surcharge	0, 180, 24 40, 2160, 3 First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236 2.268 2.230 2.050 2.639 2.586 2.636
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000 N1.002 N1.003 N1.003 N5.000 N5.001 N5.001 N6.000 N N6.001 N	MH NI 15 N2 15 N3 15 N4 15 N5 15 N6 15 N7 15 N8 15 N9 15 10 15	Storm Storm Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>ins) ars) (%) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	720, 960, 14 First (X) Surcharge	0, 180, 24 40, 2160, 3 First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236 2.268 2.230 2.050 2.639 2.586 2.636 2.580
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000 N1.002 N1.003 N1.003 N5.000 N5.001 N5.001 N6.000 N N6.001 N N5.002 N	MH N1 15 N2 15 N3 15 N4 15 N5 15 N6 15 N7 15 N8 15 N9 15 10 15 11 15 12 15	Storm Storm Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>ins) ars) (%) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	720, 960, 14 First (X) Surcharge	0, 180, 24 40, 2160, 3 First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236 2.268 2.230 2.050 2.639 2.586 2.636 2.580 2.576
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000 N1.002 N1.003 N5.000 N5.001 N5.001 N6.000 N N6.001 N N5.002 N N7.000 N	MH N1 15 N2 15 N3 15 N4 15 N5 15 N6 15 N7 15 N8 15 10 15 11 15 12 15 13 15	Storm Storm Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>ins) ars) (%) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	720, 960, 14 First (X) Surcharge	0, 180, 24 40, 2160, First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236 2.268 2.230 2.050 2.639 2.586 2.636 2.580
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000 N1.002 N1.003 N5.000 N5.001 N5.001 N6.000 N N6.001 N N5.002 N N7.000 N N8.000	MH N1 15 N2 15 N3 15 N4 15 N5 15 N6 15 N7 15 N8 15 10 15 11 15 12 15 13 15 14 15	Storm Storm Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>ins) ars) (%) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	<pre>720, 960, 14 First (X) Surcharge 100/15 Summer 30/15 Summer</pre>	0, 180, 24 40, 2160, First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236 2.268 2.230 2.050 2.639 2.586 2.636 2.580 2.576 2.351
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000 N1.002 N1.003 N5.000 N5.001 N5.001 N6.000 N5.001 N6.001 N N5.002 N N7.000 N N8.000 N	MH N1 15 N2 15 N3 15 N4 15 N5 15 N6 15 N7 15 N8 15 11 15 12 15 13 15 14 15 15 15	Storm Storm Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>ins) ars) (%) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	<pre>720, 960, 14 First (X) Surcharge 100/15 Summer 30/15 Summer</pre>	0, 180, 24 40, 2160, First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236 2.268 2.230 2.050 2.639 2.586 2.636 2.580 2.576 2.351 2.122
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000 N1.002 N1.003 N5.000 N5.001 N5.001 N6.000 N5.001 N6.001 N N5.002 N N7.000 N N8.000 N N8.001 N N5.003 N N1.004 N	MH N1 15 N2 15 N3 15 N4 15 N5 15 N6 15 N7 15 N8 15 11 15 12 15 14 15 15 16 15 17 15 17 15 17 15 18 15 19 15 1	Storm Storm Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lins) Ars) (%) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%	<pre>720, 960, 14 First (X) Surcharge 100/15 Summer 30/15 Summer 30/15 Summer</pre>	0, 180, 24 40, 2160, First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236 2.268 2.230 2.050 2.639 2.586 2.636 2.580 2.576 2.351 2.122 2.091 2.088 1.814
US/1 PN Nam N1.000 N2.000 N1.001 N3.000 N4.000 N1.002 N1.003 N5.000 N5.001 N5.001 N6.000 N5.001 N6.001 N N5.002 N N7.000 N N8.000 N N8.001 N N5.003 N N1.004 N	MH N1 15 N2 15 N3 15 N4 15 N5 15 N6 15 N7 15 N8 15 11 15 12 15 14 15 15 16 15 17 15 17 15 17 15 18 15 19 15 1	Storm Storm Winter	n(s) (mi (s) (yea Change Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Lins) Ars) (%) Climate Change +0% +0% +0% +0% +0% +0% +0% +0%	<pre>720, 960, 14 First (X) Surcharge 100/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer</pre>	0, 180, 24 40, 2160, First (Y) Flood	D, 360, 480 2880, 4320, 7200, 8640, 1, 3 0 First (Z)	<pre>, 600, 5760, 10080 0, 100 , 0, 0</pre>	Level (m) 2.645 2.575 2.508 2.236 2.268 2.230 2.050 2.639 2.586 2.636 2.580 2.576 2.351 2.122 2.091 2.088

cobs En	gineer	ing Limit	.ed						Page 3
				Immi	ngham Ea	stern			
				Ro-R	o Termin	al			
						d: Existi	na		Micco
e 05/0	8/2022	)				Helen Hea	-	Smith	Micro
								SILLUI	Draina
le Exis	ting M	Model.MDX				om Watson			Braina
novyze				Netw	ork 2020	.1.3			
year R	eturn	Period Su	mmary c	of Crit	ical Res	ults by M	laximu	m Leve	<u>l (Rank</u>
-			_	for N	<u>lorthern</u>	_			
		Sunchanged	Floodod			Half Drain	Dine		
	US/MH	Surcharged Depth			Overflow	Half Drain Time	Flow		Level
PN	Name	(m)	(m <sup>3</sup> )	Cap.	(1/s)	(mins)		Statue	Exceeded
EIN	Name	(111)	(111)	cap.	(1/5)	(mills)	(1/5)	Status	Exceeded
N1.000	N1	-0.155	0.000	0.21			9.3	OK	
N2.000	N2	-0.225	0.000	0.00			0.0	OK	
N1.001	N3	-0.165	0.000	0.16			9.3	OK*	
N3.000	N4	-0.174	0.000	0.11			4.3	OK	
N4.000	N5	-0.142	0.000	0.27			9.4	OK	
N1.002	NG	-0.102	0.000	0.57			23.0	OK*	
N1.003	N7	-0.182	0.000	0.32			22.4	OK	
N5.000	N8	-0.161	0.000	0.18			6.0	OK	
N5.001	N9	-0.150	0.000	0.22			5.9	OK	
N6.000	N10	-0.164	0.000	0.16			5.4	OK	
N6.001	N11	-0.155	0.000	0.18			5.4	OK	
N5.002	N12	-0.140	0.000	0.31			11.3	OK	
N7.000	N13	-0.149	0.000	0.24			8.5	OK	
N8.000	N14	-0.148	0.000	0.24			8.0	OK	
N8.001	N15	-0.116	0.000	0.27			7.9	OK	
N5.003	N16	-0.110	0.000	0.52			27.5	OK*	
N1.004	N17	-0.211	0.000	0.39			48.5	OK	
N9.000	N18	-0.163	0.000	0.17			5.6	OK	

Jacobs	Engi	nee	ring Li	mited	l							Page	4
						Imm	ingh	am Ea	stern				
						Ro-	Ro T	ermin	al			· ·	
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	. / 0 0 /	000	<u>^</u>							2	N '	Micr	0
Date 05									Helen Hea	ther-S	Smith	Drai	กลด
File Ex	isti	ng	Model.M	IDX		Che	cked	by T	om Watson			Bidi	
Innovyz	e					Net	work	2020	.1.3				
<u>l year</u>	Ret	urn	Period	l Summ	ary c	of Cri	tica	al Res	ults by M	aximu	n Leve	l (Ra	nk 1
						for	Nort	hern					
	US/MH	T		Return	Clima	ate 1	First	(X)	First (Y)	First	(Z) Ov	erflow	Wate Lev
PN	Name			Period				arge	Flood	Overf		Act.	(m)
		-			0								(,
N9.001	N19	15	Winter	1	-	+0%							2.5
N10.000	N20	15	Winter	1	-	+0읭							2.6
N10.001			Winter	1		F0%							2.5
N9.002			Winter	1		+0%	_ ,						2.5
N11.000			Winter	1				Summer					2.2
N11.001			Winter	1				Summer					2.1
N12.000			Winter	1				Summer					2.2
N12.001			Winter	1			- , -	Summer					2.1
N9.003 N1.005			Winter Winter	1				Summer Winter					2.0
N1.005 N13.000			Winter Winter	1		F03 I00 F08	J/15	wincer					2.6
N13.000			Winter	1		F0% F0%							2.0
N14.000			Winter	1		+0%							2.2
N13.002			Winter	1		+0%							2.2
N15.000	N33	3 15	Summer	1		+0%							2.6
N16.000	N34	15	Winter	1	-	F0%							2.1
N16.001	N35	5 15	Winter	1	-	+0% 100	0/15	Summer					2.1
N13.003	N36	5 15	Winter	1	-	+0% 100	0/15	Summer					2.1
N1.006	N37	15	Winter	1	-	+0%							1.3
			Surchar	rged F	Looded				Half Drain	Pipe			
	U	s/mh	Dept	h V		Flow			Time	Flow		Leve	əl
PN	N	lame	(m)		(m³)	Cap.	(	1/s)	(mins)	(l/s)	Status	Excee	ded
N9.0	001	N19	-0.	155	0.000	0.2	0			5.5	OK	-	
N10.0	000	N20		.161	0.000					5.9	OK		
N10.0		N21		.152	0.000					5.9	OK		
N9.0		N22	-0.	143	0.000	0.2	9			11.5	OK*		
N11.(	000	N23	-0.	.150	0.000	0.2	4			8.1	OK	t	
N11.(		N24		.169	0.000					8.1	OK		
N12.0		N25		.146	0.000					8.8	OK		
N12.0		N26		.167	0.000					8.8	OK		
N9.0		N27		.084	0.000					28.5	OK*		
N1.(		N28		.255	0.000					73.7	OK		
N13.0		N29		.160	0.000	0.1				6.1	OK		
N13.0		N30		.154	0.000					6.2	OK		
N14.0		N31		.225	0.000					0.0	OK		
N13.0 N15.0		N32 N33		.159 .225	0.000					7.0 0.0	OK		
N15.0 N16.0		N34		.225	0.000	0.0				0.0	OK		
TATO*(	100 101	N34		154	0.000					7 0	OK		

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0.000 0.22

-0.127 0.000 0.39

-0.302 0.000 0.36

N16.001 N35

N13.003 N36

N1.006 N37

-0.154

7.0

13.8

82.9

OK

OK

OK

Jacobs Engin	neering I	Limited					Page	5
•				Immingham Ea	stern			
				Ro-Ro Termin	al			
				Northern Yar		na		
• Date 05/08/2	000					2		0
				Designed by			<sup>en</sup> Drai	nage
File Existin	ng Model.	. MDX		Checked by T		1		
Innovyze				Network 2020	.1.3			
<u>30 year Reti</u>	urn Peri	od Summ	-	<u>Critical Re</u> or Northern	<u>sults by</u>	<u>Maximum I</u>	Level (Ra	<u>ink 1)</u>
Manhole H	Hot Hot Sta Wage per Number of Number	Start rt Level oeff (G] hectare Input of Onli	Factor 1. (mins) (mm) (obal) 0. (l/s) 0. Hydrogra ne Contr	0 .500 Flow per 1	nal Flow - D Factor * In: Person per of Storage of Time/Are	10m <sup>3</sup> /ha St let Coeffie Day (1/per Structures a Diagrams	corage 2.0 ecient 0.8 c/day) 0.0 0 0	0 0 0 0
	Number o	of Offli	ne Contr	ols U Number c	of Real Tim	e Controls	0	
			-	ic Rainfall De				
	Rair	nfall Mo		FSR		R 0.400		
		-	-	and and Wales				
		M5-60 (	mm)	17.000	Cv (Winter	) 0.840		
	Margin f	or Floor	l Risk Wa	arning (mm) 300	0.0 DVI	) Status OF	निर	
	11419111 1	01 11000		ls Timestep F:				
			-	DTS Status				
	Durant i a	Profile	. ,	1 - 20 - 20 10		Summer and		
	Duratio	n(s) (mi	lns)	15, 30, 60, 12 720, 960, 14				
				,20, 500, 11		7200, 8640,		
Retu	ırn Period	(s) (yea	ars)			1, 3	30, 100	
	Climate	Change	(응)			C	), 0, 0	
US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water Level
PN Name	Storm		Change	Surcharge	Flood	Overflow	Act.	(m)
N1 000 N1	16 57	20						0
	15 Winter 15 Summer	30 30	+0% +0%					2.690
	15 Summer 15 Winter	30 30	+0% +0%					2.575
	15 Winter	30		100/15 Summer				2.406
	15 Winter	30	+0%	30/15 Summer				2.439
N1.002 N6	15 Summer	30	+0%					2.332
	15 Winter		+0%					2.131
	15 Winter	30	+0%					2.679
	15 Winter	30	+0%					2.644
	15 Winter	30	+0%					2.675
	15 Winter	30 30	+0응 +0응					2.641
	15 Winter 15 Winter	30	+0% +0%					2.030
	TO WITHFEL		+0-3 +0-8	30/15 Summer				
	15 Winter	×11						2.402
N8.000 N14	15 Winter 15 Winter	30 30		30/15 Summer				2.402 2.309
N8.000 N14 N8.001 N15	15 Winter 15 Winter 15 Winter	30	+0% +0%	30/15 Summer 30/15 Summer				2.402 2.309 2.283
N8.000 N14 N8.001 N15 N5.003 N16	15 Winter	30	+0% +0%					2.402 2.309 2.283 2.275
N8.000N14N8.001N15N5.003N16N1.004N17	15 Winter 15 Winter	30 <mark>30</mark>	+0% +0%	30/15 Summer				2.402 2.309 2.283 2.275
N8.000 N14 N8.001 N15 N5.003 N16	15 Winter 15 Winter	30 <mark>30</mark>	+0% +0%	30/15 Summer				2.402 2.309 2.283 2.275 1.934

Jacobs Engineering Limited	Page 6	
•	Immingham Eastern	
	Ro-Ro Terminal	
	Northern Yard: Existing	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Existing Model.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

PN	US/MH Name	Surcharged Depth (m)			Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
N1.000	N1	-0.110	0.000	0.51			22.8	OK	
N2.000	N2	-0.225	0.000	0.00			0.0	OK	
N1.001	NЗ	-0.128	0.000	0.38			22.6	OK*	
N3.000	N4	-0.004	0.000	0.25			9.8	OK	
N4.000	N5	0.029	0.000	0.63			22.0	SURCHARGED	
N1.002	N6	0.000	0.000	1.27			50.7	SURCHARGED*	
N1.003	N7	-0.101	0.000	0.75			51.9	OK	
N5.000	N8	-0.121	0.000	0.43			14.6	OK	
N5.001	N9	-0.092	0.000	0.54			14.3	OK	
N6.000	N10	-0.125	0.000	0.39			13.3	OK	
N6.001	N11	-0.094	0.000	0.44			13.1	OK	
N5.002	N12	-0.080	0.000	0.74			27.4	OK	
N7.000	N13	-0.098	0.000	0.60			20.7	OK	
N8.000	N14	0.039	0.000	0.54			18.2	SURCHARGED	
N8.001	N15	0.076	0.000	0.62			18.5	SURCHARGED	
N5.003	N16	0.077	0.000	1.21			64.3	SURCHARGED*	
N1.004	N17	-0.091	0.000	0.91			113.7	OK	
N9.000	N18	-0.124	0.000	0.41			13.7	OK	

Jacobs	Engin	lee	ring Li	Imited								Pag	ge 7
•						Immi	ngha	am Ea	stern				
						Ro-F	RO TE	ermin	al				
						Nort	herr	) Yar	d: Exist	ina			
Date 05	5/08/2	02	2						Helen He	-	- Smit		icro
											-5111		ainage
File E>	ustin	ıg .	Model.M	IDX					om Watso	on			
Innovyz	ze					Netw	vork	2020	.1.3				
<u>30 yea:</u>	<u>r Retı</u>	ırn	Perio	d Summa					<u>sults by</u>	' Maxi	.mum I	Level	(Rank 1)
					<u>1</u>	orl	North	<u>nern</u>					
	US/MH			Return	Climato		irat	(*)	First ()	() Fire	at (7)	Orrowfl	Water ow Level
PN	Name	:		Period			irst urcha		First (N Flood		rflow	Act.	
					-			2					
N9.001			Winter	30	+0%								2.640
N10.000 N10.001			Winter Winter	30 30	+0읭 +0읭								2.680 2.641
N10.001 N9.002			Winter Winter	30 30	+0% +0%								2.641 2.634
N9.002 N11.000			Winter Winter	30 30			/15 0	Summo					2.634
N11.000 N11.001			Winter Winter	30 30				Summer Summer					2.34/ 2.321
N11.001 N12.000			Winter Winter	30 30				Summer Summer					2.321
N12.000			Winter	30				Summer					2.351
N9.003			Winter	30	+0%			Summer					2.323
N1.005			Winter	30				Vinter					1.703
N13.000			Winter	30	+0%		/13 W	VINCEI					2.682
N13.001			Winter	30	+0%								2.630
N14.000			Winter	30	+0%								2.303
N13.002			Winter	30	+0%								2.309
N15.002			Summer	30	+0%								2.605
N16.000			Winter	30	+0%								2.000
N16.001			Winter	30			/15 5	Summer					2.250
N13.003			Winter	30				Summer					2.236
N1.006	N37	15	Winter	30	+0%								1.466
		S	urcharge	d Flood	ed			Ha	lf Drain	Pipe			
	US/MH	I	Depth	Volur	ne Flow	/ 0	verfl	ow	Time	Flow			Level
PN	Name		(m)	(m³)	) Cap	••	(1/s	)	(mins)	(l/s)	Sta	atus	Exceeded
N9.001	. N19	)	-0.09	9 0.0	00 0.	48				13.5		OK	
N10.000	) N2C	)	-0.12		00 0.	44				14.6		OK	
N10.001		-	-0.09			53				14.4		OK	
N9.002			-0.08							27.9		OK*	
N11.000			-0.05			56				18.9		OK	
N11.001			-0.01							17.8		OK	
N12.000			-0.04			62				20.8		OK	
N12.001			-0.01			33				19.3		OK	
N9.003			0.14			62					SURCH	ARGED*	
N1.005			-0.11			89				171.5		OK	
N13.000			-0.11							15.1		OK	
N13.001			-0.10			52				15.1		OK	
N14.000			-0.18			01				0.2		OK	
N13.002			-0.11			47				17.4		OK	
N15.000			-0.22			00				0.0		OK	
N16.000			-0.13							0.6		OK	
N16.001			-0.06			63				20.1		OK	
N13.003			-0.03							35.2		OK	
N1.006	5 N37	,	-0.14	5 0.0	υυ Ο.	83				192.5		OK	
					@100	2_20	20 -	nna					
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Leve (m) 2.71 2.57
Leve (m) 2.71 2.57 2.58
Leve (m) 2.71 2.57 2.58 2.51 2.56 2.33
Leve (m) 2.71 2.57 2.58 2.51 2.56 2.33 2.22
Leve (m) 2.71 2.57 2.58 2.51 2.56 2.33 2.22 2.70
Leve (m) 2.71 2.57 2.58 2.51 2.56 2.33 2.22 2.70 2.67
Leve (m) 2.71 2.57 2.58 2.51 2.56 2.33 2.22 2.70 2.67 2.69
Leve (m) 2.71 2.57 2.58 2.51 2.56 2.33 2.22 2.70 2.67 2.69 2.67
Leve (m) 2.71 2.57 2.58 2.51 2.56 2.33 2.22 2.70 2.67 2.69 2.67 2.66
Leve (m) 2.71 2.57 2.58 2.51 2.56 2.33 2.22 2.70 2.67
Leve (m) 2.71 2.57 2.58 2.51 2.56 2.33 2.22 2.70 2.67 2.69 2.67 2.66 2.46
Leve (m) 2.71 2.57 2.58 2.51 2.56 2.33 2.22 2.70 2.67 2.69 2.67 2.66 2.46 2.46
Leve (m) 2.71 2.57 2.58 2.51 2.56 2.33 2.22 2.70 2.67 2.69 2.67 2.66 2.46 2.46 2.42

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•	Immingham Eastern	
	Ro-Ro Terminal	
	Northern Yard: Existing	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Existing Model.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank <u>1) for Northern</u>

PN	US/MH Name	Surcharged Depth (m)			Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (1/s)	Status	Level Exceeded
N1.000	N1	-0.090	0.000	0.66			29.4	OK	
N2.000	N2	-0.224	0.000	0.00			0.0	OK	
N1.001	NЗ	-0.087	0.000	0.48			28.5	OK*	
N3.000	N4	0.109	0.000	0.32			12.6	SURCHARGED	
N4.000	N5	0.156	0.000	0.82			28.4	SURCHARGED	
N1.002	N6	0.000	0.000	1.63			65.2	SURCHARGED*	
N1.003	N7	-0.003	0.000	0.92			63.5	OK	
N5.000	N8	-0.097	0.000	0.55			18.7	OK	
N5.001	N9	-0.062	0.000	0.69			18.4	OK	
N6.000	N10	-0.102	0.000	0.50			17.0	OK	
N6.001	N11	-0.065	0.000	0.57			16.8	OK	
N5.002	N12	-0.052	0.000	0.94			34.8	OK	
N7.000	N13	-0.040	0.000	0.76			26.6	OK	
N8.000	N14	0.191	0.000	0.69			23.3	SURCHARGED	
N8.001	N15	0.221	0.000	0.76			22.6	SURCHARGED	
N5.003	N16	0.218	0.000	1.49			79.7	SURCHARGED*	
N1.004	N17	0.042	0.000	1.07			133.0	SURCHARGED	
N9.000	N18	-0.103	0.000	0.52			17.5	OK	

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•	Immingham Eastern	
	Ro-Ro Terminal	
	Northern Yard: Existing	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Existing Model.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

100 year Return Period Summary of Critical Results by Maximum Level (Rank <u>1) for Northern</u>

										Water	
	US/MH		Return	Climate	First	t (X)	First (Y)	First (Z)	Overflow	Level	
PN	Name	Storm	Period	Change	Surcl	harge	Flood	Overflow	Act.	(m)	
N9.001	N1 Q	15 Winter	100	+0%						2.669	
N10.000	N19 N20	15 Winter		+0%						2.009	
N10.001		15 Winter		+0%						2.670	
N9.002	N22	15 Winter	100	+0%						2.660	
N11.000	N23	15 Winter	100	+0%	100/15	Summer				2.499	
N11.001	N24	15 Winter	100	+0%	100/15	Summer				2.466	
N12.000	N25	15 Winter	100	+0%	100/15	Summer				2.506	
N12.001	N26	15 Winter	100	+0%	100/15	Summer				2.470	
N9.003	N27	15 Winter	100	+0%	30/15	Summer				2.453	
N1.005	N28	15 Winter	100	+0%	100/15	Winter				1.829	
N13.000	N29	15 Winter	100	+0%						2.699	
N13.001	N30	15 Winter	100	+0%						2.650	
N14.000	N31	15 Winter	100	+0%						2.364	
N13.002	N32	15 Winter	100	+0%						2.364	
N15.000	N33	15 Summer	100	+0%						2.605	
N16.000	N34	15 Winter	100	+0%						2.329	
N16.001	N35	15 Winter	100	+0%	100/15	Summer				2.329	
N13.003	N36	15 Winter	100	+0%	100/15	Summer				2.310	
N1.006	N37	15 Winter	100	+0%						1.531	

PN	US/MH Name	Surcharged Depth (m)		Flow / Cap.	Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
				-					
N9.001	N19	-0.070	0.000	0.62			17.2	OK	
N10.000	N20	-0.099	0.000	0.56			18.7	OK	
N10.001	N21	-0.068	0.000	0.68			18.4	OK	
N9.002	N22	-0.060	0.000	0.89			35.5	OK*	
N11.000	N23	0.099	0.000	0.68			22.9	SURCHARGED	
N11.001	N24	0.129	0.000	0.37			21.9	SURCHARGED	
N12.000	N25	0.106	0.000	0.75			25.0	SURCHARGED	
N12.001	N26	0.130	0.000	0.41			24.0	SURCHARGED	
N9.003	N27	0.288	0.000	2.04			81.4	SURCHARGED*	
N1.005	N28	0.011	0.000	1.06			203.2	SURCHARGED	
N13.000	N29	-0.101	0.000	0.58			19.5	OK	
N13.001	N30	-0.088	0.000	0.67			19.4	OK	
N14.000	N31	-0.126	0.000	0.02			0.7	OK	
N13.002	N32	-0.061	0.000	0.58			21.7	OK	
N15.000	N33	-0.225	0.000	0.00			0.0	OK	
N16.000	N34	-0.051	0.000	0.03			1.0	OK	
N16.001	N35	0.011	0.000	0.76			24.4	SURCHARGED	
N13.003	N36	0.044	0.000	1.25			44.2	SURCHARGED	
N1.006	N37	-0.080	0.000	0.99			228.2	OK	
				01982-1	2020 Inn	0.00070			
			6	91 702-2	LUZU IIII	ovyze			

Jacobs Engineering Limited	Page 1	
•	Immingham Eastern	
	Ro-Ro Terminal	
	Southern Yard: Existing	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Existing South.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	1

## Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750Additional Flow - % of Total Flow 0.000Areal Reduction Factor 1.000MADD Factor \* 10m³/ha Storage 2.000Hot Start (mins)0Hot Start Level (mm)0 Flow per Person per Day (l/per/day)Manhole Headloss Coeff (Global)0.500Foul Sewage per hectare (l/s)0.000

Number of Input Hydrographs 0 Number of Storage Structures 0 Number of Online Controls 0 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0

## Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.000	Storm Duration (mins)	30
Ratio R	0.400		

Jacobs E	ngine	ering Lir	nited				I	Page 2			
•				In	mingham East	ern	[				
•				Rc	-Ro Terminal						
				Sc	outhern Yard:	Existing		Micro			
Date 05/	08/20	22		De	signed by He	len Heather					
		South.MI	X		lecked by Tom			Drainage			
Innovyze					twork 2020.1						
11110 0 9 2 0						• •					
<u>1 year</u>	<u>Retur</u>	n Period	Summar	-	<u>ritical Resul</u> or Storm	lts by Maxim	num Level	<u>(Rank 1)</u>			
	ole He	Hot S Hot Start adloss Coe	tart (mi Level ( ff (Glob	ctor 1.00 .ns) (mm) bal) 0.50	0 D0 Flow per Per	Factor * 10m³/ Inlet Co	'ha Storage Deffiecient	e 2.000 z 0.800			
FO		Number of	nput Hy Online	drograph Control	s 0 Number of s 0 Number of s 0 Number of	Time/Area Dia	grams O				
		NUMBEL OI					01013 0				
Synthetic Rainfall DetailsRainfall ModelFSRRatio R 0.400Region England and Wales Cv (Summer)0.750M5-60 (mm)17.000 Cv (Winter)0.840											
	]	Margin for		analysis	ning (mm) 300.0 Timestep Fine TS Status ON	e Inertia Stat					
		P. Duration(	rofile(s s) (mins	s) 15	, 30, 60, 120, 720, 960, 1440,	180, 240, 360 2160, 2880,	4320, 576 8640, 100	), ), 30			
	Retur	n Period(s Climate C					1, 30, 1 0, 0,				
PN	US/MH Name	Storm		Climate Change		First (Y) Flood	First (Z) Overflow	Overflow Act.			
01 000	01	1	-	-	20/15 0	20/15 0					
S1.000 S2.000		15 Winter 15 Winter	1 1	+0% +0%		30/15 Summer 30/15 Summer					
S1.001		15 Winter	1		1/15 Summer						
S3.000		15 Winter	1	+0%		30/15 Winter					
S1.002		15 Winter	1	+0%							
S4.000 S5.000		15 Winter 15 Winter	1 1	+0% +0%	100/15 Summer						
S5.000 S1.003		15 Winter 15 Winter	1		30/15 Winter						
S1.003		15 Winter	1	+0%							
S6.000	S10	15 Winter	1	+0%	1/15 Summer	1/15 Summer					
S1.005		30 Winter	1		30/15 Summer						
S1.006		30 Winter	1		30/15 Summer						
S1.007 S7.000		30 Winter 15 Winter	1		30/15 Summer 100/15 Summer						
s7.001		15 Winter	1		30/15 Summer						
				©1982-	2020 Innovyz	<u> </u>					

Jacobs Engineering Limited	Page 3	
•	Immingham Eastern	
	Ro-Ro Terminal	
	Southern Yard: Existing	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Existing South.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)		Flow / Cap.	Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	3.122	-0.153	0.000	0.22			11.0	OK
S2.000	S2	3.006	-0.019	0.000	0.34			9.8	OK
S1.001	S2	2.986	0.160	0.000	1.02			29.7	SURCHARGED
S3.000	S4	2.646	-0.129	0.000	0.29			15.0	OK
S1.002	S4	2.629	0.130	0.000	1.30			37.5	SURCHARGED
S4.000	S5	2.643	-0.132	0.000	0.36			18.5	OK
S5.000	S6	2.609	-0.166	0.000	0.15			8.4	OK
S1.003	S5	1.944	-0.275	0.000	0.44			86.7	OK
S1.004	S3	1.823	-0.275	0.000	0.40			83.3	OK
S6.000	S10	4.709	1.284	8.671	2.10			81.4	FLOOD
S1.005	S10	1.681	-0.144	0.000	0.84			155.6	OK
S1.006	S11	1.581	-0.169	0.000	0.79			153.9	OK
S1.007	S12	1.461	-0.166	0.000	0.80			152.8	OK
S7.000	S10	3.196	-0.254	0.000	0.36			54.4	OK
S7.001	S11	2.958	-0.305	0.000	0.47			147.9	OK

PN	•	Level Exceeded
S1.000	S1	9
S2.000	S2	14
S1.001	S2	7
S3.000	S4	6
S1.002	S4	
S4.000	S5	
S5.000	S6	
S1.003	S5	
S1.004	s3	
S6.000	S10	33
S1.005	S10	
S1.006	S11	
S1.007	S12	
S7.000	S10	
S7.001	S11	

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Immingham Eastern								
				Ro	-Ro Terminal	-		
				So	outhern Yard:	Existing		Micro
Date 05/08/2022 Designed by Helen Heather-Smith								
File Existing South.MDX Checked by Tom Watson								
nnovyze	:			Ne	twork 2020.1	.3		
0 year	<u>Retu</u>	<u>rn Period</u>	Summai	-	<u>ritical Resu</u> or Storm	lts by Maxi	mum Level	<u>(Rank 1</u>
	ole He ul Sew	Hot S Hot Start adloss Coe age per he Jumber of I	tart (mi Level ( ff (Glok ctare (1 Input Hyd	tor 1.00 .ns) mm) bal) 0.50 ./s) 0.00 drograph	0 00 Flow per Per 00 s 0 Number of	Factor * 10m³, Inlet Co rson per Day Storage Struc	/ha Storage beffiecient (l/per/day) tures 0	e 2.000 c 0.800
					s 0 Number of s 0 Number of		2	
		Painta	<u>S</u> all Mode	-	Rainfall Deta	<u>ils</u> Ratio R 0.4	0.0	
		Kaliilä			d and Wales Cv			
		M5	5-60 (mm	-		(Winter) 0.8		
		Manada Gan		l- 1-7	· · · · · · · · · · · · · · · · · · ·		0.000	
		Margin ior			ing (mm) 300.0 Timestep Fine			
				DI	IS Status ON			
			rofile(s	5)		1 Summe:	r and Winte	
		P Duration(		s) s) 15,	28 Status ON , 30, 60, 120, 720, 960, 1440,	Summe: 180, 240, 360 , 2160, 2880,	0, 480, 600	), ),
	Retur		s) (mins)) (years	5) 5) 15 5)	, 30, 60, 120,	Summe: 180, 240, 360 , 2160, 2880,	), 480, 600 4320, 5760	), ), 30
PN	Retur US/MH Name	Duration( n Period(s Climate C	s) (mins ) (years hange (% <b>Return</b>	5) 5) 15 5)	, 30, 60, 120, 720, 960, 1440,	Summe: 180, 240, 360 , 2160, 2880,	0, 480, 600 4320, 5760 8640, 1008 1, 30, 10	), 30 00 0
	US/MH Name	Duration( n Period(s Climate C <b>Storm</b>	s) (mins ) (years hange (% Return Period	s) s) 15 s) climate Change	<pre>, 30, 60, 120, 720, 960, 1440, First (X) Surcharge</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, First (Y) Flood	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), ), 80 00 0 <b>Overflow</b>
S1.000	US/MH Name S1	Duration( n Period(s Climate C <b>Storm</b> 15 Winter	s) (mins ) (years hange (% Return Period 30	<pre>;) 15;;) 15;;;) Climate Change +0%</pre>	<pre>, 30, 60, 120, 720, 960, 1440, First (X) Surcharge 30/15 Summer</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, First (Y) Flood 30/15 Summer	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), ), 80 00 0 <b>Overflow</b>
	US/MH Name S1 S2	Duration( n Period(s Climate C <b>Storm</b>	s) (mins ) (years hange (% Return Period 30 30	<pre>;) 15; ;) 15; ;) Climate Change +0% +0%</pre>	<pre>, 30, 60, 120, 720, 960, 1440, First (X) Surcharge 30/15 Summer</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, First (Y) Flood 30/15 Summer 30/15 Summer	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), 30 00 0 <b>Overflow</b>
S1.000 S2.000	US/MH Name S1 S2 S2	Duration( n Period(s Climate C <b>Storm</b> 15 Winter 15 Winter	s) (mins ) (years hange (% Return Period 30 30	<pre>;) 15; ;) 15; ;) Climate Change +0% +0%</pre>	<pre>, 30, 60, 120, 720, 960, 1440, First (X) Surcharge 30/15 Summer 30/15 Summer 1/15 Summer</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, First (Y) Flood 30/15 Summer 30/15 Summer	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), 30 00 0 <b>Overflow</b>
\$1.000 \$2.000 \$1.001 \$3.000 \$1.002	<b>US/MH</b> Name S1 S2 S2 S4 S4	Duration( n Period(s Climate C Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	s) (mins ) (years hange (% Return Period 30 30 30 30 30 30	<pre>s) 15 s) 15 s) Climate Change +0% +0% +0% +0% +0%</pre>	<pre>, 30, 60, 120, 720, 960, 1440, First (X) Surcharge 30/15 Summer 30/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, First (Y) Flood 30/15 Summer 30/15 Summer 30/15 Summer	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), 30 00 0 <b>Overflow</b>
<pre>\$1.000 \$2.000 \$1.001 \$3.000 \$1.002 \$4.000</pre>	US/MH Name S1 S2 S2 S4 S4 S5	Duration( n Period(s Climate C Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	s) (mins ) (years hange (% Return Period 30 30 30 30 30 30 30	<pre>s) 15 s) 15 s) Climate Change +0% +0% +0% +0% +0% +0% +0%</pre>	<pre>, 30, 60, 120, 720, 960, 1440, First (X) Surcharge 30/15 Summer 30/15 Summer 1/15 Summer 30/15 Summer</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, First (Y) Flood 30/15 Summer 30/15 Summer 30/15 Summer	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), 30 00 0 <b>Overflow</b>
<pre>\$1.000 \$2.000 \$1.001 \$3.000 \$1.002 \$4.000 \$5.000</pre>	<b>US/MH</b> Name S1 S2 S2 S4 S4 S5 S6	Duration( n Period(s Climate C Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	s) (mins ) (years hange (% <b>Return</b> <b>Period</b> 30 30 30 30 30 30 30 30 30	<pre>s) 15; s) 15; s) Climate Change +0% +0% +0% +0% +0% +0% +0% +0%</pre>	<pre>, 30, 60, 120, 720, 960, 1440, Surcharge 30/15 Summer 30/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 1/00/15 Summer</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, First (Y) Flood 30/15 Summer 30/15 Summer 30/15 Summer	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), 30 00 0 <b>Overflow</b>
\$1.000 \$2.000 \$1.001 \$3.000 \$1.002 \$4.000 \$5.000 \$1.003	US/MH Name S1 S2 S2 S4 S4 S5 S6 S5	Duration( n Period(s Climate C Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	s) (mins ) (years hange (% Return Period 30 30 30 30 30 30 30 30 30 30	<pre>s) 15; s) 15; s) Climate Change +0% +0% +0% +0% +0% +0% +0% +0%</pre>	<pre>, 30, 60, 120, 720, 960, 1440, First (X) Surcharge 30/15 Summer 30/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 100/15 Summer 30/15 Winter</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, First (Y) Flood 30/15 Summer 30/15 Summer 30/15 Summer	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), 30 00 0 <b>Overflow</b>
<pre>\$1.000 \$2.000 \$1.001 \$3.000 \$1.002 \$4.000 \$5.000</pre>	US/MH Name S1 S2 S2 S4 S4 S5 S6 S5 S3	Duration( n Period(s Climate C Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	s) (mins ) (years hange (% Return Period 30 30 30 30 30 30 30 30 30 30 30 30 30	<pre>s) 15; s) 15; s) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	<pre>, 30, 60, 120, 720, 960, 1440, First (X) Surcharge 30/15 Summer 30/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 100/15 Summer 30/15 Winter</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, <b>First (Y)</b> <b>Flood</b> 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Winter	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), 30 00 0 <b>Overflow</b>
S1.000 S2.000 S1.001 S3.000 S1.002 S4.000 S5.000 S1.003 S1.004	US/MH Name S1 S2 S2 S4 S4 S5 S6 S5 S3 S10	Duration( n Period(s Climate C Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	s) (mins ) (years hange (% Return Period 30 30 30 30 30 30 30 30 30 30 30 30 30	<pre>s) 15; s) 15; s) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	<pre>, 30, 60, 120, 720, 960, 1440, Surcharge 30/15 Summer 30/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 100/15 Summer 30/15 Winter 30/15 Winter</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, <b>First (Y)</b> <b>Flood</b> 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Winter	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), ), 80 00 0 <b>Overflow</b>
\$1.000 \$2.000 \$1.001 \$3.000 \$1.002 \$4.000 \$5.000 \$1.003 \$1.004 \$6.000 \$1.005 \$1.005 \$1.006	US/MH Name S1 S2 S2 S4 S5 S6 S5 S3 S10 S10 S11	Duration( n Period(s Climate C Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 30 Winter 30 Winter	s) (mins ) (years hange (% Return Period 30 30 30 30 30 30 30 30 30 30 30 30 30	<pre>s) 15; s) 15; s) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	<pre>, 30, 60, 120, 720, 960, 1440, 720, 960, 1440, Surcharge 30/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 30/15 Winter 30/15 Winter 1/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, <b>First (Y)</b> <b>Flood</b> 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Winter	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), 30 00 0 <b>Overflow</b>
\$1.000 \$2.000 \$1.001 \$3.000 \$1.002 \$4.000 \$5.000 \$1.003 \$1.004 \$6.000 \$1.005 \$1.005 \$1.006 \$1.007	US/MH Name S1 S2 S2 S4 S5 S6 S5 S3 S10 S10 S11 S12	Duration( n Period(s Climate C Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 30 Winter 30 Winter 30 Winter	s) (mins ) (years hange (% Return Period 30 30 30 30 30 30 30 30 30 30 30 30 30	<pre>s) 15, s) 15, s) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	<pre>First (X) Surcharge 30/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 30/15 Winter 30/15 Winter 1/15 Summer 30/15 Summer</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, <b>First (Y)</b> <b>Flood</b> 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Winter	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), 30 00 0 <b>Overflow</b>
\$1.000 \$2.000 \$1.001 \$3.000 \$1.002 \$4.000 \$5.000 \$1.003 \$1.004 \$6.000 \$1.005 \$1.005 \$1.006 \$1.007 \$7.000	US/MH Name S1 S2 S2 S4 S5 S6 S5 S3 S10 S10 S11 S12 S10	Duration( n Period(s Climate C Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 30 Winter 30 Winter 30 Winter 15 Winter	s) (mins ) (years hange (% Return Period 30 30 30 30 30 30 30 30 30 30 30 30 30	<pre>s) 15, s) 15, s) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	<pre>First (X) Surcharge 30/15 Summer 30/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 30/15 Winter 30/15 Winter 1/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer 100/15 Summer</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, <b>First (Y)</b> <b>Flood</b> 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Winter	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), ), 80 00 0 <b>Overflow</b>
\$1.000 \$2.000 \$1.001 \$3.000 \$1.002 \$4.000 \$5.000 \$1.003 \$1.004 \$6.000 \$1.005 \$1.005 \$1.006 \$1.007	US/MH Name S1 S2 S2 S4 S5 S6 S5 S3 S10 S10 S11 S12 S10	Duration( n Period(s Climate C Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 30 Winter 30 Winter 30 Winter	s) (mins ) (years hange (% Return Period 30 30 30 30 30 30 30 30 30 30 30 30 30	<pre>s) 15; s) 15; s) Climate Change +0% +0% +0% +0% +0% +0% +0% +0% +0% +0%</pre>	<pre>First (X) Surcharge 30/15 Summer 30/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 1/15 Summer 30/15 Winter 30/15 Winter 1/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer 100/15 Summer</pre>	Summe: 180, 240, 360 , 2160, 2880, 7200, <b>First (Y)</b> <b>Flood</b> 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Winter	<pre>D, 480, 600 4320, 5760 8640, 1008 1, 30, 10 0, 0, First (Z)</pre>	), 30 00 0 <b>Overflow</b>

Jacobs Engineering Limited		Page 5
•	Immingham Eastern	
	Ro-Ro Terminal	
	Southern Yard: Existing	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Existing South.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)		Flow / Cap.	Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	4.253	0.978	3.302	0.65			32.8	FLOOD
S2.000	S2	4.014	0.989	13.540	1.54			44.0	FLOOD
S1.001	S2	4.251	1.425	0.698	1.52			44.3	FLOOD
S3.000	S4	3.750	0.975	0.315	0.55			28.3	FLOOD
S1.002	S4	3.665	1.166	0.000	2.46			71.0	SURCHARGED
S4.000	S5	2.714	-0.061	0.000	0.85			44.1	OK
S5.000	S6	2.647	-0.128	0.000	0.37			20.3	OK
S1.003	S5	2.224	0.005	0.000	1.04			204.6	SURCHARGED
S1.004	S3	2.102	0.004	0.000	0.91			188.0	SURCHARGED
S6.000	S10	4.870	1.445	169.991	2.20			85.2	FLOOD
S1.005	S10	1.962	0.137	0.000	1.30			241.8	SURCHARGED
S1.006	S11	1.838	0.088	0.000	1.22			239.3	SURCHARGED
S1.007	S12	1.653	0.026	0.000	1.25			237.7	SURCHARGED
s7.000	S10	3.450	0.000	0.000	0.84			126.5	OK
S7.001	S11	3.306	0.043	0.000	1.11			347.3	SURCHARGED

PN	US/MH Name	
S1.000	S1	9
S2.000	S2	14
S1.001	S2	7
S3.000	S4	6
S1.002	S4	
S4.000	S5	
S5.000	S6	
S1.003	S5	
S1.004	S3	
S6.000	S10	33
S1.005	S10	
S1.006	S11	
S1.007	S12	
S7.000	S10	
S7.001	S11	

Jacobs Engineering	g Limited				I	Page 6		
•		Im	mingham East	ern	ſ	-		
		-Ro Terminal						
•			uthern Yard:					
• Date 05/08/2022		Micro Drainage						
Date 05/08/2022Designed by Helen Heather-SmithFile Existing South.MDXChecked by Tom Watson								
Innovyze		Ne	twork 2020.1	.3				
<u>100 year Return</u>	Period Summ		Critical Re for Storm	<u>sults by Ma</u>	ximum Lev	<u>vel (Rank</u>		
H Hot S Manhole Headloss Foul Sewage pe Number Numb	Hot Start (mi Start Level ( s Coeff (Glob er hectare (1 of Input Hyd er of Online	tor 1.00 ns) mm) al) 0.50 /s) 0.00 drograph: Control:	0 00 Flow per Per 00 s 0 Number of s 0 Number of	Factor * 10m³/ Inlet Co cson per Day Storage Struc Time/Area Dia	'ha Storage peffiecien 'l/per/day tures 0 grams 0	e 2.000 t 0.800		
Numbe			s 0 Number of : Rainfall Deta		trols O			
R	ainfall Model	n Englan	FSR d and Wales Cv	Ratio R 0.4	50			
Margir		nalysis	ning (mm) 300.0 Timestep Fine 28 Status ON	e Inertia Stat				
Durat	Profile(s tion(s) (mins	) 15,	, 30, 60, 120, 720, 960, 1440,	180, 240, 360 2160, 2880,		О, О,		
	iod(s) (years ate Change (%			7200,	1, 30, 1 0, 0,	0 0		
US/MH PN Name Sto		Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.		
		2	-	00/15				
S1.000 S1 15 Wi S2.000 S2 30 Wi		+0% +0%		30/15 Summer 30/15 Summer				
S1.001 S2 30 Wi		+0% +0%						
s3.000 s4 15 Wi		+0%		30/15 Winter				
S1.002 S4 15 Su	ummer 100	+0읭	1/15 Summer					
S4.000 S5 15 Wi			100/15 Summer					
S5.000 S6 15 Wi		+0%	20 (15 51 )					
S1.003 S5 15 Wi		+0%						
S1.004 S3 30 Wi S6.000 S10 60 Wi		+0% +0%		1/15 Summer				
S1.005 S10 80 WI		+0% +0%		I/IJ SUMMET				
S1.005 S10 S0 Wi		+0%						
S1.007 S12 30 Wi		+0%						
S7.000 S10 15 Wi			100/15 Summer					
s7.001 s11 15 Wi	inter 100	+0%	30/15 Summer					

Jacobs Engineering Limited		Page 7
•	Immingham Eastern	
	Ro-Ro Terminal	
	Southern Yard: Existing	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Existing South.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)		Flow / Cap.	Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (1/s)	Status
S1.000	S1	4.258	0.983	8.770	0.74			37.4	FLOOD
S2.000	S2	4.029	1.004	28.521	1.58			45.2	FLOOD
S1.001	S2	4.254	1.428	4.234	1.55			45.3	FLOOD
S3.000	S4	3.754	0.979	4.044	0.63			32.7	FLOOD
S1.002	S4	3.712	1.213	0.000	2.49			71.8	FLOOD RISK
S4.000	S5	3.004	0.229	0.000	1.00			51.7	SURCHARGED
S5.000	S6	2.662	-0.113	0.000	0.48			26.2	OK
S1.003	S5	2.472	0.253	0.000	1.21			236.5	SURCHARGED
S1.004	S3	2.380	0.282	0.000	1.06			217.7	SURCHARGED
S6.000	S10	4.970	1.545	269.722	2.26			87.5	FLOOD
S1.005	S10	2.159	0.334	0.000	1.57			293.1	SURCHARGED
S1.006	S11	1.980	0.230	0.000	1.46			286.0	SURCHARGED
S1.007	S12	1.715	0.088	0.000	1.49			283.0	SURCHARGED
S7.000	S10	3.746	0.296	0.000	1.09			163.3	SURCHARGED
S7.001	S11	3.496	0.233	0.000	1.45			453.1	SURCHARGED

US/MH Name	
Name	Inceeded
S1	9
S2	14
S2	7
S4	6
S4	
S5	
S6	
S5	
S3	
S10	33
S10	
S11	
S12	
S10	
S11	
	Name S1 S2 S2 S4 S5 S6 S5 S3 S10 S10 S11 S12 S10

Jacobs Engineering Limited	Page 1	
•	Immingham Eastern	
	Ro-Ro Terminal	
	Western Yard: Existing	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Existing Case.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

## Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750Additional Flow - % of Total Flow 0.000Areal Reduction Factor 1.000MADD Factor \* 10m³/ha Storage 2.000Hot Start (mins)0Inlet Coefficient 0.800Hot Start Level (mm)0 Flow per Person per Day (l/per/day)Manhole Headloss Coeff (Global)0.500Foul Sewage per hectare (l/s)0.000

Number of Input Hydrographs 0 Number of Storage Structures 0 Number of Online Controls 0 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0

## Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type Summer
Return Period (years)	30	Cv (Summer) 0.750
Region	England and Wales	Cv (Winter) 0.840
M5-60 (mm)	18.700 Storm	Duration (mins) 30
Ratio R	0.400	

Jacobs Engineer	ing L	imit	ed						Pa	ge 2
•				Immi	ngham H	Easte	rn			-
•					o Termi					
				West	ern Yai	rd: E	xisting			
Date 05/08/2022							2		mith M	icro
Date 05/08/2022Designed by Helen Heather-SmithFile Existing Case.MDXChecked by Tom Watson									ainage	
										J
Innovyze Network 2020.1.3										
<u>l year Return</u>	<u>Perio</u>	<u>d Su</u>	mmary		<u>storm</u>	<u>esult</u>	<u>s by Ma</u>	ximum	Level	( <u>Rank 1)</u>
Ho Manhole Head Foul Sewage Num N	Hot Star Loss Co e per P ber of umber	Star of Le oeff necta: Inpu of On	n Facto: t (mins vel (mm (Global re (l/s t Hydrc line Cc	) 0 ) 0.500 ) 0.000 Ographs ( ontrols (	Additi MZ Flow per ) Number ) Number	ional : ADD Fa r Pers of St of Ti	ctor * 1 Inle	Om³/ha t Coef: ay (l/ŋ ructur Diagra	es O ms O	2.000 0.800
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		F	Model	<u>chetic Ra</u> England a	FS: and Wale	R s Cv (	<u>s</u> Ratio R (Summer) (Winter)	0.750		
Mai	rgin fo	or Flo		lysis Ti	-	Fine	DVD : Inertia :			
Di	iratior		ile(s) (mins)				80, 240, 2160, 28	360, 80, 43	nd Winter 480, 600, 20, 5760, 40, 10080	
Return I C	Period Limate		-					1,	, 30, 100 0, 0, 0	
US/MH PN Name	Sto			Climate Change		• •	First Floo		First (Z) Overflow	Overflow Act.
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	30 Wi 30 Wi		1 1	+0왕						
	30 Wi 30 Wi		1	+0% +0%						
	30 Wi		1	+0%						
	30 Wi		1	+0%						
	30 Wi		1	+0왕						
	30 Wi 30 Wi		1 1	+0응 +0응	1/15 S 1/15 S					
S1.006 SSEPARATOR			1	+0%			00,10 L	. Smanie L		
S1.007 S10	30 Wi		1		1/15 S					
1		nter	1		1/15 S					
	30 Wi		1							
S1.009 S12	30 Wi 30 Wi 15 Wi	nter	1 1		1/15 S 30/15 S		100/15 \$	Summer		
\$1.009\$12\$3.000\$13	30 Wi	nter nter		+0%	30/15 S	ummer	100/15 s 100/15 v			
\$1.009\$12\$3.000\$13	30 Wi 15 Wi	nter nter	1	+0%	30/15 s 30/15 s	ummer ummer				

	Engineeri	ng Lim	ited					P	age 3
•	. Immingham Eastern								
				Ro-Ro	Termi	nal			
				Weste	rn Yar	d: Exist	ina		
•	F (00 (0000						2		Micro
	5/08/2022			-	-		eather-Sm	uth	Drainage
File E	xisting Ca	se.MDX		Check	ed by '	Tom Wats	on		
Innovy	ze			Netwo	rk 202	0.1.3		ľ	
<u>1 yea:</u>	<u>r Return P</u>	eriod S	Summary of		<u>cal Re</u> Storm	<u>sults by</u>	Maximum	Level	<u>(Rank 1)</u>
	US/MH	Water : Level	Surcharged Depth		Flow /	Overflow	Half Drain Time	Pipe Flow	
	,		-		- •		-		
PN	Name	(m)	(m)	(m <sup>3</sup> )	Cap.	(1/s)	(mins)	(1/s)	Status
<b>PN</b> S1.000	•		-	(m <sup>3</sup> ) 0.000	- •		-	(1/s)	<b>Status</b> FLOOD RISK
	Name	(m)	(m)		Cap.		-	(1/s)	
s1.000	Name S1	(m) 4.551	(m) 0.618	0.000	<b>Cap</b> .		-	(1/s) 10.0	FLOOD RISK FLOOD
s1.000 s1.001	Name S1 S2	(m) 4.551 4.503	(m) 0.618 0.869	0.000	Cap. 0.82 1.19		-	(1/s) 10.0 14.6	FLOOD RISK FLOOD FLOOD
S1.000 S1.001 S1.002	Name S1 S2 S3	(m) 4.551 4.503 4.506	(m) 0.618 0.869 1.151	0.000 3.029 6.504	Cap. 0.82 1.19 0.55		-	(1/s) 10.0 14.6 16.8 36.5	FLOOD RISK FLOOD FLOOD
S1.000 S1.001 S1.002 S1.003	Name S1 S2 S3 S4	(m) 4.551 4.503 4.506 4.603	(m) 0.618 0.869 1.151 1.917	0.000 3.029 6.504 3.407	Cap. 0.82 1.19 0.55 1.24		-	(1/s) 10.0 14.6 16.8 36.5 40.3	FLOOD RISK FLOOD FLOOD FLOOD
\$1.000 \$1.001 \$1.002 \$1.003 \$1.004	Name \$1 \$2 \$3 \$4 \$5	(m) 4.551 4.503 4.506 4.603 4.545	(m) 0.618 0.869 1.151 1.917 1.988	0.000 3.029 6.504 3.407 0.000	Cap. 0.82 1.19 0.55 1.24 1.37		-	(1/s) 10.0 14.6 16.8 36.5 40.3	FLOOD RISK FLOOD FLOOD FLOOD RISK
\$1.000 \$1.001 \$1.002 \$1.003 \$1.004 \$2.000	Name \$1 \$2 \$3 \$4 \$5 \$6	(m) 4.551 4.503 4.506 4.603 4.545 4.819 4.615	(m) 0.618 0.869 1.151 1.917 1.988 0.811	0.000 3.029 6.504 3.407 0.000 0.000	Cap. 0.82 1.19 0.55 1.24 1.37 0.80		-	<pre>(l/s) 10.0 14.6 16.8 36.5 40.3 44.4 75.2</pre>	FLOOD RISK FLOOD FLOOD FLOOD RISK FLOOD RISK
S1.000 S1.001 S1.002 S1.003 S1.004 S2.000 S2.001 S1.005	Name \$1 \$2 \$3 \$4 \$5 \$6 \$7	(m) 4.551 4.503 4.506 4.603 4.545 4.819 4.615 4.336	(m) 0.618 0.869 1.151 1.917 1.988 0.811 1.222	0.000 3.029 6.504 3.407 0.000 0.000 15.258	Cap. 0.82 1.19 0.55 1.24 1.37 0.80 1.39		-	(1/s) 10.0 14.6 16.8 36.5 40.3 44.4 75.2 133.8	FLOOD RISK FLOOD FLOOD FLOOD RISK FLOOD RISK FLOOD
S1.000 S1.001 S1.002 S1.003 S1.004 S2.000 S2.001 S1.005	Name S1 S2 S3 S4 S5 S6 S7 S8 SSEPARATOR	(m) 4.551 4.503 4.506 4.603 4.545 4.819 4.615 4.336	(m) 0.618 0.869 1.151 1.917 1.988 0.811 1.222 1.912	0.000 3.029 6.504 3.407 0.000 0.000 15.258 0.000	Cap. 0.82 1.19 0.55 1.24 1.37 0.80 1.39 2.51		-	(1/s) 10.0 14.6 16.8 36.5 40.3 44.4 75.2 133.8 132.0	FLOOD RISK FLOOD FLOOD FLOOD RISK FLOOD RISK FLOOD RISK
S1.000 S1.001 S1.002 S1.003 S1.004 S2.000 S2.001 S1.005 S1.006	Name S1 S2 S3 S4 S5 S6 S7 S8 SSEPARATOR	(m) 4.551 4.503 4.506 4.603 4.545 4.819 4.615 4.336 3.869	(m) 0.618 0.869 1.151 1.917 1.988 0.811 1.222 1.912 1.523	0.000 3.029 6.504 3.407 0.000 0.000 15.258 0.000 0.000	Cap. 0.82 1.19 0.55 1.24 1.37 0.80 1.39 2.51 2.53		-	(1/s) 10.0 14.6 16.8 36.5 40.3 44.4 75.2 133.8 132.0 130.8	FLOOD RISK FLOOD FLOOD FLOOD RISK FLOOD RISK FLOOD RISK SURCHARGED
\$1.000 \$1.001 \$1.002 \$1.003 \$1.004 \$2.000 \$2.001 \$1.005 \$1.006 \$1.007	Name S1 S2 S3 S4 S5 S6 S7 S8 SSEPARATOR S10	(m) 4.551 4.503 4.506 4.603 4.545 4.819 4.615 4.336 3.869 3.489	(m) 0.618 0.869 1.151 1.917 1.988 0.811 1.222 1.912 1.523 1.205	0.000 3.029 6.504 3.407 0.000 0.000 15.258 0.000 0.000 0.000	Cap. 0.82 1.19 0.55 1.24 1.37 0.80 1.39 2.51 2.53 2.50		-	(1/s) 10.0 14.6 16.8 36.5 40.3 44.4 75.2 133.8 132.0 130.8 130.0	FLOOD RISK FLOOD FLOOD FLOOD RISK FLOOD RISK FLOOD RISK SURCHARGED SURCHARGED
\$1.000 \$1.001 \$1.002 \$1.003 \$1.004 \$2.000 \$2.001 \$1.005 \$1.006 \$1.007 \$1.008	Name \$1 \$2 \$3 \$4 \$5 \$6 \$7 \$8 \$SEPARATOR \$10 \$11	(m) 4.551 4.503 4.506 4.603 4.545 4.819 4.615 4.336 3.869 3.489 3.078	(m) 0.618 0.869 1.151 1.917 1.988 0.811 1.222 1.912 1.523 1.205 0.861	0.000 3.029 6.504 3.407 0.000 0.000 15.258 0.000 0.000 0.000 0.000	Cap. 0.82 1.19 0.55 1.24 1.37 0.80 1.39 2.51 2.53 2.50 2.38		-	(1/s) 10.0 14.6 16.8 36.5 40.3 44.4 75.2 133.8 132.0 130.8 130.0	FLOOD RISK FLOOD FLOOD FLOOD RISK FLOOD RISK FLOOD RISK SURCHARGED SURCHARGED

PN	US/MH Name	Level Exceeded
	Traine	Inoceaca
S1.000	S1	18
S1.001	S2	40
S1.002	S3	40
S1.003	S4	32
S1.004	S5	21
S2.000	S6	28
S2.001	S7	39
S1.005	S8	14
S1.006	SSEPARATOR	
S1.007	S10	
S1.008	S11	
S1.009	S12	
S3.000	S13	2
S3.001	S14	1

Jacobs Engineering Limited				Page 4				
•	Immingha	m Eastern						
	Ro-Ro Te	rminal						
	Western '	Yard: Exist:	ing	Micco				
Date 05/08/2022	Designed	by Helen He	eather-Smith	Micro				
File Existing Case.MDX		-		Drainage				
File Existing Case.MDXChecked by Tom WatsonInnovyzeNetwork 2020.1.3								
ТШОУУ2е	Network .	2020.1.3						
<u>30 year Return Period Summary of</u>	<u>for Stor</u>	-	/ Maximum Lev	7el (Rank 1)				
Areal Reduction Factor 1 Hot Start (mins) Hot Start Level (mm) Manhole Headloss Coeff (Global) (	0 0 0.500 Flow	itional Flow MADD Factor I	* 10m³/ha Stora nlet Coeffiecie	age 2.000 ent 0.800				
Foul Sewage per hectare (l/s) ( Number of Input Hydrogr Number of Online Cont	aphs 0 Numb	-						
Number of Offline Cont	rols 0 Numb	per of Real Ti	me Controls 0					
<u>Synthe</u> Rainfall Model	tic Rainfal		R 0.400					
Region Eng M5-60 (mm)		lles Cv (Summe 000 Cv (Winte						
Margin for Flood Risk W Analys	-	p Fine Inert	VD Status OFF ia Status OFF					
Profile(s) Duration(s) (mins)			Summer and Win 40, 360, 480,	600,				
Return Period(s) (years) Climate Change (%)	720, 960	, 1440, 2160,	2880, 4320, 5 7200, 8640, 1 1, 30, 0, 0	0080				
	rn Climate od Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow				
S1.000 S1 30 Winter	30 +0%	1/15 Summer	30/15 Summer					
	30 +0%		1/15 Winter					
	30 +0%	_,	1/15 Summer					
	30 +0%	1/15 Summer						
	30 +0% 30 +0%		30/15 Summer 30/15 Summer					
	30 +0%	,	1/15 Summer					
	30 +0%		30/15 Summer					
	30 +0%							
	30 +0%							
	30 +0% 30 +0%							
			100/15 Summer					
S3.001 S14 15 Winter	30 +0%	30/15 Summer	100/15 Winter					
©198	32-2020 Ir	novyze						

Jacobs Engineering Limited		Page 5
•	Immingham Eastern	
	Ro-Ro Terminal	
	Western Yard: Existing	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Existing Case.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	1

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			Water	Surcharged		/		Half Drain	-
	US/MH	Overflow	Level	Depth	Volume	Flow /		Time	Flow
PN	Name	Act.	(m)	(m)	(m³)	Cap.	(1/s)	(mins)	(1/s)
S1.000	S1		4.685	0.752	6.962	0.76			9.3
S1.001	S2		4.539	0.905	39.147	2.04			24.9
S1.002	S3		4.557	1.202	57.413	0.91			28.0
S1.003	S4		4.673	1.987	72.788	1.51			44.4
S1.004	S5		4.633	2.076	33.182	1.85			54.5
S2.000	S6		5.022	1.014	62.403	0.74			41.4
S2.001	S7		4.784	1.391	183.727	1.61			87.3
S1.005	S8		4.617	2.193	16.761	2.94			156.7
S1.006	SSEPARATOR		4.128	1.782	0.000	2.85			148.2
S1.007	S10		3.702	1.418	0.000	2.75			143.8
S1.008	S11		3.233	1.016	0.000	2.55			138.9
S1.009	S12		2.547	0.435	0.000	2.54			137.9
S3.000	S13		4.257	0.532	0.000	0.34			11.1
S3.001	S14		4.246	0.581	0.000	1.69			89.9

PN	US/MH Name	Status	Level Exceeded
S1.000	S1	FLOOD	18
S1.001	S2	FLOOD	40
S1.002	S3	FLOOD	40
\$1.003	S4	FLOOD	32
\$1.004	S5	FLOOD	21
\$2.000	S6	FLOOD	28
\$2.001 \$1.005 \$1.006	S7 S8 SSEPARATOR	FLOOD FLOOD SURCHARGED	39 14
S1.007	\$10	SURCHARGED	
S1.008	\$11	SURCHARGED	
S1.009	\$12	SURCHARGED	
s3.000	S13	FLOOD RISK	2
s3.001	S14	SURCHARGED	1

	ed				Page 6
•	Imm	ningham East	tern		
	Ro-	-Ro Terminal	1		
	Wes	stern Yard:	Existi	ng	Micro
Date 05/08/2022	Des	signed by He	elen He	ather-Smith	
File Existing Case.MDX	Che	ecked by Tor	n Watso	n	Drainage
Innovyze		work 2020.1			
111100 9 20					
<u>100 year Return Period</u>		<u>Critical Re</u> for Storm	esults ]	<u>oy Maximum I</u>	evel (Rank
	Simulat	<u>tion Criteria</u>			
Areal Reduction					
Hot Start Lev Manhole Headloss Coeff Foul Sewage per hectar	vel (mm) ( (Global) 0.500 ce (l/s) 0.000	) ) Flow per Pe )	In rson per		ent 0.800
Number of Inpu Number of On Number of Off	line Controls	0 Number of	Time/Are	ea Diagrams O	
		Rainfall Deta		D 0 100	
Rainfall	Model egion England	FSR and Wales Cu		R 0.400	
	(mm)	17.000 Ct			
Margin for Flo		-			
	-	Fimestep Fin S Status 0		a Status OFF	
	DIS	status 0.	IN		
				~	
Duration(s)				Summer and Win 0, 360, 480, 6 2880, 4320, 5 7200, 8640, 10	500, 760,
Return Period(s) ( <u>)</u> Climate Chang				1, 30,	
US/MH	Return C		t (X)	First (Y)	First (Z)
US/MH PN Name Stor			t (X) harge	First (Y) Flood	First (Z) Overflow
	rm Period (	Change Surc			• •
PN         Name         Stor           \$1.000         \$1         30 Wi           \$1.001         \$2         180 Wi	rm Period ( nter 100 nter 100	Change Surc +0% 1/15 +0% 1/15	harge Summer Summer	Flood 30/15 Summer 1/15 Winter	• •
PN         Name         Stor           \$1.000         \$1         30 Wi           \$1.001         \$2         180 Wi           \$1.002         \$3         180 Wi	nter 100 nter 100 nter 100 nter 100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15	harge Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer	• •
PN         Name         Stor           \$1.000         \$1         30 Wi           \$1.001         \$2         180 Wi           \$1.002         \$3         180 Wi           \$1.003         \$4         60 Wi	m Period ( nter 100 nter 100 nter 100 nter 100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15	harge Summer Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer 1/15 Winter	• •
PN         Name         Stor           \$1.000         \$1         30 Wi           \$1.001         \$2         180 Wi           \$1.002         \$3         180 Wi	m         Period         C           nter         100         100           nter         100         100           nter         100         100           nter         100         100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15	harge Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer	• •
PN         Name         Stor           \$1.000         \$1         30 Wi           \$1.001         \$2         180 Wi           \$1.002         \$3         180 Wi           \$1.003         \$4         60 Wi           \$1.004         \$5         60 Wi	m         Period         C           nter         100         100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15	harge Summer Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer 1/15 Winter 30/15 Summer	• •
PN         Name         Stor           \$1.000         \$1         30 Wi           \$1.001         \$2         180 Wi           \$1.002         \$3         180 Wi           \$1.003         \$4         60 Wi           \$1.004         \$5         60 Wi           \$2.000         \$6         60 Wi	m         Period         C           nter         100         100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15	harge Summer Summer Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer 1/15 Winter 30/15 Summer 30/15 Summer	• •
PN         Name         Stor           S1.000         S1         30 Wi           S1.001         S2         180 Wi           S1.002         S3         180 Wi           S1.003         S4         60 Wi           S1.004         S5         60 Wi           S2.000         S6         60 Wi           S2.001         S7         60 Wi	m         Period         C           nter         100         100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15	harge Summer Summer Summer Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer 1/15 Winter 30/15 Summer 30/15 Summer 1/15 Summer	• •
PN         Name         Stor           S1.000         S1         30 Wi           S1.001         S2         180 Wi           S1.002         S3         180 Wi           S1.003         S4         60 Wi           S1.004         S5         60 Wi           S2.000         S6         60 Wi           S1.005         S8         30 Wi           S1.006         SSEPARATOR         15 Su           S1.007         S10         15 Wi	m         Period         C           nter         100         100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15	harge Summer Summer Summer Summer Summer Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer 1/15 Winter 30/15 Summer 30/15 Summer 1/15 Summer	• •
PN         Name         Stor           S1.000         S1         30 Wi           S1.001         S2         180 Wi           S1.002         S3         180 Wi           S1.003         S4         60 Wi           S1.004         S5         60 Wi           S2.000         S6         60 Wi           S1.005         S8         30 Wi           S1.006         SSEPARATOR         15 Su           S1.007         S10         15 Wi           S1.008         S11         15 Su	m         Period         C           nter         100         100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15	harge Summer Summer Summer Summer Summer Summer Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer 1/15 Winter 30/15 Summer 30/15 Summer 1/15 Summer	• •
PN         Name         Stor           S1.000         S1         30 Wi           S1.001         S2         180 Wi           S1.002         S3         180 Wi           S1.003         S4         60 Wi           S1.004         S5         60 Wi           S2.000         S6         60 Wi           S1.005         S8         30 Wi           S1.006         SSEPARATOR         15 Su           S1.007         S10         15 Wi           S1.008         S11         15 Su           S1.009         S12         15 Wi	m         Period         C           nter         100         100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15	harge Summer Summer Summer Summer Summer Summer Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer 1/15 Winter 30/15 Summer 30/15 Summer 30/15 Summer	• •
PN         Name         Stor           \$1.000         \$1         30         Wi           \$1.001         \$2         180         Wi           \$1.002         \$3         180         Wi           \$1.003         \$4         60         Wi           \$1.004         \$5         60         Wi           \$2.000         \$6         60         Wi           \$1.005         \$8         30         Wi           \$1.006         \$SEPARATOR         15         \$u           \$1.007         \$10         15         \$u           \$1.008         \$11         15         \$u	m         Period         C           nter         100         100           nter         100         100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         30/15	harge Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer 1/15 Winter 30/15 Summer 30/15 Summer 1/15 Summer	•••
PN         Name         Stor           S1.000         S1         30 Wi           S1.001         S2         180 Wi           S1.002         S3         180 Wi           S1.003         S4         60 Wi           S1.004         S5         60 Wi           S2.000         S6         60 Wi           S1.005         S8         30 Wi           S1.006         SSEPARATOR         15 Su           S1.007         S10         15 Wi           S1.008         S11         15 Su           S1.009         S12         15 Wi           S3.000         S13         15 Wi	m         Period         C           nter         100         100           nter         100         100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         30/15	harge Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer 1/15 Winter 30/15 Summer 30/15 Summer 30/15 Summer	• •
PN         Name         Stor           \$1.000         \$1         30 Wi           \$1.001         \$2         180 Wi           \$1.002         \$3         180 Wi           \$1.003         \$4         60 Wi           \$1.004         \$5         60 Wi           \$2.000         \$6         60 Wi           \$2.001         \$7         60 Wi           \$1.005         \$8         30 Wi           \$1.006         \$SEPARATOR         15 Su           \$1.007         \$10         15 Wi           \$1.008         \$11         15 Su           \$1.009         \$12         15 Wi           \$3.000         \$13         15 Wi	m         Period         C           nter         100         100           nter         100         100	Change         Surce           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         1/15           +0%         30/15	harge Summer Summer Summer Summer Summer Summer Summer Summer Summer Summer	Flood 30/15 Summer 1/15 Winter 1/15 Summer 1/15 Winter 30/15 Summer 30/15 Summer 30/15 Summer	• •

Jacobs Engineering Limited		Page 7
•	Immingham Eastern	
	Ro-Ro Terminal	
	Western Yard: Existing	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Existing Case.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	1

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)		Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	S1		4.690	0.757	12.356	0.79			9.6
S1.001	S2		4.563	0.929	62.558	2.06			25.1
S1.002	S3		4.585	1.230	85.378	1.03			31.6
S1.003	S4		4.708	2.022	107.604	1.49			43.9
S1.004	S5		4.660	2.103	59.719	1.80			53.0
S2.000	S6		5.067	1.059	107.235	0.74			41.1
S2.001	S7		4.874	1.481	273.515	1.62			87.9
S1.005	S8		4.642	2.218	41.830	2.86			152.4
S1.006	SSEPARATOR		4.141	1.795	0.000	2.92			152.1
S1.007	S10		3.710	1.426	0.000	2.77			144.8
S1.008	S11		3.237	1.020	0.000	2.55			139.2
S1.009	S12		2.550	0.438	0.000	2.55			138.1
S3.000	S13		4.530	0.805	2.082	1.03			33.9
S3.001	S14		4.590	0.925	0.054	2.00			106.6

PN	US/MH Name	Status	Level Exceeded
S1.000	S1	FLOOD	18
S1.001	S2	FLOOD	40
S1.002	S3	FLOOD	40
S1.003	S4	FLOOD	32
S1.004	S5	FLOOD	21
S2.000	S6	FLOOD	28
S2.001	S7	FLOOD	39
S1.005	S8	FLOOD	14
S1.006	SSEPARATOR	SURCHARGED	
S1.007	S10	SURCHARGED	
S1.008	S11	SURCHARGED	
S1.009	S12	SURCHARGED	
S3.000	S13	FLOOD	2
S3.001	S14	FLOOD	1

Jacobs Engineering Limited		Page 1
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +1.9 mAOD	Mirro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

#### STORM SEWER DESIGN by the Modified Rational Method

#### Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes ECC

FSR Rainfall Model - England and WalesReturn Period (years)30PIMP (%)100M5-60 (mm)17.00Add Flow / Climate Change (%)0Ratio R0.400Minimum Backdrop Height (m)0.200Maximum Rainfall (mm/hr)50Maximum Backdrop Height (m)1.500Maximum Time of Concentration (mins)30Min Design Depth for Optimisation (m)1.200Foul Sewage (l/s/ha)0.000Min Vel for Auto Design only (m/s)1.00Volumetric Runoff Coeff.0.750Min Slope for Optimisation (1:X)500

Designed with Level Soffits

Jacobs E	Ingineer	ing Limite	ed						Page 2
•				IERRT	- Nor	thern	Yard		
				Outfa	ll Con	dition	s Replica	ting	
							.9 mAOD		
Date 05/	08/2022						Heather-	Smith	Micro
		odol - Sur	caba		-			SILLEII	Drainage
	-	odel - Sur	Clia		ed by '		LSON		L. L.
Innovyze	2			Netwo	rk 202	0.1.3			
<u>l year</u>	<u>Return I</u>	Period Sum?	mary of		<u>cal Re</u> Storm	<u>sults</u>	<u>by Maximı</u>	<u>ım Leve</u>	<u>l (Rank 1)</u>
	_			mulation					
	Area	l Reduction					ow - % of '1 or * 10m³/h		
	Но	t Start Lev			MAI	DD Facto	Inlet Coe		
	ole Headl	oss Coeff (	Global)	0.500 F	low per	Person			
Fo	ul Sewage	per hectar	e (l/s)	0.000					
	NTaamala	oer of Input	- Uudroom	capha 0	Number	of Ctor	200 0+	ures 5	
		mber of input Imber of Onl		-			5		
		nber of Offl					2		
			0	etic Rai		oto:1			
		Rainfall M		etic Rai	<u>ntall D</u> FSR		tio R 0.40	0	
				gland an			mmer) 0.75		
		M5-60	(mm)		17.000	Cv (Wi	nter) 0.84	0	
	Manuala				`			200	0
	Margin	for Flood H				econd T	ncrement (	300. Extended	
		-	-	IS Statu	-	000110 1		OF	
			D	VD Statu	s			0	N
			Inert	ia Statu	S			0	N
		Profil	. ,					and Win	
		ration(s) (n		, 30, 60	, 120,				
		eriod(s) (ye imate Change			25		5, 10, 15, 5, 25, 25,		
	011				20	, 20, 2	0, 20, 20,	20, 20,	20
	US/MH		Deturn	Olimata	Time	- (Y)	Direct (V)	Rivet (	7) 0
PN	Name	Storm		Climate Change		t (X) harge	First (1) Flood	Overflo	Z) Overflow w Act.
				2		2-			
N-1.000	. ,			+25%					
N-1.001 N-2.000	( )	15 Winter 15 Winter		+25% +25%	25/15	Winter			
N-2.001		15 Winter		+25%		Summer			
N-1.002	. ,	15 Winter		+25%	30/15	Winter			
N-3.000		15 Winter		+25%					
N-3.001	MH (N) - 7 MH (N) - 8	15 Winter 15 Winter		+25% +25%					
N-4.000 N-4.001		15 Winter 15 Winter		+25%	30/15	Winter			
		15 Winter		+25%	·				
	MH(N)-11			+25%	5/60	Winter			
		15 Winter 15 Winter		+25% +25%					
		15 Winter 15 Winter		+25% +25%					
		15 Winter		+25%	15/15	Summer			
	MH(N)-16				20/180				
		240 Winter		+25%	2/60	Winter			
N-7.000	MH(N)-18	15 Winter		+25%					
			©19	82-2020	) Innov	vyze			

	gineerin	ر د		тгорт .	- North	nern Yar	4		ge 3
							eplicating	ſ	
				a Surch	harge d	of +1.9 :	mAOD	M	icro
ce 05/08	3/2022			Designe	ed by H	Helen He	ather-Smit		
			urcha	-	-	om Watso			raina
-	55Cu 1100			Networl			11		
novyze									(D ]
<u>year ke</u>	<u>eturn Pe</u>	<u>rioa 5</u>	ummary or	for St		<u>uits by</u>	<u>Maximum Le</u>	evel	(Rank
		Water	Surcharged	Flooded			Half Drain	Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(1/s)	(mins)	(l/s)	Status
- 1 000		0 605	0 1 0 5						
N-1.000	MH(N)-1	3.605	-0.195	0.000	0.26			20.3	OF
N-1.001	MH(N)-2	3.419	-0.188	0.000	0.30			31.2	OF
N-2.000	MH(N)-3	3.708 3.266	-0.167	0.000	0.38 0.63			31.2 40.5	
N-2.001 N-1.002	MH (N) -4 MH (N) -5	3.266	-0.126 -0.137	0.000	0.63		4		OF OF
	MH (N) - 5 MH (N) - 6	3.533	-0.137	0.000	0.72		4	24.6	OF OF
	MH (N) - 0 MH (N) - 7	3.250	-0.276	0.000	0.10			38.0	OF
	MH (N) - 8	3.623	-0.177	0.000	0.13			28.0	OF
	MH (N) - 9	3.273	-0.208	0.000	0.40			47.1	OF
	MH(N)-10	3.030	-0.234	0.000	0.30			58.3	
	MH(N)-11	2.607	-0.143	0.000	0.80		3	150.3	
	MH(N)-12	3.538	-0.262	0.000	0.19			26.9	OF
	MH(N)-13	3.162	-0.356	0.000	0.09			42.0	OF
N-6.000	MH(N)-14	3.550	-0.250	0.000	0.23			36.3	OF
N-6.001	MH(N)-15	3.125	-0.230	0.000	0.46			77.1	OF
N-6.002	MH(N)-16	2.815	-0.311	0.000	0.21			76.8	OF
	MH(N)-17	2.588	-0.012	0.000	0.06		123	28.7	
N-7.000	MH(N)-18	3.319	-0.265	0.000	0.18			44.6	OF
			DN	US/MI	-	<i>r</i> el			
			PN	Name	Exce	eaea			
			N-1.00	0 MH(N)	-1				
			N-1.00	1 MH(N)	-2				
			N-2.00						
			N-2.00						
			N-1.00						
			N-3.00						
			N-3.00						
			N-4.00	0 MH(N) 1 MH(N)					
				2 MH(N)-					
				3 MH(N)-					
				0 MH(N)-					
				1 MH(N)-					
				0 MH(N)-					
				1 MH(N)-					
			N-6.00	2 MH(N)-	16				
			N-1.00	4 MH(N)-	17				
			N 7 00	0 1477 (177)	18				
			N-7.00	0 MH(N)-	10				
			N-7.00	0 MH(N)-	10				

Jacobs Engi	ineering Li	mited						Page 4
			IERF	RT - Nor	thern	Yard		
			Outf	all Cor	nditior	ns Repl	icating	r 📔 🔒
	a Su	ircharge	e of +1	.9 mAC	- D	Micco		
Date 05/08/	/2022					ner-Smit		
	sed Model -	Surcha		cked by			ICT DIMIC	<sup>n</sup> Draina
-	sed Model -	Sulciia		-		itson		
Innovyze			Netv	vork 202	20.1.3			
_					_			
<u>l year Ret</u>	urn Period	Summary			esults	by Max	<u>kimum Le</u>	evel (Rank
			for	Storm				
	US/MH		Return	Climate	Firs	t (X)	First (Y	() First (Z)
PN	Name	Storm	Period	Change	Surc	harge	Flood	Overflow
N-8.000	MH(N)-19	15 Wint	er 1	+25%	25/15	Winter		
N-8.001	MH(N)-20	15 Wint	er 1	+25%	25/15	Winter		
N-8.002	MH(N)-21	15 Wint	er 1	+25%	20/120	Winter		
N-8.003	MH(N)-22	15 Wint	er 1	+25%	10/120	Winter		
N-1.005	( )			- = = =	1/180	Winter		
N-9.000	( )							
N-10.000	( )			+25%				
N-10.001	( )			+25%		Summer		
N-10.002	. ,				20/120			
NT 1 000	( )			+25% +25%	1/15			
N-1.006	MU(N) _ EV. 27		.e. 1	-772	1/13	Summer		
	MH(N)-EX-37	TOO MINC						
	MH(N)-EX-37							
N-1.007		Wa	ter Surch	arged Flooth Vo				Half Drain P Time F

PN	Name	Act.	(m)	(m)	(m³)	Cap.	(1/s)	(mins)	(1/s)	
N-8.000	MH(N)-19		3.565	-0.235	0.000	0.45			101.0	
N-8.001	MH(N)-20		3.268	-0.275	0.000	0.44			127.3	
N-8.002	MH(N)-21		2.971	-0.272	0.000	0.47			152.1	
N-8.003	MH(N)-22		2.688	-0.305	0.000	0.37			152.9	
N-1.005	MH(N)-23		2.511	0.000	0.000	0.07		145	43.0	
N-9.000	MH(N)-24		3.485	-0.200	0.000	0.24			48.6	
N-10.000	MH(N)-25		3.505	-0.295	0.000	0.25			58.8	
N-10.001	MH(N)-26		3.121	-0.237	0.000	0.45			93.5	
N-10.002	MH(N)-27		2.769	-0.310	0.000	0.21			93.9	
N-1.006	MH(N)-28		2.506	0.581	0.000	0.28		197	42.7	
N-1.007	MH(N)-EX-37		1.919	0.308	0.000	0.18			42.7	

	US/MH		Level
PN	Name	Status	Exceeded
N-8.000	MH(N)-19	OK	
N-8.001	MH(N)-20	OK	
N-8.002	MH(N)-21	OK	
N-8.003	MH(N)-22	OK	
N-1.005	MH(N)-23	SURCHARGED	
N-9.000	MH(N)-24	OK	
N-10.000	MH(N)-25	OK	
N-10.001	MH(N)-26	OK	
N-10.002	MH(N)-27	OK	
N-1.006	MH(N)-28	SURCHARGED	
N-1.007	MH(N)-EX-37	SURCHARGED	
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Jacobs E	Ingineeri	ing Limite	ed						Page 5
•	2			IERRT	- Nor	thern	Yard		
				Outfa	11 Con	dition	s Replica	ting	
•							.9 mAOD	.01119	
• Date 05/	108/2022						Heather-	Cmith	Micro
			aha		-			SILLCII	Drainage
	-	odel - Sur	cna		ed by '		tson		J
Innovyze	2			Netwo	rk 202	0.1.3			
<u>2 year</u>	<u>Return F</u>	Period Sum	<u>mary of</u>		<u>cal Re</u> Storm	<u>sults</u>	by Maximu	<u>ım Leve</u>	<u>l (Rank 1)</u>
				mulation					
	Area	l Reduction					ow - % of ] or * 10m³/h		
	Hot	t Start Lev			MAI	DD Facto	Inlet Coe		
Manh		oss Coeff (			low per	Person			
Fo	ul Sewage	per hectar	e (l/s)	0.000					
	Mumh	er of Input	Hudrocz	capha 0	Numbor	of Ctor	ane Struct	ures 5	
		er of input Imber of Onl		-			2		
		ber of Offl					2		
		Rainfall M	_	etic Rai			tio R 0.40	0	
				gland an			mmer) 0.75		
							nter) 0.84		
				. ,	<b>、</b>			200	0
	Margin	for Flood F				econd T	ncrement (	300. Extended	
		1	-	IS Statu	-	ccona i	neremente (	OF	
			D	VD Statu	s			0	N
			Inert	ia Statu	S			0	N
		Profil	Le(s)				Summer	and Win	ter
		ration(s) (m		, 30, 60	, 120,	-			
		eriod(s) (ye .mate Change			25		5, 10, 15, 5, 25, 25,		
	(11	lillate change	= (~)		20	, 23, 2	5, 25, 25,	23, 23,	20
PN	US/MH Name	Storm		Climate Change		t (X) harge	First (Y) Flood	First (	Z) Overflow Dw Act.
				-		3-	- 2004		
N-1.000				+25%					
N-1.001 N-2.000		15 Winter 15 Winter		+25% +25%	25/15	Winter			
N-2.001		15 Winter 15 Winter		+25%	- / -	Summer			
N-1.002	MH(N)-5	15 Winter		+25%		Winter			
N-3.000	. ,	15 Winter		+25%					
N-3.001	· · /	15 Winter 15 Winter		+25% +25%					
N-4.000 N-4.001		15 Winter 15 Winter		+25%	30/15	Winter			
	MH (N) -10	15 Winter		+25%					
		180 Winter	2	+25%	5/60	Winter			
	MH(N)-12			+25%					
		15 Winter 15 Winter		+25% +25%					
		15 Winter 15 Winter		+25%	15/15	Summer			
	MH(N)-16	15 Winter			20/180				
		180 Winter		+25%	2/60	Winter			
N-7.000	MH(N)-18	15 Winter	2	+25%					
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L									

Jacobs Engineering Limited		Page 6
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +1.9 mAOD	Mirro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
N-1.000	MH(N)-1	3.621	-0.179	0.000	0.34			26.3	OK
N-1.001	MH(N)-2	3.437	-0.170	0.000	0.39			40.4	OK
N-2.000	MH(N)-3	3.730	-0.145	0.000	0.49			40.4	OK
N-2.001	MH(N)-4	3.300	-0.092	0.000	0.81			52.4	OK
N-1.002	MH(N)-5	3.179	-0.088	0.000	0.94		4	89.9	OK
N-3.000	MH(N)-6	3.548	-0.252	0.000	0.23			31.7	OK
N-3.001	MH(N)-7	3.265	-0.261	0.000	0.20			48.9	OK
N-4.000	MH(N)-8	3.643	-0.157	0.000	0.44			36.2	OK
N-4.001	MH(N)-9	3.301	-0.180	0.000	0.51			61.0	OK
N-4.002	MH(N)-10	3.052	-0.212	0.000	0.39			75.4	OK
N-1.003	MH(N)-11	2.693	-0.057	0.000	0.31		47	57.6	OK
N-5.000	MH(N)-12	3.554	-0.246	0.000	0.25			34.7	OK
N-5.001	MH(N)-13	3.173	-0.345	0.000	0.12			54.3	OK
N-6.000	MH(N)-14	3.569	-0.231	0.000	0.30			47.1	OK
N-6.001	MH(N)-15	3.163	-0.192	0.000	0.59			99.7	OK
N-6.002	MH(N)-16	2.835	-0.291	0.000	0.27			99.3	OK
N-1.004	MH(N)-17	2.669	0.069	0.000	0.11		145	54.7	SURCHARGED
N-7.000	MH(N)-18	3.334	-0.250	0.000	0.24			57.6	OK

	US/MH	Level
PN	Name	Exceeded
N-1.000	MH(N)-1	
N-1.001	MH(N)-2	
N-2.000	MH(N)-3	
N-2.001	MH(N)-4	
N-1.002	MH(N)-5	
N-3.000	MH(N)-6	
N-3.001	MH(N)-7	
N-4.000	MH(N)-8	
N-4.001	MH(N)-9	
N-4.002	MH(N)-10	
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	
N-6.001	MH(N)-15	
N-6.002	MH(N)-16	
N-1.004	MH(N)-17	
N-7.000	MH(N)-18	
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acces high	neering Li	mited						Page 7	
			IERR	T - Nor	thern	Yard			
			Outf	Outfall Conditions Replicating					
					-	-	– Micro		
Date 05/08/	(2022			a Surcharge of +1.9 mAOD Designed by Helen Heather-Smith					
File Propos	sed Model -	Surcha	Chec	ked by	Tom Wa	itson		Drainag	
Innovyze			Netw	ork 202	20.1.3				
	urn Period			Storm					
	US/MH		Return	Climate	First	t (X)	First (Y)	First (Z)	
PN	US/MH Name			Climate Change		• •	First (Y) Flood	• •	
<b>PN</b> N-8.000	Name			Change	Surcl	• •	• •	• •	
	<b>Name</b> MH(N)-19	Storm	Period 2	<b>Change</b> +25%	Surcl	<b>harge</b> Winter	• •	• •	
N-8.000	<b>Name</b> MH(N)-19 MH(N)-20	<b>Storm</b> 15 Winter	Period 2 2	<b>Change</b> +25%	<b>Surcl</b> 25/15 25/15	<b>harge</b> Winter Winter	• •	• •	
N-8.000 N-8.001	<b>Name</b> MH(N)-19 MH(N)-20 MH(N)-21	<b>Storm</b> 15 Winter 15 Winter	<b>Period</b> 2 2 2 2	<b>Change</b> +25% +25% +25%	<b>Surcl</b> 25/15 25/15	Minter Winter Winter Winter	• •	• •	
N-8.000 N-8.001 N-8.002	Name MH(N)-19 MH(N)-20 MH(N)-21 MH(N)-22	Storm 15 Winter 15 Winter 15 Winter	<b>Period</b> 2 2 2 2	<b>Change</b> +25% +25% +25%	Surcl 25/15 25/15 20/120 10/120	Minter Winter Winter Winter	• •	• •	
N-8.000 N-8.001 N-8.002 N-8.003	Name MH(N)-19 MH(N)-20 MH(N)-21 MH(N)-22 MH(N)-23	Storm 15 Winter 15 Winter 15 Winter 15 Winter	<b>Period</b> 2 2 2 2 2 2 2	<b>Change</b> +25% +25% +25% +25%	Surcl 25/15 25/15 20/120 10/120	Winter Winter Winter Winter Winter	• •	• •	
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005	Name MH(N)-19 MH(N)-20 MH(N)-21 MH(N)-22 MH(N)-23 MH(N)-24	Storm 15 Winter 15 Winter 15 Winter 15 Winter 180 Winter	<b>Period</b> 2 2 2 2 2 2 2 2 2	Change +25% +25% +25% +25% +25% +25%	Surcl 25/15 25/15 20/120 10/120	Winter Winter Winter Winter Winter	• •	• •	
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000	Name MH(N)-19 MH(N)-20 MH(N)-21 MH(N)-22 MH(N)-23 MH(N)-24 MH(N)-25	Storm 15 Winter 15 Winter 15 Winter 180 Winter 15 Winter	Period 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Change +25% +25% +25% +25% +25% +25% +25%	Surcl 25/15 25/15 20/120 10/120	Winter Winter Winter Winter Winter Winter	• •	• •	
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000	Name MH(N)-19 MH(N)-20 MH(N)-21 MH(N)-22 MH(N)-23 MH(N)-24 MH(N)-25 MH(N)-26	Storm 15 Winter 15 Winter 15 Winter 180 Winter 15 Winter 15 Winter	Period 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surcl 25/15 25/15 20/120 10/120 1/180	Winter Winter Winter Winter Winter Summer	• •	• •	
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001	Name MH(N)-19 MH(N)-20 MH(N)-21 MH(N)-22 MH(N)-23 MH(N)-24 MH(N)-25 MH(N)-26 MH(N)-27	Storm 15 Winter 15 Winter 15 Winter 180 Winter 15 Winter 15 Winter 15 Winter 15 Winter	Period 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surcl 25/15 25/15 20/120 10/120 1/180 25/15	Winter Winter Winter Winter Winter Summer Winter	• •	• •	

			water	Surcharged	riooded			Hall Drain	Pipe	
	US/MH	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	Act.	(m)	(m)	(m³)	Cap.	(1/s)	(mins)	(l/s)	
N-8.000	MH(N)-19		3.602	-0.198	0.000	0.58			130.7	
N-8.001	MH (N) - 20		3.311	-0.232	0.000	0.58			164.8	
N-0.001	MH (N) = 20		2.211	-0.232	0.000	0.57				
N-8.002	MH(N)-21		3.015	-0.228	0.000	0.60			197.2	
N-8.003	MH(N)-22		2.723	-0.270	0.000	0.47			197.7	
N-1.005	MH(N)-23		2.666	0.155	0.000	0.14		165	89.6	
N-9.000	MH(N)-24		3.500	-0.185	0.000	0.31			62.9	
N-10.000	MH(N)-25		3.530	-0.270	0.000	0.32			76.2	
N-10.001	MH(N)-26		3.157	-0.201	0.000	0.58			120.9	
N-10.002	MH(N)-27		2.788	-0.291	0.000	0.27			121.3	
N-1.006	MH(N)-28		2.663	0.738	0.000	0.32		205	48.9	
N-1.007	MH(N)-EX-37		1.921	0.310	0.000	0.21			48.9	
1										

		US/MH		Level
PN	ſ	Name	Status	Exceeded
N-8.	000	MH(N)-19	OK	
N-8.	001	MH(N)-20	OK	
N-8.	002	MH(N)-21	OK	
N-8.	003	MH(N)-22	OK	
N-1.	005	MH(N)-23	SURCHARGED	
N-9.	000	MH(N)-24	OK	
N-10.	000	MH(N)-25	OK	
N-10.	001	MH(N)-26	OK	
N-10.	002	MH(N)-27	OK	
N-1.	006	MH(N)-28	SURCHARGED	
N-1.	007	MH(N)-EX-37	SURCHARGED	
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Jacobs E	ngineeri	ng Limite	d					Page 8		
				IERRT	- Northern	Yard				
					l Condition		ating			
•					charge of +1	-	-			
• Date 05/	08/2022				ned by Heler		-Smith	Micro		
		del - Suro	rha	-	ed by Tom Wa		DILLETI	Drainage		
		dei - Suit	JIIa • • •		k 2020.1.3	115011		<u> </u>		
Innovyze				Networ	.K 2020.1.3					
<u>5 year 1</u>	<u>Return P</u>	eriod Sumr	nary of	<u>Critic</u> <u>for S</u>	<u>cal Results</u> torm	<u>by Maxim</u>	um Level	<u>l (Rank 1)</u>		
Simulation Criteria Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m <sup>3</sup> /ha Storage 2.000 Hot Start Level (mm) 0 Inlet Coefficient 0.800 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (1/per/day) 0.000 Foul Sewage per hectare (1/s) 0.000 Number of Input Hydrographs 0 Number of Storage Structures 5 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0										
	Synthetic Rainfall Details Rainfall Model FSR Ratio R 0.400 Region England and Wales Cv (Summer) 0.750 M5-60 (mm) 17.000 Cv (Winter) 0.840									
	Margin	for Flood R	isk Warr	ing (mm)			300.	0		
			nalysis DI DV		2.5 Second	Increment	(Extended OF OI OI	F		
		Profile ation(s) (m riod(s) (yea	ins) 15,	30, 60,	, 120, 180, 2 1, 2,			720		
	Cli	mate Change	(응)		25, 25,	25, 25, 25,	25, 25,	25		
WARN	NING: Half	Drain Time	has not	been ca	alculated as a	the structu	re is to	o full.		
	US/MH			Climate		• •	•	) Overflow		
PN	Name	Storm	reriod	Change	Surcharge	Flood	Overflow	v Act.		
N-1.000			5	+25%						
N-1.001	MH (N) -2	15 Winter	5	+25%						
N-2.000 N-2.001	MH(N)-3 MH(N)-4		5 5		25/15 Winter 10/15 Summer					
N-2.001 N-1.002			5		30/15 Winter					
N-3.000		15 Winter	5	+25%						
N-3.001			5	+25%						
N-4.000 N-4.001			5 5	+25% +25%	30/15 Winter					
	MH(N)-9 MH(N)-10	15 Winter 15 Winter	5	+25%	JOLIJ WINCEL					
		180 Winter	5	+25%	5/60 Winter					
	MH(N)-12	15 Winter	5	+25%						
	MH(N)-13 MH(N)-14	15 Winter	5 5	+25% +25%						
	MH(N)-14 MH(N)-15	15 Winter 15 Winter	5		15/15 Summer					
				20.0000	Turne -					
			©193	52-2020	Innovyze					

	Page 9
IERRT - Northern Yard	
Outfall Conditions Replicating	
a Surcharge of +1.9 mAOD	Mirro
Designed by Helen Heather-Smith	
Checked by Tom Watson	Diamage
Network 2020.1.3	1
	Outfall Conditions Replicating a Surcharge of +1.9 mAOD Designed by Helen Heather-Smith Checked by Tom Watson

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
N-1.000	MH(N)-1	3.640	-0.160	0.000	0.43			34.0	OK
N-1.001	MH(N)-2	3.458	-0.149	0.000	0.50			52.2	OK
N-2.000	MH(N)-3	3.757	-0.118	0.000	0.63			52.3	OK
N-2.001	MH(N)-4	3.359	-0.033	0.000	1.00			64.7	OK
N-1.002	MH(N)-5	3.212	-0.055	0.000	1.00		4	96.0	OK
N-3.000	MH(N)-6	3.566	-0.234	0.000	0.30			40.9	OK
N-3.001	MH(N)-7	3.281	-0.245	0.000	0.26			63.2	OK
N-4.000	MH(N)-8	3.667	-0.133	0.000	0.57			46.9	OK
N-4.001	MH(N)-9	3.334	-0.147	0.000	0.66			79.1	OK
N-4.002	MH(N)-10	3.078	-0.186	0.000	0.50			97.4	OK
N-1.003	MH(N)-11	2.842	0.092	0.000	0.38		83	71.8	SURCHARGED
N-5.000	MH(N)-12	3.574	-0.226	0.000	0.32			44.9	OK
N-5.001	MH(N)-13	3.189	-0.329	0.000	0.16			70.2	OK
N-6.000	MH(N)-14	3.591	-0.209	0.000	0.39			60.8	OK
N-6.001	MH(N)-15	3.212	-0.143	0.000	0.77			129.0	OK

PN	US/MH Name	Level Exceeded
N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000	MH (N) -2 MH (N) -3 MH (N) -4	
N-4.000 N-4.001 N-4.002 N-1.003 N-5.000 N-5.001 N-6.000	MH(N)-9 MH(N)-10 MH(N)-11	

	gineerin	g Limite	d					Page 1	LO
•				IERRT -	Northe	rn Yard			
				Outfall	Condit	ions Rep	olicating		
				a Surcha				Mice	
Date 05/0	8/2022				-		cher-Smith		
File Prop		el - Sur	cha	Checked	-			Drair	lage
Innovyze	0500 1100	CI DUI		Network	-				
-									
<u>5 year R</u>	eturn Pe:	riod Sum	mary of	<u>Critica</u> for Sto		ts by M	aximum Lev	vel (Ran	<u>k 1)</u>
				<u>101 500</u>	<u>/_111</u>				
	US/M	н	R	eturn Clim	nate Fi	irst (X)	First (Y)	First (	Z)
PN	Name	e St	corm P	eriod Cha	nge Si	ırcharge	Flood	Overflo	W
N-6.00	)2 MH (N	)-16 15	Winter	5 +	+25% 20/ <sup>1</sup>	180 Winte	r		
N-1.00		)-17 180				60 Winte			
N-7.00	00 MH (N	)-18 15	Winter	5 +	+25%				
N-8.00		)-19 15				15 Winte			
N-8.00		)-20 15				15 Winte			
N-8.00 N-8.00		)-21 15				l20 Winte L20 Winte			
N-8.00	(	)-22 180				120 Winte 180 Winte			
N-9.00		)-24 15			+25%				
N-10.00	00 MH(N	)-25 15	Winter	5 +	+25%				
N-10.00			Winter			15 Summe			
N-10.00		)-27 180				20 Winte			
N-1.00	06 MH(N 07 MH(N)-E	)-28 180 X-37 180				'15 Summe '15 Summe			
IN 1.00	57 MII (N) 12	A 37 100	WINCEL	5	230 1)	10 Dullille	T		
			Water	Surcharged				lf Drain	Pipe
	US/MH	Overflow		Depth			Overflow	Time	Flow
PN	Name	Act.	(m)	(m)	(m³)	Cap.	(1/s)	(mins)	(1/s)
N-6.002	MH(N)-16		2.860	-0.266	5 0.000	0.35			128.4
N-1.004	MH(N)-17		2.835	0.235	0.000	0.16		177	78.1
	MIT (NT) 10		3.354	-0.230	0.000	0.31			74.5
N-7.000	MH(N)-18								160 0
N-8.000	MH(N)-19		3.650	-0.150					169.0
N-8.000 N-8.001	MH(N)-19 MH(N)-20		3.363	-0.150 -0.180	0.000	0.74			213.2
N-8.000 N-8.001 N-8.002	MH(N)-19 MH(N)-20 MH(N)-21		3.363 3.070	-0.150 -0.180 -0.173	0.000 0.000	0.74 0.78			213.2 253.0
N-8.000 N-8.001 N-8.002 N-8.003	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22		3.363 3.070 2.844	-0.150 -0.180 -0.173 -0.149	0.000 0.000 0.000	0 0.74 0 0.78 0 0.16		194	213.2 253.0 67.7
N-8.000 N-8.001 N-8.002	MH(N)-19 MH(N)-20 MH(N)-21		3.363 3.070	-0.150 -0.180 -0.173	0 0.000 0 0.000 0 0.000 0.000	0 0.74 0 0.78 0 0.16 0 0.15		194	213.2 253.0
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23		3.363 3.070 2.844 2.832	-0.150 -0.180 -0.173 -0.149 0.321	0.000 0.000 0.000 0.000 0.000	0 0.74 0 0.78 0 0.16 0 0.15 0 0.40		194	213.2 253.0 67.7 100.0
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26		3.363 3.070 2.844 2.832 3.518 3.557 3.204	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154	0       0.000         3       0.000         4       0.000         7       0.000         8       0.000         9       0.000         10       0.000         10       0.000         10       0.000         10       0.000         11       0.000	0         0.74           0         0.78           0         0.16           0         0.15           0         0.40           0         0.42           0         0.75		194	213.2 253.0 67.7 100.0 81.4 98.5 156.4
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27		3.363 3.070 2.844 2.832 3.518 3.557 3.204 2.832	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154 -0.247	0         0.000           8         0.000           9         0.000           9         0.000           9         0.000           9         0.000           9         0.000           9         0.000           9         0.000           9         0.000           9         0.000           9         0.000	0         0.74           0         0.78           0         0.16           0         0.15           0         0.40           0         0.42           0         0.75           0         0.09		194	213.2 253.0 67.7 100.0 81.4 98.5 156.4 40.8
N-8.000 N-8.001 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002 N-1.006	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27 MH (N) -28		3.363 3.070 2.844 2.832 3.518 3.557 3.204 2.832 2.828	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154 -0.247 0.903	0.000           8.0.000           9.000           0.000           9.000           0.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000	$\begin{array}{c} 0 & 0.74 \\ 0 & 0.78 \\ 0 & 0.16 \\ 0 & 0.15 \\ 0 & 0.40 \\ 0 & 0.42 \\ 0 & 0.75 \\ 0 & 0.09 \\ 0 & 0.36 \end{array}$		194	213.2 253.0 67.7 100.0 81.4 98.5 156.4 40.8 54.6
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27 MH (N) -28		3.363 3.070 2.844 2.832 3.518 3.557 3.204 2.832	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154 -0.247	0.000           8.0.000           9.000           0.000           9.000           0.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000	$\begin{array}{c} 0 & 0.74 \\ 0 & 0.78 \\ 0 & 0.16 \\ 0 & 0.15 \\ 0 & 0.40 \\ 0 & 0.42 \\ 0 & 0.75 \\ 0 & 0.09 \\ 0 & 0.36 \end{array}$		194	213.2 253.0 67.7 100.0 81.4 98.5 156.4 40.8
N-8.000 N-8.001 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002 N-1.006	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27 MH (N) -28		3.363 3.070 2.844 2.832 3.518 3.557 3.204 2.832 2.828 1.924	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154 -0.247 0.903	0.000           8.0.000           9.000           0.000           9.000           0.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000           9.000	$\begin{array}{c} 0 & 0.74 \\ 0 & 0.78 \\ 0 & 0.16 \\ 0 & 0.15 \\ 0 & 0.40 \\ 0 & 0.42 \\ 0 & 0.75 \\ 0 & 0.09 \\ 0 & 0.36 \end{array}$		194	213.2 253.0 67.7 100.0 81.4 98.5 156.4 40.8 54.6
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002 N-1.006	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27 MH (N) -28		3.363 3.070 2.844 2.832 3.518 3.557 3.204 2.832 2.828 1.924	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154 -0.247 0.903 0.313	0.000           8.0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000	0 0.74 0.78 0 0.16 0 0.15 0 0.40 0 0.42 0 0.75 0 0.09 0 0.36 0 0.24	d	194	213.2 253.0 67.7 100.0 81.4 98.5 156.4 40.8 54.6
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002 N-1.006	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27 MH (N) -28		3.363 3.070 2.844 2.832 3.518 3.557 3.204 2.832 2.828 1.924	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154 -0.247 0.903 0.313	0 0.000 0 0.000	0 0.74 0.78 0.16 0.15 0.40 0.42 0.75 0.09 0.36 0.24 <b>Level</b> <b>Exceede</b>	d	194	213.2 253.0 67.7 100.0 81.4 98.5 156.4 40.8 54.6
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002 N-1.006	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27 MH (N) -28	PN	3.363 3.070 2.844 2.832 3.518 3.557 3.204 2.832 2.828 1.924	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154 -0.247 0.903 0.313 S/MH Jame	0.000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	0 0.74 0.78 0.16 0.15 0.40 0.42 0.75 0.09 0.36 0.24 <b>Level</b> Exceede	d	194	213.2 253.0 67.7 100.0 81.4 98.5 156.4 40.8 54.6
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002 N-1.006	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27 MH (N) -28	<b>PN</b> N-6.	3.363 3.070 2.844 2.832 3.518 3.557 3.204 2.832 2.828 1.924 U 1 002 M 004 M 000 M	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154 -0.247 0.903 0.313 S/MH Name H(N)-16 H(N)-17 SU H(N)-18	0.000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	0 0.74 0.78 0.16 0.15 0.40 0.42 0.75 0.09 0.36 0.24 <b>Level</b> <b>Exceede</b>	đ	194	213.2 253.0 67.7 100.0 81.4 98.5 156.4 40.8 54.6
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002 N-1.006	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27 MH (N) -28	PN N-6. N-1. N-7. N-8.	3.363 3.070 2.844 2.832 3.518 3.557 3.204 2.832 2.828 1.924 U 1.924 U 1.924 U 1.924	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154 -0.247 0.903 0.313 S/MH Name H(N)-16 H(N)-17 St H(N)-18 H(N)-19	0.000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	0) 0.74 0.78 0.16 0.15 0.40 0.42 0.75 0.09 0.36 0.24 <b>Level</b> Exceede	d	194	213.2 253.0 67.7 100.0 81.4 98.5 156.4 40.8 54.6
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002 N-1.006	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27 MH (N) -28	PN N-6. N-1. N-7. N-8. N-8.	3.363 3.070 2.844 2.832 3.518 3.557 3.204 2.832 2.828 1.924 U 1 002 M 004 M 000 M 000 M 000 M	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154 -0.247 0.903 0.313 S/MH Name H(N)-16 H(N)-17 St H(N)-18 H(N)-19 H(N)-20	0.000 0.0000 0.00000	0) 0.74 0.78 0.16 0.15 0.40 0.42 0.75 0.09 0.36 0.24 <b>Level</b> Exceede	d	194	213.2 253.0 67.7 100.0 81.4 98.5 156.4 40.8 54.6
N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002 N-1.006	MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27 MH (N) -28	PN N-6. N-1. N-7. N-8.	3.363 3.070 2.844 2.832 3.518 3.557 3.204 2.832 2.828 1.924 U 1 002 M 004 M 000 M 000 M 000 M 000 M 001 M 002 M	-0.150 -0.180 -0.173 -0.149 0.321 -0.167 -0.243 -0.154 -0.247 0.903 0.313 S/MH Name H(N)-16 H(N)-17 St H(N)-18 H(N)-19	0.000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	0) 0.74 0.78 0.16 0.15 0.40 0.42 0.75 0.09 0.36 0.24 <b>Level</b> <b>Exceede</b>	d	194	213.2 253.0 67.7 100.0 81.4 98.5 156.4 40.8 54.6

Jacobs Engineering Limited		Page 11
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +1.9 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

 US/MH
 Level

 PN
 Name
 Status
 Exceeded

 N-1.005
 MH (N) - 23
 SURCHARGED
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Jacobs Engineer:	ing Limite	d					P	age 12
			IERRT	- Nor	thern `	Yard		
				-		s Replica	ting	
•						.9 mAOD	-	
• Date 05/08/2022				-				Nicro
		,				Heather-	Smith	)rainage
File Proposed Mo	odel - Sur	cha			Tom Wat	tson		
Innovyze			Netwo	rk 202	0.1.3			
<u>10 year Return</u>	Period Sun	nmary o	of Criti	ical Re	esults	by Maxim	um Level	(Rank 1)
		-		<u>Storm</u>		-		
			mulatior					
Area	l Reduction					ow - % of 1 or * 10m³/ł		
Но	t Start Leve	el (mm)	0	INAI	DD Facto		effiecient	
Manhole Headle				low per	Person			
Foul Sewage	per hectare	e (l/s)	0.000					
	er of Input							
	mber of Onl							
Num	ber of Offl	ine Cont	trois U	Number	or keal	Time Cont	rois U	
		_	etic Rai	nfall D				
	Rainfall M					tio R 0.40		
	Re M5-60		gland an			mmer) 0.75 nter) 0.84		
	M3-00	(11111)		17.000	CV (WI	licer) 0.04	0	
Margin	for Flood P						300.0	
	A	-		-	econd I	ncrement (		
			TS Statu VD Statu				OFF ON	
			ia Statu				ON	
	Profil	e(s)				Summer	and Winte	er
Dur	ration(s) (m	nins) 15	, 30, 60	, 120,				
	eriod(s) (ye			25		5, 10, 15,		
	lmate Change	e (5)		20	, 20, 2	5, 25, 25,	23, 23, 2	25
US/MH PN Name	Storm		Climate Change		t (X) harge	First (Y) Flood	First (Z) Overflow	
			-	Surci	ye	1 1000	C.GLIIOW	
	15 Winter		+25%					
N-1.001 MH(N)-2 N-2.000 MH(N)-3	15 Winter 15 Winter	10 10	+25% +25%	25/15	Winter			
	15 Winter 15 Winter		+25%		Summer			
	15 Winter	10	+25%		Winter			
	15 Winter	10	+25%					
N-3.001 MH(N)-7 N-4.000 MH(N)-8		10 10	+25% +25%					
	15 Winter 15 Winter	10	+25%	30/15	Winter			
N-4.002 MH(N)-10		10	+25%					
N-1.003 MH(N)-11		10	+25%	5/60	Winter			
N-5.000 MH(N)-12		10	+25% +25%					
N-5.001 MH(N)-13 N-6.000 MH(N)-14		10 10	+25% +25%					
N-6.001 MH(N)-15		10	+25%	15/15	Summer			
	240 Winter	10	+25%	20/180	Winter			
N-6.002 MH(N)-16								
N-1.004 MH(N)-17	240 Winter	10	+25%	2/60	Winter			
	240 Winter	10 10	+25% +25%	2/60	Winter			

Jacobs Engineering Limited		Page 13
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +1.9 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (1/s)	Status
N-1.000	MH(N)-1	3.653	-0.147	0.000	0.50			39.3	OK
N-1.001	MH(N)-2	3.481	-0.126	0.000	0.62			64.3	OK
N-2.000	MH(N)-3	3.777	-0.098	0.000	0.73			60.6	OK
N-2.001	MH(N)-4	3.439	0.047	0.000	1.20			77.5	SURCHARGED
N-1.002	MH(N)-5	3.233	-0.034	0.000	1.00		4	96.0	OK
N-3.000	MH(N)-6	3.579	-0.221	0.000	0.34			47.3	OK
N-3.001	MH(N)-7	3.299	-0.227	0.000	0.32			78.6	OK
N-4.000	MH(N)-8	3.683	-0.117	0.000	0.66			54.3	OK
N-4.001	MH(N)-9	3.378	-0.103	0.000	0.83			99.0	OK
N-4.002	MH(N)-10	3.107	-0.157	0.000	0.63			122.9	OK
N-1.003	MH(N)-11	2.976	0.226	0.000	0.34		113	63.7	SURCHARGED
N-5.000	MH(N)-12	3.586	-0.214	0.000	0.38			51.9	OK
N-5.001	MH(N)-13	3.205	-0.313	0.000	0.20			87.8	OK
N-6.000	MH(N)-14	3.605	-0.195	0.000	0.45			70.4	OK
N-6.001	MH(N)-15	3.298	-0.057	0.000	0.97			162.1	OK
N-6.002	MH(N)-16	2.972	-0.154	0.000	0.09			33.3	OK
N-1.004	MH(N)-17	2.969	0.369	0.000	0.16		212	80.8	SURCHARGED
N-7.000	MH(N)-18	3.366	-0.218	0.000	0.36			86.3	OK

	US/MH	Level
PN	Name	Exceeded
N-1.000	MH(N)-1	
N-1.001	MH(N)-2	
N-2.000	MH(N)-3	
N-2.001	MH(N)-4	
N-1.002	MH(N)-5	
N-3.000	MH(N)-6	
N-3.001	MH(N)-7	
N-4.000	MH(N)-8	
N-4.001	MH(N)-9	
N-4.002	MH(N)-10	
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	
N-6.001	MH(N)-15	
N-6.002	MH(N)-16	
N-1.004	MH(N)-17	
N-7.000	MH(N)-18	
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•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +1.9 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

<u>for Storm</u>

PN	US/MH Name	Storm		Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
N-8.000	MH(N)-19	15 Winter	10	+25%	25/15 Winter		
N-8.001	MH(N)-20	15 Winter	10	+25%	25/15 Winter		
N-8.002	MH(N)-21	15 Winter	10	+25%	20/120 Winter		
N-8.003	MH(N)-22	120 Winter	10	+25%	10/120 Winter		
N-1.005	MH(N)-23	240 Winter	10	+25%	1/180 Winter		
N-9.000	MH(N)-24	15 Winter	10	+25%			
N-10.000	MH(N)-25	15 Winter	10	+25%			
N-10.001	MH(N)-26	15 Winter	10	+25%	25/15 Summer		
N-10.002	MH(N)-27	240 Winter	10	+25%	20/120 Winter		
N-1.006	MH(N)-28	240 Winter	10	+25%	1/15 Summer		
N-1.007	MH(N)-EX-37	240 Winter	10	+25%	1/15 Summer		

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	
N-8.000	MH(N)-19		3.683	-0.117	0.000	0.87			195.7	
N-8.001	MH(N)-20		3.419	-0.124	0.000	0.88			253.5	
N-8.002	MH(N)-21		3.125	-0.118	0.000	0.94			307.6	
N-8.003	MH(N)-22		3.016	0.023	0.000	0.25			105.5	
N-1.005	MH(N)-23		2.965	0.454	0.000	0.15		231	94.9	
N-9.000	MH(N)-24		3.530	-0.155	0.000	0.47			94.3	
N-10.000	MH(N)-25		3.576	-0.224	0.000	0.48			114.0	
N-10.001	MH(N)-26		3.256	-0.102	0.000	0.92			192.1	
N-10.002	MH(N)-27		2.966	-0.113	0.000	0.09			38.7	
N-1.006	MH(N)-28		2.962	1.037	0.000	0.39		248	58.8	
N-1.007	MH(N)-EX-37		1.926	0.315	0.000	0.25			58.8	

	US/MH		Level
PN	Name	Status	Exceeded
N-8.00	0 MH(N)-19	OK	
N-8.00	1 MH(N)-20	OK	
N-8.00	2 MH(N)-21	OK	
N-8.00	3 MH(N)-22	SURCHARGED	
N-1.00	5 MH(N)-23	SURCHARGED	
N-9.00	0 MH(N)-24	OK	
N-10.00	0 MH(N)-25	OK	
N-10.00	1 MH(N)-26	OK	
N-10.00	2 MH(N)-27	OK	
N-1.00	6 MH(N)-28	SURCHARGED	
N-1.00	7 MH(N)-EX-37	SURCHARGED	
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Jacobs E	Ingineer	ing Limite	d					F	age 15
				IERRT	- Nor	thern	Yard		
					-		s Replica	ting	
							.9 mAOD	-	
• Date 05/	(00/2022				-		Heather-		Micro
			1					Smith	Drainage
	=	odel - Sur	cha			Tom Wa	tson		
Innovyze	2			Netwo	rk 202	0.1.3			
<u>15 year</u>	Return	<u>Period Sur</u>	nmary c		ical Re Storm	esults	by Maxim	um Level	<u>(Rank 1)</u>
				imulatio					
	Area	l Reduction					ow - % of 1 or * 10m³/ł		
	Ho	t Start Lev	el (mm)	0	1-1-1-1	DD Facto		effiecient	
	ole Headl	oss Coeff ( per hectar	Global)	0.500 F	low per	Person	per Day (]	/per/day)	0.000
		per of Input							
		umber of Onl nber of Offl							
		Delification	_	etic Rai				0	
		Rainfall M		aland an			tio R 0.40 mmer) 0.75		
		M5-60		grana an			nter) 0.84		
	Margin	for Flood H	Risk War	ning (mm	.)			300.0	
		1	-		-	econd I	ncrement (		
				TS Statu VD Statu				OFF	
				ia Statu				ON ON	
		Profil	e (s)				Summer	and Wint	er
	Dur	ration(s) (n	. ,	, 30, 60	, 120,	180, 24			
	Return Pe	eriod(s) (ye	ears)			1, 2,	5, 10, 15,	20, 25,	30
	Cli	imate Change	을 (응)		25	, 25, 2	5, 25, 25,	25, 25,	25
PN	US/MH Name	Storm		Climate Change		t (X) harge	First (Y) Flood	First (Z Overflow	) Overflow Act.
N 1 000	MIT / NT \	15 572	1 -						
N-1.000 N-1.001		15 Winter 15 Winter		+25% +25%					
N-2.000	( )	15 Winter		+25%	25/15	Winter			
N-2.001		15 Winter		+25%		Summer			
N-1.002	( )	15 Winter		+25%	30/15	Winter			
N-3.000		15 Winter 15 Winter		+25% +25%					
		15 Winter 15 Winter		+25%					
N-4.001		15 Winter		+25%	30/15	Winter			
	MH(N)-10			+25%					
		240 Winter		+25%	5/60	Winter			
		15 Winter 15 Winter		+25% +25%					
		15 Winter 15 Winter		+25%					
		15 Winter		+25%	15/15	Summer			
		240 Winter			20/180				
		240 Winter 15 Winter		+25% +25%	2/60	Winter			
				82-2020	) Tnnos	7.170			
			ST3	, UZ ZUZI		vy∠⊂			

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	a Surcharge of +1.9 mAOD	Mirro
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File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

	US/MH	Water Level	Surcharged Depth			Overflow	Half Drain Time	Pipe Flow	
PN	Name	(m)	(m)	(m <sup>3</sup> )	Cap.	(1/s)	(mins)	(1/s)	Status
N-1.000	MH(N)-1	3.661	-0.139	0.000	0.55			42.8	OK
N-1.001	MH(N)-2	3.491	-0.116	0.000	0.67			70.0	OK
J-2.000	MH(N)-3	3.792	-0.083	0.000	0.80			65.9	OK
1-2.001	MH(N)-4	3.473	0.081	0.000	1.30			84.3	SURCHARGED
J-1.002	MH(N)-5	3.247	-0.020	0.000	1.00		5	96.0	OK
1-3.000	MH(N)-6	3.586	-0.214	0.000	0.37			51.5	OK
N-3.001	MH(N)-7	3.306	-0.220	0.000	0.35			85.7	OK
1-4.000	MH(N)-8	3.695	-0.105	0.000	0.72			59.1	OK
1-4.001	MH(N)-9	3.396	-0.085	0.000	0.91			107.8	OK
1-4.002	MH(N)-10	3.120	-0.144	0.000	0.69			133.6	OK
N-1.003	MH(N)-11	3.066	0.316	0.000	0.35		131	66.2	SURCHARGED
N-5.000	MH(N)-12	3.594	-0.206	0.000	0.41			56.6	OK
N-5.001	MH(N)-13	3.211	-0.307	0.000	0.22			95.7	OK
N-6.000	MH(N)-14	3.615	-0.185	0.000	0.49			76.8	OK
N-6.001	MH(N)-15	3.371	0.016	0.000	1.03			172.4	SURCHARGED
N-6.002	MH(N)-16	3.064	-0.062	0.000	0.10			36.5	OK
N-1.004	MH(N)-17	3.058	0.458	0.000	0.17		235	83.1	SURCHARGED
N-7.000	MH(N)-18	3.373	-0.211	0.000	0.39			94.0	OK

	US/MH	Level
PN	Name	Exceeded
N-1.000	MH(N)-1	
N-1.001	MH(N)-2	
N-2.000	MH(N)-3	
N-2.001	MH(N)-4	
N-1.002	MH(N)-5	
N-3.000	MH(N)-6	
N-3.001	MH(N)-7	
N-4.000	MH(N)-8	
N-4.001	MH(N)-9	
N-4.002	MH(N)-10	
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	
N-6.001	MH(N)-15	
N-6.002	MH(N)-16	
N-1.004	MH(N)-17	
N-7.000	MH(N)-18	
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	a Surcharge of +1.9 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

<u>for Storm</u>

PN	US/MH Name	Storm		Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
N-8.000	MH(N)-19	15 Winter	15	+25%	25/15 Winter		
N-8.001	MH(N)-20	15 Winter	15	+25%	25/15 Winter		
N-8.002	MH(N)-21	120 Winter	15	+25%	20/120 Winter		
N-8.003	MH(N)-22	120 Winter	15	+25%	10/120 Winter		
N-1.005	MH(N)-23	240 Winter	15	+25%	1/180 Winter		
N-9.000	MH(N)-24	15 Winter	15	+25%			
N-10.000	MH(N)-25	15 Winter	15	+25%			
N-10.001	MH(N)-26	15 Winter	15	+25%	25/15 Summer		
N-10.002	MH(N)-27	240 Winter	15	+25%	20/120 Winter		
N-1.006	MH(N)-28	240 Winter	15	+25%	1/15 Summer		
N-1.007	MH(N)-EX-37	240 Winter	15	+25%	1/15 Summer		

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (1/s)	
N-8.000	MH(N)-19		3.705	-0.095	0.000	0.95			213.2	
N-8.001	MH(N)-20		3.448	-0.095	0.000	0.96			276.1	
N-8.002	MH(N)-21		3.240	-0.003	0.000	0.36			117.1	
N-8.003	MH(N)-22		3.111	0.118	0.000	0.27			113.0	
N-1.005	MH(N)-23		3.054	0.543	0.000	0.16		247	102.3	
N-9.000	MH(N)-24		3.537	-0.148	0.000	0.51			102.7	
N-10.000	MH(N)-25		3.588	-0.212	0.000	0.53			124.2	
N-10.001	MH(N)-26		3.287	-0.071	0.000	0.99			206.2	
N-10.002	MH(N)-27		3.066	-0.013	0.000	0.09			42.0	
N-1.006	MH(N)-28		3.051	1.126	0.000	0.41		261	61.5	
N-1.007	MH(N)-EX-37		1.927	0.316	0.000	0.27			61.5	

	US/MH		Level
PN	Name	Status	Exceeded
N-8.00	00 MH(N)-19	OK	
N-8.00	01 MH(N)−20	OK	
N-8.00	02 MH(N)-21	OK	
N-8.00	) 3 MH (N) - 22	SURCHARGED	
N-1.00	)5 MH(N)-23	SURCHARGED	
N-9.00	00 MH(N)-24	OK	
N-10.00	00 MH(N)-25	OK	
N-10.00	01 MH(N)−26	OK	
N-10.00	02 MH(N)−27	OK	
N-1.00	06 MH(N)-28	SURCHARGED	
N-1.00	07 MH(N)-EX-37	SURCHARGED	
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Jacobs E	Ingineer	ing Limite	ed					P	age 18
•				IERRT	- Nor	thern	Yard		
-				Outfa	11 Con	dition	s Replica	ting	
•							.9 mAOD	-	
• Date 05/	108/2022						Heather-		Aicro
			aha						)rainage
	=	odel - Sur	cna			Tom Wa	tson		J
Innovyze	2			Netwo	rk 202	0.1.3			
<u>20 year</u>	Return	Period Sur	nmary c			esults	by Maxim	um Level	(Rank 1)
				<u>ior</u> :	<u>Storm</u>				
			S	imulatio	n Crite:	ria			
	Area	l Reduction	Factor	1.000	Additi	onal Flo			
		Hot Start	(mins)	0	MAI	DD Facto	or * 10m³/h		
Manh		t Start Lev oss Coeff (			low per	Person		ffiecient /per/day)	
		per hectar			ION POL	1010011	por 201 (1	., por, adj,	0.000
	Numb	er of Input	: Hydrog	raphs 0	Number	of Stor	age Struct	ures 5	
		umber of Onl					-		
	Nur	ber of Offl	ine Con	trols O	Number	ot Real	'Time Cont	rols O	
			<u>Synth</u>	etic Rai	nfall D	<u>etails</u>			
		Rainfall M					tio R 0.40		
		Re M5-60		gland an			mmer) 0.75 nter) 0.84		
		115 00	(11111)		17.000	CV (WI	11CEI) 0.04	0	
	Margin	for Flood H						300.0	
		7	-	Timeste TS Statu	-	econd I	ncrement (	Extended) OFF	
				VD Statu				ON	
			Inert	ia Statu	S			ON	
		Profil	Le(s)				Summer	and Winte	er
		ation(s) (n		, 30, 60	, 120,				
		eriod(s) (ye .mate Change			25		5, 10, 15, 5, 25, 25,		
	011		2 (0)		20	, 20, 2	5, 25, 25,	23, 23, 2	
				<b>61</b> · · ·				/ /->	o 61
PN	US/MH Name	Storm		Climate Change		t (X) harge	Flood	Overflow	Overflow Act.
N-1.000	MH (N) -1	15 Winter	20	+25%					
N-1.001	( )	15 Winter		+25%					
N-2.000	MH(N)-3	15 Winter	20	+25%	25/15	Winter			
N-2.001		15 Winter			10/15				
N-1.002 N-3.000	( )	15 Winter 15 Winter		+25% +25%	30/15	Winter			
N-3.000		15 Winter 15 Winter		+25%					
N-4.000	( )	15 Winter		+25%					
N-4.001		15 Winter		+25%	30/15	Winter			
		240 Winter 240 Winter		+25% +25%	5/60	Winter			
		15 Winter		+25%		WINCEL			
N-5.001	MH(N)-13	15 Winter	20	+25%					
		15 Winter		+25%	a E /a E	-			
		15 Winter 240 Winter		+25% +25%	15/15 20/180	Summer Winter			
		240 Winter 240 Winter		+25%		Winter			
N-7.000	MH(N)-18	15 Winter	20	+25%					
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					,	-			

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•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +1.9 mAOD	Micro
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File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

		Water	Surcharged				Half Drain	Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(1/s)	(mins)	(l/s)	Status
N-1.000	MH(N)-1	3.668	-0.132	0.000	0.58			45.5	OK
N-1.001	MH (N) -2	3.499	-0.108	0.000	0.71			74.4	OK
N-2.000	MH (N) - 3	3.840	-0.035	0.000	0.83			68.4	OK
N-2.001	MH(N) - 4	3.494	0.102	0.000	1.37			88.4	SURCHARGED
N-1.002	MH (N) - 5	3.257	-0.010	0.000	1.00		5	96.0	OK
N-3.000	MH (N) - 6	3.592	-0.208	0.000	0.40		-	54.7	OK
N-3.001	MH (N) -7	3.311	-0.215	0.000	0.37			91.1	OK
N-4.000	MH (N) -8	3.703	-0.097	0.000	0.77			62.8	OK
N-4.001	MH (N) - 9	3.411	-0.070	0.000	0.96			114.4	OK
N-4.002	MH (N) -10	3.138	-0.126	0.000	0.15			29.0	OK
N-1.003	MH(N)-11	3.134	0.384	0.000	0.36		146	67.7	SURCHARGED
N-5.000	MH(N)-12	3.600	-0.200	0.000	0.43			60.1	OK
N-5.001	MH(N)-13	3.216	-0.302	0.000	0.23			101.7	OK
N-6.000	MH(N)-14	3.622	-0.178	0.000	0.52			81.6	OK
N-6.001	MH(N)-15	3.409	0.054	0.000	1.09			183.6	SURCHARGED
	MH (N) -16	3.130	0.004	0.000	0.10			38.4	
	MH (N) -17	3.126	0.526	0.000	0.17		246	86.3	SURCHARGED
N-7.000	MH (N) -18	3.379	-0.205	0.000	0.41		210	99.9	OK
	( / 0	2.075	0.200	2,000					011

	US/MH	Level
PN	Name	Exceeded
N-1.000	MH(N)-1	
N-1.001	MH (N) -2	
N-2.000	MH(N)-3	
N-2.001	MH(N)-4	
N-1.002	MH(N)-5	
N-3.000	MH(N)-6	
N-3.001	MH(N)-7	
N-4.000	MH(N)-8	
N-4.001	MH(N)-9	
N-4.002	MH(N)-10	
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	
N-6.001	MH(N)-15	
N-6.002	MH(N)-16	
N-1.004	MH(N)-17	
N-7.000	MH(N)-18	
- 1 0 0 0		

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	a Surcharge of +1.9 mAOD	Mirro
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File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

<u>for Storm</u>

PN	US/MH Name	S	torm		Climate Change		t (X) harge	First Floo	• •	First (Z) Overflow
N-8.000	MH(N)-19	15	Winter	20	+25%	25/15	Winter			
N-8.001	MH(N)-20	15	Winter	20	+25%	25/15	Winter			
N-8.002	MH(N)-21	180	Winter	20	+25%	20/120	Winter			
N-8.003	MH(N)-22	180	Winter	20	+25%	10/120	Winter			
N-1.005	MH(N)-23	240	Winter	20	+25%	1/180	Winter			
N-9.000	MH(N)-24	15	Winter	20	+25%					
N-10.000	MH(N)-25	15	Winter	20	+25%					
N-10.001	MH(N)-26	15	Winter	20	+25%	25/15	Summer			
N-10.002	MH(N)-27	240	Winter	20	+25%	20/120	Winter			
N-1.006	MH(N)-28	240	Winter	20	+25%	1/15	Summer			
N-1.007	MH(N)-EX-37	240	Winter	20	+25%	1/15	Summer			

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	
N-8.000	MH(N)-19		3.758	-0.042	0.000	0.99			221.3	
N-8.001	MH(N)-20		3.520	-0.023	0.000	0.99			283.6	
N-8.002	MH(N)-21		3.329	0.086	0.000	0.29			93.4	
N-8.003	MH(N)-22		3.187	0.194	0.000	0.21			87.2	
N-1.005	MH(N)-23		3.122	0.611	0.000	0.17		260	110.3	
N-9.000	MH(N)-24		3.543	-0.142	0.000	0.54			109.2	
N-10.000	MH(N)-25		3.597	-0.203	0.000	0.56			132.0	
N-10.001	MH(N)-26		3.354	-0.004	0.000	1.00			208.6	
N-10.002	MH(N)-27		3.123	0.044	0.000	0.10			44.5	
N-1.006	MH(N)-28		3.118	1.193	0.000	0.42		277	63.9	
N-1.007	MH(N)-EX-37		1.928	0.317	0.000	0.28			63.9	
										1

	US/MH		Level
PN	Name	Status	Exceeded
N-8.000	MH(N)-19	OK	
N-8.001	MH(N)-20	OK	
N-8.002	MH(N)-21	SURCHARGED	
N-8.003	MH(N)-22	SURCHARGED	
N-1.005	MH(N)-23	SURCHARGED	
N-9.000	MH(N)-24	OK	
N-10.000	MH(N)-25	OK	
N-10.001	MH(N)-26	OK	
N-10.002	MH(N)-27	SURCHARGED	
N-1.006	MH(N)-28	SURCHARGED	
N-1.007	MH(N)-EX-37	SURCHARGED	
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Jacobs Engineering	Limited					Pa	age 21
•		IERRT	- Nor	thern Y	Yard		-
		Outfa	11 Cond	ditions	s Replica	ting	
•					.9 mAOD	-	
• Date 05/08/2022			=		Heather-		licro
	l Curcha	-	_			SIIIICII	)rainage
File Proposed Mode	1 - Surcha		ed by '		tson		J
Innovyze		Netwo	rk 202	0.1.3			
<u>25 year Return Per</u>	iod Summary	of Crit:	ical Re	esults	by Maxim	um Level	(Rank 1)
		for S	<u>Storm</u>				
Amonal D	eduction Facto	Simulation			••• • • • • •	latal Elan	0 000
	ot Start (mins						
Hot St	tart Level (mm	) 0				ffiecient	
Manhole Headloss	Coeff (Global	) 0.500 F	low per	Person	per Day (l	/per/day)	0.000
Foul Sewage per	r hectare (l/s	) 0.000					
Number	of Input Hydro	ographs 0	Number	of Stora	age Struct	ures 5	
	r of Online Co				-		
Number	of Offline Co	ontrols 0	Number	of Real	Time Cont:	rols O	
	Synt	thetic Rai	nfall D	<u>etails</u>			
Ra	infall Model				tio R 0.40		
	Region E M5-60 (mm)	England an			mmer) 0.75		
	M3-60 (IIIII)		17.000	CV (WI	nter) 0.84	0	
Margin for	Flood Risk Wa	arning (mm	)			300.0	
	Analysi		-	econd I	ncrement (		
		DTS Statu DVD Statu				OFF ON	
	Iner	tia Statu				ON	
	Profile(s)				Summer	and Winte	r
Durati	.on(s) (mins) 1	15, 30, 60	, 120,	180, 24			
	od(s) (years)				5, 10, 15,		
Climat	e Change (%)		25	, 25, 2	5, 25, 25,	25, 25, 2	5
US/MH		n Climate			First (Y)		
PN Name	Storm Perio	d Change	Surch	harge	Flood	Overflow	Act.
N-1.000 MH(N)-1 15	5 Winter 2	5 +25%					
	5 Winter 2						
N-2.000 MH(N)-3 15 N-2.001 MH(N)-4 15			25/15 10/15	Winter			
N-1.002 MH(N)-5 15				Winter			
N-3.000 MH(N)-6 15							
N-3.001 MH(N)-7 15							
N-4.000 MH(N)-8 15 N-4.001 MH(N)-9 15			30/15	Winter			
N-4.002 MH(N)-10 240			JU/TJ	"THCET			
N-1.003 MH(N)-11 240			5/60	Winter			
N-5.000 MH(N)-12 15		5 +25%					
N-5.001 MH(N)-13 15 N-6.000 MH(N)-14 15							
			15/15	Summer			
N-6.001 MH(N)-15 15							
N-6.001 MH(N)-15 15 N-6.002 MH(N)-16 240	) Winter 2	S +∠S≷	20/180	Winter			
N-6.002 MH(N)-16 240 N-1.004 MH(N)-17 240	) Winter 2	5 +25%		Winter Winter			
N-6.002 MH(N)-16 240	) Winter 2						

Jacobs Engineering Limited		Page 22
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +1.9 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

		Water	Surcharged	Flooded			Half Drain	Pipe	
	US/MH	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	(m)	(m)	(m³)	Cap.	(1/s)	(mins)	(l/s)	Status
N-1.000	MH(N)-1	3.673	-0.127	0.000	0.61			47.7	OK
N-1.001	MH(N)-2	3.506	-0.101	0.000	0.75			78.0	OK
N-2.000	MH(N)-3	3.888	0.013	0.000	0.86			71.0	SURCHARGED
N-2.001	MH(N)-4	3.511	0.119	0.000	1.41			91.6	SURCHARGED
N-1.002	MH(N)-5	3.266	-0.001	0.000	1.00		6	96.0	OK
N-3.000	MH(N)-6	3.596	-0.204	0.000	0.42			57.4	OK
N-3.001	MH(N)-7	3.315	-0.211	0.000	0.39			95.5	OK
N-4.000	MH(N)-8	3.710	-0.090	0.000	0.80			65.9	OK
N-4.001	MH(N)-9	3.437	-0.044	0.000	0.98			117.2	OK
N-4.002	MH(N)-10	3.191	-0.073	0.000	0.16			30.5	OK
N-1.003	MH(N)-11	3.186	0.436	0.000	0.37		156	69.0	SURCHARGED
N-5.000	MH(N)-12	3.605	-0.195	0.000	0.46			63.0	OK
N-5.001	MH(N)-13	3.219	-0.299	0.000	0.24			106.6	OK
N-6.000	MH(N)-14	3.628	-0.172	0.000	0.55			85.5	OK
N-6.001	MH(N)-15	3.439	0.084	0.000	1.15			192.7	SURCHARGED
N-6.002	MH(N)-16	3.182	0.056	0.000	0.11			40.0	SURCHARGED
N-1.004	MH(N)-17	3.178	0.578	0.000	0.18		257	87.5	SURCHARGED
N-7.000	MH(N)-18	3.384	-0.200	0.000	0.43			104.8	OK

	US/MH	Level
PN	Name	Exceeded
N-1.000	MH(N)-1	
N-1.001	MH(N)-2	
N-2.000	MH(N)-3	
N-2.001	MH(N)-4	
N-1.002	MH(N)-5	
N-3.000	MH(N)-6	
N-3.001	MH(N)-7	
N-4.000	MH(N)-8	
N-4.001	MH(N)-9	
N-4.002	MH(N)-10	
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	
N-6.001	MH(N)-15	
N-6.002	MH(N)-16	
N-1.004	MH(N)-17	
N-7.000	MH(N)-18	
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Jacobs Engineering Limited		Page 23
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +1.9 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

<u>for Storm</u>

PN	US/MH Name	•		Climate Change	• • •	First (Y) Flood	First (Z) Overflow
N-8.000	MH(N)-19	15 Winter	25	+25%	25/15 Winter		
N-8.001	MH(N)-20	15 Winter	25	+25%	25/15 Winter		
N-8.002	MH(N)-21	180 Winter	25	+25%	20/120 Winter		
N-8.003	MH(N)-22	180 Winter	25	+25%	10/120 Winter		
N-1.005	MH(N)-23	240 Winter	25	+25%	1/180 Winter		
N-9.000	MH(N)-24	15 Winter	25	+25%			
N-10.000	MH(N)-25	15 Winter	25	+25%			
N-10.001	MH(N)-26	15 Winter	25	+25%	25/15 Summer		
N-10.002	MH(N)-27	240 Winter	25	+25%	20/120 Winter		
N-1.006	MH(N)-28	240 Winter	25	+25%	1/15 Summer		
N-1.007	MH(N)-EX-37	240 Winter	25	+25%	1/15 Summer		

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
N-8.000	MH(N)-19		3.827	0.027	0.000	1.03			229.4
N-8.001	MH(N)-20		3.563	0.020	0.000	1.02			293.0
N-8.002	MH(N)-21		3.388	0.145	0.000	0.30			98.0
N-8.003	MH(N)-22		3.244	0.251	0.000	0.22			90.8
N-1.005	MH(N)-23		3.174	0.663	0.000	0.17		276	111.3
N-9.000	MH(N)-24		3.548	-0.137	0.000	0.56			114.4
N-10.000	MH(N)-25		3.604	-0.196	0.000	0.59			138.4
N-10.001	MH(N)-26		3.385	0.027	0.000	1.06			221.0
N-10.002	MH(N)-27		3.174	0.095	0.000	0.10			46.2
N-1.006	MH(N)-28		3.170	1.245	0.000	0.46		291	68.6
N-1.007	MH(N)-EX-37		1.930	0.319	0.000	0.30			68.6

	US/MH		Level
PN	Name	Status	Exceeded
N-8.000	MH(N)-19	SURCHARGED	
N-8.001	MH (N) -20		
N-8.002	MH(N)-21	SURCHARGED	
N-8.003	MH(N)-22	SURCHARGED	
N-1.005	MH(N)-23	SURCHARGED	
N-9.000	MH(N)-24	OK	
N-10.000	MH(N)-25	OK	
N-10.001	MH(N)-26	SURCHARGED	
N-10.002	MH(N)-27	SURCHARGED	
N-1.006	MH(N)-28	SURCHARGED	
N-1.007	MH(N)-EX-37	SURCHARGED	
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Jacobs Engineer:	ing Limite	d					E	age 24
			IERRT	- Nort	hern `	Yard	r	
			Outfa	11 Cond	lition	s Replica	ting	
•						.9 mAOD	-	
• Date 05/08/2022								Micro
		- 1	-	=		Heather-	SMILLI	Drainage
File Proposed Mo	odel - Sur	cna		ed by I		tson		J
Innovyze			Netwo	rk 2020	).1.3			
<u>30 year Return</u>	Period Sum	<u>nmary o</u>		ical Re Storm	sults	by Maxim	um Level	<u>(Rank 1)</u>
Ho Manhole Headl Foul Sewage Numk Nu		Factor (mins) el (mm) Global) e (l/s) Hydrogr ine Cont	1.000 0 0.500 F 0.000 caphs 0 crols 1	MAD low per Number o Number o	nal Flo D Facto Person of Stor of Time	or * 10m³/h Inlet Coe per Day (1 age Struct /Area Diag	na Storage effiecient ./per/day) ures 5 rams 0	e 2.000 2 0.800
	Rainfall M Re M5-60	odel gion Eng			Ra Cv (Su	tio R 0.40 mmer) 0.75 nter) 0.84	0	
Margin	for Flood R	isk Warn	ning (mm	)			300.0	
	Profil	D' D' Inert e(s)	IS Statu /D Statu ia Statu	s S S			OFF ON ON and Wint	er
Return Pe	cation(s) (m eriod(s) (ye imate Change	ars)	, 30, 60		1, 2,	5, 10, 15, 5, 25, 25,	20, 25,	30
US/MH	<b>0</b> h a sure		Climate		(X)			) Overflow
PN Name	Storm	reriod	Change	Surch	arge	Flood	Overflow	Act.
	15 Winter	30	+25%					
N-1.001 MH(N)-2		30	+25%	05/15				
	15 Winter 15 Winter	30 <mark>30</mark>	+25% +25%		Winter Summer			
	15 Winter	30	+25%		Winter			
	15 Winter	30	+25%					
	15 Winter	30	+25%					
N-4.000 MH(N)-8		30	+25%	00/				
	15 Winter	<mark>30</mark> 30	+25% +25%	30/15	Winter			
N-4.002 MH(N)-10 N-1.003 MH(N)-11		30 30	+25%	5/60	Winter			
N-5.000 MH(N)-12		30	+25%	0,00				
N-5.001 MH(N)-13		30	+25%					
N-6.000 MH(N)-14		30	+25%					
N-6.001 MH(N)-15		30	+25%		Summer			
N-6.002 MH(N)-16 N-1.004 MH(N)-17		30 30	+25% +25%	20/180	Winter Winter			
N-1.004 MH(N)-17 N-7.000 MH(N)-18		30	+25%	2/00	wincer			
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Jacobs Engineering Limited		Page 25
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +1.9 mAOD	Mirro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

	Pipe Flow	Half Drain Time	Overflow	Flow /		Surcharged Depth	Water Level	US/MH	
Status	(l/s)	(mins)	(1/s)	Cap.	(m³)	(m)	(m)	Name	PN
OI	49.6			0.63	0.000	-0.123	3.677	MH(N)-1	N-1.000
OI	81.1			0.78	0.000	-0.096	3.511	MH(N)-2	N-1.001
SURCHARGEI	73.4			0.89	0.000	0.056	3.931	MH(N)-3	N-2.000
SURCHARGEI	94.1			1.45	0.000	0.134	3.526	MH(N)-4	N-2.001
SURCHARGEI	109.0	6		1.14	0.000	0.004	3.271	MH(N)-5	N-1.002
OI	59.6			0.43	0.000	-0.200	3.600	MH(N)-6	000.8-0
OI	99.2			0.40	0.000	-0.207	3.319	MH(N)-7	N-3.001
OI	68.4			0.84	0.000	-0.084	3.716	MH(N)-8	J-4.000
SURCHARGEI	119.3			1.00	0.000	0.000	3.481	MH(N)-9	N-4.001
OI	31.8			0.16	0.000	-0.030	3.234	MH(N)-10	N-4.002
SURCHARGEI	69.9	163		0.37	0.000	0.476	3.226	MH(N)-11	N-1.003
OI	65.5			0.47	0.000	-0.191	3.609	MH(N)-12	N-5.000
OI	110.8			0.25	0.000	-0.296	3.222	MH(N)-13	N-5.001
OI	88.9			0.57	0.000	-0.167	3.633	MH(N)-14	N-6.000
SURCHARGEI	200.1			1.19	0.000	0.111	3.466	MH(N)-15	N-6.001
SURCHARGEI	41.2			0.11	0.000	0.098	3.224	MH(N)-16	N-6.002
SURCHARGEI	85.1	265		0.17	0.000	0.620	3.220	MH(N)-17	N-1.004
OI	108.9			0.45	0.000	-0.196	3.388	MH(N)-18	N-7.000

	US/MH	Level
PN	Name	Exceeded
N-1.000	MH(N)-1	
N-1.001	MH(N)-2	
N-2.000	MH(N)-3	
N-2.001	MH(N)-4	
N-1.002	MH(N)-5	
N-3.000	MH(N)-6	
N-3.001	MH(N)-7	
N-4.000	MH(N)-8	
N-4.001	MH(N)-9	
N-4.002	MH(N)-10	
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	
N-6.001	MH(N)-15	
N-6.002	MH(N)-16	
N-1.004	MH(N)-17	
N-7.000	MH(N)-18	
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•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +1.9 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

for	Storm

PN	US/MH Name	· · ·		Climate Change		First (Y) Flood	First (Z) Overflow
N-8.000	MH(N)-19	15 Winter	30	+25%	25/15 Winter		
N-8.001	MH(N)-20	15 Winter	30	+25%	25/15 Winter		
N-8.002	MH(N)-21	180 Winter	30	+25%	20/120 Winter		
N-8.003	MH(N)-22	180 Winter	30	+25%	10/120 Winter		
N-1.005	MH(N)-23	240 Winter	30	+25%	1/180 Winter		
N-9.000	MH(N)-24	15 Winter	30	+25%			
N-10.000	MH(N)-25	15 Winter	30	+25%			
N-10.001	MH(N)-26	15 Winter	30	+25%	25/15 Summer		
N-10.002	MH(N)-27	240 Winter	30	+25%	20/120 Winter		
N-1.006	MH(N)-28	240 Winter	30	+25%	1/15 Summer		
N-1.007	MH(N)-EX-37	240 Winter	30	+25%	1/15 Summer		

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (1/s)	
N-8.000	MH(N)-19		3.879	0.079	0.000	1.06			237.0	
N-8.001	MH(N)-20		3.598	0.055	0.000	1.05			301.1	
N-8.002	MH(N)-21		3.439	0.196	0.000	0.31			101.5	
N-8.003	MH(N)-22		3.295	0.302	0.000	0.22			93.5	
N-1.005	MH(N)-23		3.216	0.705	0.000	0.15		292	95.9	
N-9.000	MH(N)-24		3.552	-0.133	0.000	0.59			118.9	
N-10.000	MH(N)-25		3.611	-0.189	0.000	0.61			143.8	
N-10.001	MH(N)-26		3.413	0.055	0.000	1.10			230.3	
N-10.002	MH(N)-27		3.217	0.138	0.000	0.11			47.5	
N-1.006	MH(N)-28		3.212	1.287	0.000	0.50		294	74.8	
N-1.007	MH(N)-EX-37		1.933	0.322	0.000	0.32			74.8	
										1

	US/MH		Level
PN	Name	Status	Exceeded
N-8.000	MH(N)-19	SURCHARGED	
N-8.001	MH(N)-20	SURCHARGED	
N-8.002	MH(N)-21	SURCHARGED	
N-8.003	MH(N)-22	SURCHARGED	
N-1.005	MH(N)-23	SURCHARGED	
N-9.000	MH(N)-24	OK	
N-10.000	MH(N)-25	OK	
N-10.001	MH(N)-26	SURCHARGED	
N-10.002	MH(N)-27	SURCHARGED	
N-1.006	MH(N)-28	SURCHARGED	
N-1.007	MH(N)-EX-37	SURCHARGED	
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Jacobs Engineering Limited		Page 1
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Mirro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

#### STORM SEWER DESIGN by the Modified Rational Method

#### Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes ECC

FSR Rainfall Model - England and WalesReturn Period (years)30PIMP (%)100M5-60 (mm)17.00Add Flow / Climate Change (%)0Ratio R0.400Minimum Backdrop Height (m)0.200Maximum Rainfall (mm/hr)50Maximum Backdrop Height (m)1.500Maximum Time of Concentration (mins)30Min Design Depth for Optimisation (m)1.200Foul Sewage (1/s/ha)0.000Min Vel for Auto Design only (m/s)1.00Volumetric Runoff Coeff.0.750Min Slope for Optimisation (1:X)500

Designed with Level Soffits

•	Enginee	ring Limit	ced				Pag	e 2
		_		IERR	T - Norther	n Yard		
				Out.f	all Conditi	ons Replicat	ing	
					rcharge of	-		
	5/08/202	2						clo
						en Heather-S		ainago
	-	Model - Sı	ircha		ked by Tom			
Innovy:	ze			Netw	ork 2020.1.	3		
<u>1 yea</u> 1	<u>r Return</u>	Period Su	<u>ummary o</u>	<u>f Crit</u>	ical Result	<u>s by Maximum</u>	<u>Level (1</u>	Rank 1)
				<u>for</u>	Storm			
			S	imulati	on Criteria			
	Are		n Factor	1.000	Additional	Flow - % of To actor * 10m³/ha		
	F	HOL SLAI HOt Start Le	evel (mm)	0	LOD LO	Inlet Coef		
	nhole Head		(Global)	0.500	Flow per Pers	son per Day (1/		
	-				) Number of S	torage Structur	res 5	
						ime/Area Diagra		
	N	umber of Of	fline Con	trols (	) Number of R	eal Time Contro	ols O	
				netic Ra	ainfall Detai			
		Rainfall		aland -	FSR Males Cu	Ratio R 0.400 (Summer) 0.750		
			-	-		(Winter) 0.750 (Winter) 0.840		
	Margi	n for Flood	Risk War	ning (n	nm)		300.0	
			Analysis	5 Timest	ep 2.5 Secon	d Increment (Ex	ktended)	
				NTS Stat ND Stat			OFF	
				VD Stat ia Stat			ON ON	
			INCL	.iu bcui			011	
		Prof	ile(s)			Summer a	and Winter	
			(mins) 15	5, 30, 6		240, 360, 480,	600, 720	
	D	uration(s)						
	Return	Period(s) (	-			2, 5, 10, 15, 2	20, 25, 30	
	Return		-			2, 5, 10, 15, 2 , 25, 25, 25, 2	20, 25, 30	
WA	Return C	Period(s) ( limate Chan	ge (%)	ot been	25, 25		20, 25, 30 25, 25, 25	11.
WA	Return C	Period(s) ( limate Chan	ge (%)		25, 25	, 25, 25, 25, 2	20, 25, 30 25, 25, 25	
WA	Return C ARNING: Ha	Period(s) ( limate Chan	ge (%) me has no	Climate	25, 25	, 25, 25, 25, 2 s the structure	20, 25, 30 25, 25, 25 e is too fu	
PN	Return C ARNING: Ha US/MH Name	Period(s) ( limate Chan lf Drain Ti <b>Storm</b>	ge (%) me has no <b>Return (</b>	Climate Change	25, 25 calculated as First (X) Surcharge	, 25, 25, 25, 2 s the structure First (Y)	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
<b>PN</b> N-1.000 N-1.001	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter	ge (%) me has no Return ( Period 1 1	<b>Climate</b> <b>Change</b> +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
<b>PN</b> N-1.000 N-1.001 N-2.000	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter 15 Winter	ge (%) me has no Return ( Period 1 1 1	<b>Climate</b> <b>Change</b> +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-1.001 N-2.000 N-2.001	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	ge (%) me has no Return ( Period 1 1 1 1	Climate Change +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-1.001 N-2.000 N-2.001 N-1.002	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4 MH(N)-5	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	ge (%) me has no Return ( Period 1 1 1 1 1	Climate Change +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/720 Winter 5/720 Winter 5/480 Winter 5/360 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/600 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4 MH(N)-5 MH(N)-6	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	ge (%) me has no Return ( Period 1 1 1 1 1 1	Climate Change +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/720 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/600 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-6 MH(N)-7	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	ge (%) me has no Return ( Period 1 1 1 1 1 1	Climate Change +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	ge (%) me has no Return ( Period 1 1 1 1 1 1 1 1	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/720 Winter 5/600 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/600 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-4 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	ge (%) me has no Period 1 1 1 1 1 1 1 1 1 1	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/480 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 720 Winter	ge (%) me has no Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/720 Winter 5/600 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11 MH(N)-12	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter	ge (%) me has no Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/600 Winter 5/600 Winter 5/360 Winter 5/360 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000 N-5.001	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11 MH(N)-12 MH(N)-13	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter	ge (%) me has no Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/360 Winter 5/360 Winter 5/360 Winter 5/720 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000 N-5.001 N-6.000	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11 MH(N)-12	Period(s) ( limate Chan lf Drain Ti Storm 15 Winter 15 Winter	ge (%) me has no Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/360 Winter 5/360 Winter 5/360 Winter 5/720 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo

Jacobs Engineering Limited					
•	IERRT - Northern Yard				
	Outfall Conditions Replicating				
	a Surcharge of +3.7 mAOD	Micro			
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage			
File Proposed Model - Surcha	Checked by Tom Watson	Diamage			
Innovyze	Network 2020.1.3	1			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
N-1.000	MH(N)-1	3.605	-0.195	0.000	0.26			20.3	OK
N-1.001	MH(N)-2	3.419	-0.188	0.000	0.30			31.2	OK
N-2.000	MH(N)-3	3.708	-0.167	0.000	0.38			31.2	OK
N-2.001	MH(N)-4	3.266	-0.126	0.000	0.63			40.5	OK
N-1.002	MH(N)-5	3.130	-0.137	0.000	0.72		4	69.5	OK
N-3.000	MH(N)-6	3.533	-0.267	0.000	0.18			24.6	OK
N-3.001	MH(N)-7	3.250	-0.276	0.000	0.15			38.0	OK
N-4.000	MH(N)-8	3.623	-0.177	0.000	0.34			28.0	OK
N-4.001	MH(N)-9	3.273	-0.208	0.000	0.40			47.1	OK
N-4.002	MH(N)-10	3.062	-0.202	0.000	0.03			6.2	OK
N-1.003	MH(N)-11	3.062	0.312	0.000	0.09			17.0	SURCHARGED
N-5.000	MH(N)-12	3.538	-0.262	0.000	0.19			26.9	OK
N-5.001	MH(N)-13	3.162	-0.356	0.000	0.09			42.0	OK
N-6.000	MH(N)-14	3.550	-0.250	0.000	0.23			36.3	OK
N-6.001	MH(N)-15	3.125	-0.230	0.000	0.46			77.1	OK

PN	US/MH Name	Level Exceeded
N-1.000	MH(N)-1	3
N-1.001	MH(N)-2	3
N-2.000	MH(N)-3	3
N-2.001	MH(N)-4	3
N-1.002	MH(N)-5	1
N-3.000	MH(N)-6	3
N-3.001	MH(N)-7	2
N-4.000	MH(N)-8	3
N-4.001	MH(N)-9	3
N-4.002	MH(N)-10	3
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	3
N-6.001	MH(N)-15	3

Jacobs En	gineering	Limited	ł						Pa	ige 4	
							n Yard				
				Outf	all Co	onditi	lons Re	plicati	ng		(
				a Su	rchar	ge of	+3.7 m	AOD	N	licro	
Date 05/0	8/2022			Desi	gned 1	oy Hel	.en Hea	ther-Sm			
File Prop	osed Mode	l - Surc	cha	Chec	ked b	y Tom	Watson	1		rain	lay
Innovyze				Netw	ork 2	020.1.	. 3				
<u>1 year R</u>	<u>eturn Per</u>	iod Summ	<u>ary of</u>		<u>ical</u> Storm		ts by M	<u>Aaximum</u>	Level	<u>(Ran</u>	<u>k 1)</u>
PN	US/MH Name	Stor			limate Change	Firs Surc	t (X) harge	First Floo		irst verf]	
N-6.002	) MIT (NT)	16 720 Mi	ntor	1	125%	2/100	Wintor				
N-6.002 N-1.004	( )	16 720 Wi 17 720 Wi		1 1			Winter Summer				
N-7.000	. ,	17 720 W1 18 15 Wi		1		, .	Winter				
N-8.000		19 15 Wi		1				30/480 W	inter		
N-8.001	MH(N)-2	20 15 Wi	nter	1				30/480 W			
N-8.002	( )	21 720 Wi		1				30/600 W	inter		
N-8.003	. ,	22 720 Wi		1			Winter				
N-1.005	. ,	23 720 Wi		1	+25%		Winter				
N-9.000 N-10.000		24 15 Wi 25 15 Wi		1 1			Winter	30/480 W	intor		
N-10.000	. ,	26 15 Wi		1			Winter	30/400 W	INCEL		
N-10.002		27 720 Wi		1			Winter				
N-1.006	5 MH(N)-2	28 720 Wi	nter	1	+25%	1/15	Summer				
			Water	Surcha	rged F	looded			Half D	rain	Pip
	US/MH	Overflow	Level	Dep	-			Overflow			- Flov
PN	Name	Act.	(m)	(m	)	(m³)	Cap.	(1/s)	(min	s)	(1/s
N-6.002	MH(N)-16		3.062	— C	.064	0.000	0.02				8.
N-1.004	MH(N)-17		3.062		.462						21.
N-7.000	MH(N)-18		3.319	- C	.265	0.000	0.18				44.
N-8.000	MH(N)-19		3.565		.235	0.000					101.
N-8.001	MH(N)-20		3.268		.275	0.000					127.
N-8.002	MH(N)-21		3.062		.181	0.000					16.
N-8.003 N-1.005	MH (N) -22 MH (N) -23		3.062 3.062		.069 .551	0.000					15. 22.
N-9.000	MH (N) -24		3.485		.200	0.000					48.
1-10.000	MH(N)-25		3.505		.295	0.000					58.
-10.001	MH(N)-26		3.121		.237	0.000					93.
-10.002	MH(N)-27		3.062		.017	0.000					9.
N-1.006	MH(N)-28 H(N)-EX-37		3.062 3.062		.137 .451	0.000					3. 0.
		PN	1	<b>S/MH</b> Name IH (N) -1		<b>atus</b> OK	Leve] Exceed				
		N-6.C	JUZ №								
		N-6.0 N-1.0			7 SURC	HARGED					
			004 M			HARGED: OK					
		N-1.0 N-7.0 N-8.0	004 M 000 M 000 M	IH (N) -1 IH (N) -1 IH (N) -1	.8 .9	OK OK		3			
		N-1.0 N-7.0	004 M 000 M 000 M 001 M	IH (N) –1 IH (N) –1	.8 .9 :0	OK		3 3 1			

Jacobs Engineering Limited		Page 5
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Mirro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

 US/MH
 Level

 PN
 Name
 Status
 Level

 N-1.005
 MH (N) - 23
 SURCHARGED

 N-9.000
 MH (N) - 24
 OK

 N-10.000
 MH (N) - 25
 OK
 3

 N-10.001
 MH (N) - 26
 OK
 3

 N-10.002
 MH (N) - 27
 OK
 3

 N-10.003
 MH (N) - 28
 SURCHARGED
 1

 N-1.006
 MH (N) - 287
 SURCHARGED
 1

•	eering Limit	ted				Pag	e 6
•	-		IERR	T - Norther	n Yard		
			Outf	all Conditi	ons Replicat	ing	
				rcharge of	-		
• Date 05/08/20	100			-			
					en Heather-S		ainago
File Proposed	d Model - Si	urcha		ked by Tom			
Innovyze			Netw	ork 2020.1.	3		
<u>2 year Retui</u>	n Period Su	ummary of	Crit	ical Result	s by Maximum	Level (1	Rank 1)
			<u>for</u>	Storm			
		Sir	nulati	<u>on Criteria</u>			
P					Flow - % of To actor * 10m³/ha		
	Hot Start Le	evel (mm)	0		Inlet Coef		
	adloss Coeff age per hecta			Flow per Pers	on per Day (1/	per/day) 0	.000
					torage Structur		
					ime/Area Diagra eal Time Contro		
			tic Ra	ainfall Detail			
	Rainfall		- 1	FSR	Ratio R 0.400 (Summer) 0.750		
					(Winter) 0.840		
Mar	gin for Flood		-			300.0	
		-	Timest S Stat	-	d Increment (E>	tended) OFF	
			D Stat			OFF	
		Inerti				ON	
	Prof	ile(s)			Summer	and Winter	
		. ,	30, 6	50, 120, 180,	240, 360, 480,		
	Duration(s)		,				
Retur	Duration(s) n Period(s) (			1, 1	2, 5, 10, 15, 2		
Retur		years)			2, 5, 10, 15, 2 , 25, 25, 25, 2	20, 25, 30	
	n Period(s) ( Climate Chan	years) ge (%)	been	25, 25	, 25, 25, 25, 2	20, 25, 30 25, 25, 25	11.
	n Period(s) ( Climate Chan	years) ge (%)	been	25, 25		20, 25, 30 25, 25, 25	11.
WARNING: US/MH	n Period(s) ( Climate Chan Half Drain Ti	years) ge (%) me has not Return Cl	imate	25, 25 calculated as First (X)	, 25, 25, 25, 2 s the structure First (Y)	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING:	n Period(s) ( Climate Chan Half Drain Ti	years) ge (%) me has not	imate	25, 25	, 25, 25, 25, 2 s the structure	20, 25, 30 25, 25, 25 e is too fu	
WARNING: US/MH PN Name N-1.000 MH(N)·	n Period(s) ( Climate Chan Half Drain Ti Storm -1 15 Winter	years) ge (%) me has not Return Cl Period Cl 2	imate hange +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter	, 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name N-1.000 MH(N)· N-1.001 MH(N)·	n Period(s) ( Climate Chan Half Drain Ti Storm -1 15 Winter -2 15 Winter	years) ge (%) me has not Return Cl Period Cl 2 2	<b>imate</b> hange +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name J-1.000 MH(N)· J-1.001 MH(N)· J-2.000 MH(N)·	n Period(s) ( Climate Chan Half Drain Ti Storm -1 15 Winter -2 15 Winter -3 15 Winter	years) ge (%) me has not Return Cl Period Cl 2 2 2 2	<b>imate</b> hange +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure      First (Y)      Flood      30/480 Winter      30/480 Winter      30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name J-1.000 MH(N)· J-1.001 MH(N)· J-2.000 MH(N)· J-2.001 MH(N)·	n Period(s) ( Climate Chan Half Drain Ti Storm -1 15 Winter -2 15 Winter -3 15 Winter -4 15 Winter	years) ge (%) me has not Return Cl Period Cl 2 2 2 2 2 2 2	<b>imate</b> hange +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name J-1.000 MH(N)· J-2.000 MH(N)· J-2.000 MH(N)· J-2.001 MH(N)· J-1.002 MH(N)·	n Period(s) ( Climate Chan Half Drain Ti Storm -1 15 Winter -2 15 Winter -3 15 Winter -4 15 Winter -5 720 Winter	years) ge (%) me has not Return Cl Period Cl 2 2 2 2 2 2 2 2 2 2	imate hange +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/720 Winter 5/720 Winter 5/480 Winter 5/360 Winter	<pre>, 25, 25, 25, 2 s the structure      First (Y)      Flood      30/480 Winter      30/480 Winter      30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name J-1.000 MH(N)· J-2.000 MH(N)· J-2.001 MH(N)· J-2.001 MH(N)· J-1.002 MH(N)· J-3.000 MH(N)·	n Period(s) ( Climate Chan Half Drain Ti Storm -1 15 Winter -2 15 Winter -3 15 Winter -4 15 Winter -5 720 Winter -6 15 Winter	years) ge (%) me has not Return Cl Period Cl 2 2 2 2 2 2 2 2 2 2 2 2 2 2	imate hange +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/720 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/600 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name J-1.000 MH(N)· J-2.000 MH(N)· J-2.001 MH(N)· J-2.001 MH(N)· J-3.000 MH(N)·	n Period(s) ( Climate Chan Half Drain Ti -1 15 Winter -2 15 Winter -3 15 Winter -4 15 Winter -5 720 Winter -6 15 Winter -7 15 Winter	years) ge (%) me has not Return Cl Period Cl 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	imate hange +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/480 Winter     30/600 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name V-1.000 MH(N)· V-2.000 MH(N)· V-2.001 MH(N)· V-2.001 MH(N)· V-3.000 MH(N)· V-3.001 MH(N)· V-4.000 MH(N)·	n Period(s) ( Climate Chan Half Drain Ti -1 15 Winter -2 15 Winter -3 15 Winter -3 15 Winter -4 15 Winter -5 720 Winter -6 15 Winter -7 15 Winter -8 15 Winter -9 15 Winter	years) ge (%) me has not Return Cl Period Cl 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	imate hange +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name V-1.000 MH(N)· V-2.000 MH(N)· V-2.001 MH(N)· V-2.001 MH(N)· V-3.000 MH(N)· V-3.001 MH(N)· V-4.000 MH(N)· V-4.001 MH(N)·	n Period(s) ( Climate Chan Half Drain Ti -1 15 Winter -2 15 Winter -3 15 Winter -3 15 Winter -4 15 Winter -5 720 Winter -6 15 Winter -7 15 Winter -8 15 Winter -8 15 Winter -9 15 Winter	years) ge (%) me has not Return Cl Period Cl 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	imate hange +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/600 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name N-1.000 MH(N)- N-2.000 MH(N)- N-2.001 MH(N)- N-2.001 MH(N)- N-3.000 MH(N)- N-3.001 MH(N)- N-4.000 MH(N)- N-4.002 MH(N)- N-4.003 MH(N)-	n Period(s) ( Climate Chan Half Drain Ti -1 15 Winter -2 15 Winter -3 15 Winter -3 15 Winter -4 15 Winter -5 720 Winter -6 15 Winter -7 15 Winter -8 15 Winter -9 15 Winter 10 720 Winter	years) ge (%) me has not Return Cl Period Cl 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	imate hange +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name N-1.000 MH(N) N-2.000 MH(N) N-2.001 MH(N) N-2.001 MH(N) N-3.000 MH(N) N-3.001 MH(N) N-4.000 MH(N) N-4.002 MH(N) N-4.002 MH(N) N-4.003 MH(N) N-1.003 MH	n Period(s) ( Climate Chan Half Drain Ti -1 15 Winter -2 15 Winter -3 15 Winter -3 15 Winter -4 15 Winter -5 720 Winter -6 15 Winter -7 15 Winter -8 15 Winter -9 15 Winter 10 720 Winter 11 720 Winter 12 15 Winter	years) ge (%) me has not Return Cl Period Cl 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	imate hange +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/600 Winter 5/600 Winter 5/360 Winter 5/360 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name N-1.000 MH(N)- N-2.000 MH(N)- N-2.001 MH(N)- N-2.001 MH(N)- N-3.000 MH(N)- N-3.001 MH(N)- N-4.000 MH(N)- N-4.002 MH(N)- N-4.003 MH(N)-	n Period(s) ( Climate Chan Half Drain Ti -1 15 Winter -2 15 Winter -3 15 Winter -3 15 Winter -4 15 Winter -5 720 Winter -6 15 Winter -7 15 Winter -8 15 Winter -9 15 Winter 10 720 Winter 11 720 Winter 12 15 Winter 13 720 Winter	years) ge (%) me has not Return Cl Period Cl 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	imate hange +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/360 Winter 5/360 Winter 5/720 Winter 5/720 Winter 5/600 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
WARNING: US/MH PN Name N-1.000 MH(N)· N-2.000 MH(N)· N-2.001 MH(N)· N-2.001 MH(N)· N-3.000 MH(N)· N-3.001 MH(N)· N-4.000 MH(N)· N-4.001 MH(N)· N-4.002 MH(N)· N-4.003 MH(N)· N-1.003 MH(N)· N-5.000 MH(N)·	n Period(s) ( Climate Chan Half Drain Ti -1 15 Winter -2 15 Winter -3 15 Winter -3 15 Winter -4 15 Winter -5 720 Winter -6 15 Winter -7 15 Winter -8 15 Winter -8 15 Winter 10 720 Winter 11 720 Winter 12 15 Winter 13 720 Winter	years) ge (%) me has not Return Cl Period Cl 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	imate hange +25% +25% +25% +25% +25% +25% +25% +25%	25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/360 Winter 5/360 Winter 5/720 Winter 5/720 Winter 5/720 Winter	<pre>, 25, 25, 25, 2 s the structure     First (Y)     Flood     30/480 Winter     30/480 Winter</pre>	20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo

Jacobs Engineering Limited	Page 7	
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Mirro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	1

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
N-1.000	MH(N)-1	3.621	-0.179	0.000	0.34			26.3	OK
N-1.001	MH(N)-2	3.437	-0.170	0.000	0.39			40.4	OK
N-2.000	MH(N)-3	3.730	-0.145	0.000	0.49			40.4	OK
N-2.001	MH(N)-4	3.300	-0.092	0.000	0.81			52.4	OK
N-1.002	MH(N)-5	3.251	-0.016	0.000	0.09			8.8	OK
N-3.000	MH(N)-6	3.548	-0.252	0.000	0.23			31.7	OK
N-3.001	MH(N)-7	3.265	-0.261	0.000	0.20			48.9	OK
N-4.000	MH(N)-8	3.643	-0.157	0.000	0.44			36.2	OK
N-4.001	MH(N)-9	3.301	-0.180	0.000	0.51			61.0	OK
N-4.002	MH(N)-10	3.251	-0.013	0.000	0.04			7.6	OK
N-1.003	MH(N)-11	3.251	0.501	0.000	0.10			19.1	SURCHARGED
N-5.000	MH(N)-12	3.554	-0.246	0.000	0.25			34.7	OK
N-5.001	MH(N)-13	3.252	-0.266	0.000	0.01			5.0	OK
N-6.000	MH(N)-14	3.569	-0.231	0.000	0.30			47.1	OK
N-6.001	MH(N)-15	3.252	-0.103	0.000	0.06			10.2	OK

PN	US/MH Name	Level Exceeded
PN	Name	Exceeded
N-1.000	MH(N)-1	3
N-1.001	MH(N)-2	3
N-2.000	MH(N)-3	3
N-2.001	MH(N)-4	3
N-1.002	MH(N)-5	1
N-3.000	MH(N)-6	3
N-3.001	MH(N)-7	2
N-4.000	MH(N)-8	3
N-4.001	MH(N)-9	3
N-4.002	MH(N)-10	3
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	3
N-6.001	MH(N)-15	3

acobs En	gineerin	g Limited	L						Pag	e 8
				IERRT -	- Nort	her	n Yard			
				Outfall	Cond	liti	ons Re	plicatin	a l	
								-		
				a Surch	-				Mi	
ate 05/0	8/2022			Designe	ed by	Hel	en Hea	ther-Smi	th Dc	ainag
ile Prop	osed Mode	el - Surc	ha	Checked	d by T	'om	Watson			JII IQ
nnovyze			1	Network	x 2020	1.	3		1	
<u>2 year R</u>	eturn Pei	riod Summ	<u>ary of</u>	<u>Critica</u> <u>for St</u>		sult	ts by M	<u>laximum I</u>	<u>evel (F</u>	Rank 1
	US/MH		Reti	ırn Clim	ate H	Firs	t (X)	First (	Y) Fir	st (Z)
PN	Name	Stor	m Per:	iod Char	nge S	Surc	harge	Flood	Ove	erflow
N-6.002	2 MH(N)-	-16 720 Wir	nter	2 +	25% 2/	480	Winter			
N-1.004		-17 720 Wir		2 +	25% 1/	120	Summer			
N-7.000	) MH(N)-	-18 15 Wir	nter	2 +	25% 5/	600	Winter			
N-8.000	. ,	-19 15 Wir						30/480 Wi		
N-8.001		-20 15 Wir			,			30/480 Wi		
N-8.002	, ,	-21 720 Wir			,			30/600 Wi	nter	
N-8.003	( )	-22 720 Wir					Winter			
N-1.005		-23 720 Wir					Winter			
N-9.000		-24 15 Wir					Winter	20 ( 400 57		
N-10.000 N-10.001	( )	-25 15 Wir -26 720 Wir					Winter Winter	30/480 Wi	nter	
N-10.001	, ,	-28 720 Wil -27 720 Wir					Winter			
N-1.006	( )	-28 720 Win					Summer			
	/ MH(N)-EX-						Summer			
	US/MH	Overflow	Water S Level	Depth	Vol	ume	Flow /	Overflow	Half Dra Time	Flc
PN	Name	Act.	(m)	(m)	(m	3)	Cap.	(l/s)	(mins)	(1/:
N-6.002	MH(N)-16		3.252	0.12	26 0.	.000	0.03			10
N-1.004	MH(N)-17		3.252	0.65	52 0.	.000	0.05			23
1-7.000	MH(N)-18		3.334	-0.25	50 0.	.000	0.24			57
1-8.000	MH(N)-19		3.602	-0.19	98 0.	.000	0.58			130
1-8.001	MH(N)-20		3.311	-0.23		.000	0.57			164
1-8.002	MH(N)-21		3.252	0.00		.000	0.06			19
1-8.003	MH(N)-22		3.252	0.25		.000				18
I-1.005	MH(N)-23		3.252	0.74		000	0.04			23
1-9.000 -10.000	MH(N)-24 MH(N)-25		3.500 3.530	-0.18		.000	0.31 0.32			62 76
-10.000	MH(N)-25 MH(N)-26		3.252	-0.27		.000	0.32			76 11
-10.001	MH (N) -20 MH (N) -27		3.252	-0.10		.000				11
J-1.006	MH (N) -28		3.252	1.32		.000	0.03			3
	H(N)-EX-37		3.252	1.64		.000	0.00			0
		PN		/MH ame	Statu	ıs	Level Exceed			
		N-6.0 N-1.0 N-7.0	04 MH	(N)-16 S (N)-17 S (N)-18						
						OK		3		
		N-8.0 N-8.0	00 MH	(N) -19 (N) -20		OK OK		3 3		
		N-8.0	00 МН 01 МН	(N)-19	SURCHAF	OK				

Jacobs Engineering Limited		Page 9
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Mirro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

<u>for Storm</u>

	US/MH		Level
PN	Name	Status	Exceeded
N-1.005	MH(N)-23	SURCHARGED	
N-9.000	MH(N)-24	OK	
N-10.000	MH(N)-25	OK	3
N-10.001	MH(N)-26	OK	
N-10.002	MH(N)-27	SURCHARGED	
N-1.006	MH(N)-28	SURCHARGED	
N-1.007	MH(N)-EX-37	SURCHARGED	

•	Enginee	ring Limit	ced				Pag	e 10
-	-	-		IERR	T - Norther	n Yard		
				Outf	all Conditi	ons Replicat	ing	
					rcharge of	-		
•		0						
	5/08/202		_			en Heather-S		ainage
File Proposed Model - Surcha Checked by Tom Watson								
Innovy	ze			Netw	ork 2020.1.	3		
<u>5 yea</u> ı	r Return	Period Su	ummary c		<u>ical Result</u> Storm	<u>s by Maximum</u>	Level (I	<u>Rank 1)</u>
					<u>on Criteria</u>			
	Are					Flow - % of To actor * 10m³/ha		
	F	Hot Start Le	evel (mm)	0	PADD FO	Inlet Coef		
	nhole Head		(Global)	0.500	Flow per Pers	on per Day (1/		
I	rour seway	ge per necca	ITE (1/5)	0.000				
		Number of O	nline Cor	ntrols 1	Number of T	torage Structur ime/Area Diagra eal Time Contro	ams O	
			Svn+1	hetic Ra	ainfall Detail	ls		
		Rainfall			FSR	Ratio R 0.400		
		1	Region E	ngland a	and Wales Cv	(Summer) 0.750		
		M5-6	0 (mm)		17.000 Cv	(Winter) 0.840		
	Margi	n for Flood	Diek Wa	rning (r	am )		300.0	
	Margi	II 101 F1000				d Increment (Ex		
			-	DTS Stat	-	(	OFF	
			1	DVD Stat	cus		ON	
			Iner	tia Stat	cus		ON	
			ile(s)			Summer a	nd Wintor	
		Proi				ounder c	ing wincer	
	D		(mins) 1	5, 30,	60, 120, 180,	240, 360, 480,		
	Return	uration(s) Period(s) (	years)	5, 30,	1,	240, 360, 480, 2, 5, 10, 15, 2	600, 720 20, 25, 30	
	Return	uration(s)	years)	5, 30,	1,	240, 360, 480,	600, 720 20, 25, 30	
	Return C	uration(s) Period(s) ( limate Chan	years) ge (%)		1, 2 25, 25	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2	600, 720 20, 25, 30 25, 25, 25	
WA	Return C	uration(s) Period(s) ( limate Chan	years) ge (%)		1, 2 25, 25	240, 360, 480, 2, 5, 10, 15, 2	600, 720 20, 25, 30 25, 25, 25	11.
	Return C ARNING: Ha US/MH	uration(s) Period(s) ( limate Chan	years) ge (%) me has no Return (	ot been Climate	1, 5 25, 25 calculated as First (X)	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2	600, 720 20, 25, 30 25, 25, 25	Overflo
PN	Return C ARNING: Ha US/MH Name	uration(s) Period(s) ( limate Chan lf Drain Ti <b>Storm</b>	years) ge (%) me has n Return ( Period	ot been Climate Change	1, 25, 25 calculated as First (X) Surcharge	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	
<b>PN</b> N-1.000	Return C ARNING: Ha US/MH Name MH(N)-1	uration(s) Period(s) ( limate Chan lf Drain Ti <b>Storm</b> 720 Winter	years) ge (%) me has n Return ( Period 5	ot been Climate Change +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
<b>PN</b> N-1.000 N-1.001	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2	uration(s) Period(s) ( limate Chan If Drain Ti <b>Storm</b> 720 Winter 720 Winter	years) ge (%) me has n Return ( Period 5 5	ot been Climate Change +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
<b>PN</b> N-1.000 N-1.001 N-2.000	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3	uration(s) Period(s) ( limate Chan If Drain Ti <b>Storm</b> 720 Winter 720 Winter 720 Winter	years) ge (%) me has n Return ( Period 5 5 5 5	ot been Climate Change +25% +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
<b>PN</b> N-1.000 N-1.001 N-2.000 N-2.001	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4	vuration(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter 720 Winter 720 Winter	years) ge (%) me has no Return o Period 5 5 5 5 5	ot been Climate Change +25% +25% +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-1.001 N-2.000 N-2.001 N-1.002	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4 MH(N)-5	vuration(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	years) ge (%) me has no Return o Period 5 5 5 5 5 5 5 5	ot been Climate Change +25% +25% +25% +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/600 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4 MH(N)-5 MH(N)-6	vuration(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter 720 Winter 720 Winter	years) ge (%) me has no Period 5 5 5 5 5 5 5 5 5 5 5 5	ot been Climate Change +25% +25% +25% +25% +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-6 MH(N)-7	vuration(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	years) ge (%) me has no Period 5 5 5 5 5 5 5 5 5 5 5 5	ot been Climate Change +25% +25% +25% +25% +25% +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/720 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8	vuration(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	years) ge (%) me has no Period 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ot been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/480 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/600 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10	storm 720 Winter 720 Winter	years) ge (%) me has no Period 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ot been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/720 Winter 5/600 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 <b>s the structure</b> <b>First (Y)</b> <b>Flood</b> 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11	Period(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter	years) ge (%) me has no Period 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ot been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/720 Winter 5/600 Winter 5/600 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 <b>s the structure</b> <b>First (Y)</b> <b>Flood</b> 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11 MH(N)-12	Period(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter	years) ge (%) me has no Period 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ot been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/720 Winter 5/360 Winter 5/360 Winter 5/360 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 <b>s the structure</b> <b>First (Y)</b> <b>Flood</b> 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000 N-5.001	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11 MH(N)-12 MH(N)-13	storm Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter	years) ge (%) me has no Period 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ot been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/360 Winter 5/720 Winter 5/720 Winter 5/600 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 <b>s the structure</b> <b>First (Y)</b> <b>Flood</b> 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000 N-5.001 N-6.000	Return C ARNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11 MH(N)-12 MH(N)-13 MH(N)-14	Period(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter	years) ge (%) me has no Period 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ot been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 5 25, 25 calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/720 Winter 5/360 Winter 5/720 Winter 5/720 Winter 5/720 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 <b>s the structure</b> <b>First (Y)</b> <b>Flood</b> 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo

Jacobs Engineering Limited		Page 11
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
N-1.000	MH(N)-1	3.879	0.079	0.000	0.04			2.9	SURCHARGED
N-1.001	MH(N)-2	3.879	0.272	0.000	0.04			4.6	SURCHARGED
N-2.000	MH(N)-3	3.879	0.004	0.000	0.06			4.6	SURCHARGED
N-2.001	MH(N)-4	3.879	0.487	0.000	0.10			6.2	SURCHARGED
N-1.002	MH(N)-5	3.878	0.611	0.000	0.11			10.9	SURCHARGED
N-3.000	MH(N)-6	3.877	0.077	0.000	0.02			3.4	SURCHARGED
N-3.001	MH(N)-7	3.877	0.351	0.000	0.02			5.6	SURCHARGED
N-4.000	MH(N)-8	3.878	0.078	0.000	0.05			4.0	SURCHARGED
N-4.001	MH(N)-9	3.878	0.397	0.000	0.06			7.4	SURCHARGED
N-4.002	MH(N)-10	3.878	0.614	0.000	0.05			9.3	SURCHARGED
N-1.003	MH(N)-11	3.877	1.127	0.000	0.11			20.6	SURCHARGED
N-5.000	MH(N)-12	3.876	0.076	0.000	0.03			3.7	SURCHARGED
N-5.001	MH(N)-13	3.875	0.357	0.000	0.01			6.2	SURCHARGED
N-6.000	MH(N)-14	3.876	0.076	0.000	0.03			5.1	SURCHARGED
N-6.001	MH(N)-15	3.876	0.521	0.000	0.07			12.5	SURCHARGED

	US/MH	Level
PN	Name	Exceeded
N-1.000	MH(N)-1	3
N-1.001	MH(N)-2	3
N-2.000	MH(N)-3	3
N-2.001	MH(N)-4	3
N-1.002	MH(N)-5	1
N-3.000	MH(N)-6	3
N-3.001	MH(N)-7	2
N-4.000	MH(N)-8	3
N-4.001	MH(N)-9	3
N-4.002	MH(N)-10	3
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	3
N-6.001	MH(N)-15	3

acobs Eng	gineering	Limited	l						Page	12
				IER	RT - 1	Jorther	n Yard			
				Out	fall (	Conditi	ons Re	plicatin	a	
							+3.7 m	-		
ate 05/08	2/2022					-				0
		_	_		-	-		ther-Smi	<sup>cn</sup> Drair	าลต
ile Propo	osed Model	- Surc	ha				Watson			.eg
nnovyze				Net	work 2	2020.1.	. 3			
. wear Be	eturn Peri	od Summ	ary of	Cri	tical	Posuli	te bu N	lavimum I	ovel (Par	、レ 1
<u>year ne</u>			<u>ary or</u>		r Stor		<u> </u>			
	US/MH		Rei	turn	Climat	e Firs	t (X)	First (1	Y) First	(Z)
PN	Name	Stor	m Per	riod	Change	Surc	harge	Flood	Overf	low
N-6.002	MU(N) _ 1	5 720 Wir	tor	5	+25	\$ 2/480	Wintor			
N-6.002 N-1.004		720 Wir 720 Wir		5		s 2/480 s 1/120				
N-7.000	. ,	720 Wir 3 720 Wir		5		° 1/120 8 5/600				
N-8.000		) 720 Wir ) 720 Wir		5				30/480 Win	nter	
N-8.001		) 720 Wir		5				30/480 Win		
N-8.002		. 720 Wir		5				30/600 Win		
N-8.003		2 720 Wir		5	+25	\$ 1/600	Winter			
N-1.005		3 720 Wir		5	+25	€ 1/60	Winter			
N-9.000	MH(N)-24	4 720 Wir	nter	5	+25	≥ 5/720	Winter			
N-10.000	MH(N)-25	5 720 Wir	nter	5	+25	€ 5/720	Winter	30/480 Win	nter	
N-10.001	MH(N)-26	5 720 Wir	nter	5	+25	\$ 5/480	Winter			
N-10.002	MH(N)-2	720 Wir	nter	5	+25	8 2/480	Winter			
N-1.006	MH(N)-28	3 720 Wir	nter	5	+25	8 1/15	Summer			
N-1.007	MH(N)-EX-3	720 Wir	nter	5	+25	8 1/15	Summer			
			Water	Surcl	narged	Flooded			Half Drain	Pip
	US/MH O	verflow	Level		pth			Overflow	Time	Flc
PN	Name	Act.	(m)	(	- m)	(m³)	Cap.	(1/s)	(mins)	(1/
1-6.002	MH(N)-16		3.876		0.750	0.000	0.03			11
I-0.002	MH(N)-17		3.876		1.276	0.000				26
I-7.000	MH(N)-18		3.875		0.291	0.000				20
-8.000	MH(N)-19		3.878		0.078	0.000				14
-8.001	MH (N) -20		3.877		0.334	0.000				19
-8.002	MH (N) -21		3.877		0.634	0.000				23
-8.003	MH (N) -22		3.876		0.883	0.000				22
-1.005	MH(N)-23		3.875		1.364	0.000				27
-9.000	MH(N)-24		3.875		0.190	0.000				6
10.000	MH(N)-25		3.876		0.076	0.000				8
10.001	MH(N)-26		3.876		0.518	0.000				14
10.002	MH(N)-27		3.875		0.796	0.000	0.03			13
1-1.006	MH(N)-28		3.874		1.949	0.000	0.09			13
I-1.007 MH	(N)-EX-37		3.706		2.095	0.000	0.06			13
			υ	s/mh			Level			
		PN	1	Name	S	tatus	Exceed	ed		
		N-6.0	02 M	H(N)-	-16 SUF	CHARGED				
		N-1.0				CHARGED				
		N-7.0				CHARGED				
		N-8.0	00 M	H(N)-		CHARGED		3		

N-8.001 MH(N)-20 SURCHARGED

N-8.002 MH(N)-21 SURCHARGED

N-8.003 MH(N)-22 SURCHARGED

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Jacobs Engineering Limited		Page 13
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

 US/MH
 Level

 PN
 Name
 Status
 Exceeded

 N-1.005
 MH (N) - 23
 SURCHARGED
 4

 N-9.000
 MH (N) - 24
 SURCHARGED
 3

 N-10.000
 MH (N) - 25
 SURCHARGED
 3

 N-10.001
 MH (N) - 26
 SURCHARGED
 3

 N-10.002
 MH (N) - 27
 SURCHARGED
 3

 N-10.002
 MH (N) - 28
 SURCHARGED
 4

 N-1.006
 MH (N) - 28
 SURCHARGED
 4

 N-1.007
 MH (N) - 28
 SURCHARGED
 4

Jacobs Enginee	ring Limit	ced				Page 14
•			IERR	T - Norther	n Yard	
					ons Replicat	ing
•				rcharge of	1	
•						Micro
Date 05/08/202					en Heather-S	<sup>mith</sup> Drainage
File Proposed	Model - Sı	ircha		ked by Tom		Didiridg
Innovyze			Netw	ork 2020.1.	3	
<u>10 year Returr</u>	n Period S	ummary		<u>tical Resul</u> <u>Storm</u>	ts by Maximur	n Level (Rank 1
I Manhole Head Foul Sewag Nu	Hot Start Le dot Start Le dloss Coeff ge per hecta mber of Inpu Number of On	on Factor evel (mins) evel (mm) (Global) are (l/s) ut Hydro nline Co	r 1.000 0 0.500 0.000 graphs ( ntrols 2	MADD Fa Flow per Pers ) Number of S 1 Number of T	on per Day (1/) torage Structur ime/Area Diagra	Storage 2.000 fiecient 0.800 per/day) 0.000 res 5 mms 0
N	umber of Of:	fline Co	ntrols (	) Number of Re	eal Time Contro	ols O
			hetic Ra	ainfall Detail		
	Rainfall		nalar-1		Ratio R 0.400	
		Region E O (mm)	ngland a		(Summer) 0.750 (Winter) 0.840	
	145 04	0 (11011)		17.000 CV	(WINCEI) 0.040	
Margi	n for Flood	Risk Wa	.rning (r	nm)		300.0
		-		-	d Increment (E>	tended)
			DTS Stat			OFF
			DVD Stat			ON
		Iner	tia Stat	cus		ON
	_					
-		ile(s) (mina) 1	E 20	0 100 100		Ind Winter
	Period(s) (		5, 50,		240, 360, 480, 2, 5, 10, 15, 2	
	limate Chan				, 25, 25, 25, 2	
WARNING: Ha	lf Drain Ti	me has n	ot been	calculated as	s the structure	e is too full.
US/MH			Climate	• •	First (Y)	First (Z) Overflo
PN Name	Storm	Period	Change	Surcharge	Flood	Overflow Act.
N-1.000 MH(N)-1	720 Winter	10	+25%	5/720 Winter	30/480 Winter	
( )	720 Winter	10			30/480 Winter	
	720 Winter	10			30/480 Winter	
( )	720 Winter	10			30/480 Winter	
( )	720 Winter	10 10			30/600 Winter 30/480 Winter	
N-3.000 MH(N)-6 N-3.001 MH(N)-7		10 10			30/480 Winter 30/480 Winter	
N-4.000 MH(N)-8		10			30/480 Winter	
N-4.001 MH(N)-9		10			30/480 Winter	
N-4.002 MH(N)-10		10	+25%	5/360 Winter	30/480 Winter	
N-1.003 MH(N)-11		10		1/180 Winter		
N-5.000 MH(N)-12		10			30/600 Winter	
N-5.001 MH(N)-13		10		5/600 Winter		
N-6.000 MH(N)-14 N-6.001 MH(N)-15		10 10			30/480 Winter 30/480 Winter	
	. LO MILICUL	± 0	.200	-,		

Jacobs Engineering Limited		Page 15
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Mirro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
N-1.000	MH(N)-1	4.095	0.295	0.000	0.04			3.3	SURCHARGED
J-1.001	MH(N)-2	4.093	0.486	0.000	0.05			5.4	SURCHARGED
N-2.000	MH(N)-3	4.097	0.222	0.000	0.06			5.3	SURCHARGED
N-2.001	MH(N)-4	4.094	0.702	0.000	0.11			7.2	SURCHARGED
N-1.002	MH(N)-5	4.091	0.824	0.000	0.13			12.6	SURCHARGED
000.6-0	MH(N)-6	4.091	0.291	0.000	0.03			4.0	SURCHARGED
N-3.001	MH(N)-7	4.090	0.564	0.000	0.03			6.5	SURCHARGED
N-4.000	MH(N)-8	4.095	0.295	0.000	0.06			4.6	SURCHARGED
N-4.001	MH(N)-9	4.093	0.612	0.000	0.07			8.6	SURCHARGED
N-4.002	MH(N)-10	4.091	0.827	0.000	0.05			10.6	SURCHARGED
N-1.003	MH(N)-11	4.089	1.339	0.000	0.11			21.3	SURCHARGED
N-5.000	MH(N)-12	4.087	0.287	0.000	0.03			4.4	SURCHARGED
N-5.001	MH(N)-13	4.086	0.568	0.000	0.02			7.2	SURCHARGED
N-6.000	MH(N)-14	4.091	0.291	0.000	0.04			6.0	SURCHARGED
N-6.001	MH(N)-15	4.090	0.735	0.000	0.09			14.4	SURCHARGED

	US/MH	Level
PN	Name	Exceeded
N-1.000	MH(N)-1	3
N-1.001	MH(N)-2	3
N-2.000	MH(N)-3	3
N-2.001	MH(N)-4	3
N-1.002	MH(N)-5	1
N-3.000	MH(N)-6	3
N-3.001	MH(N)-7	2
N-4.000	MH(N)-8	3
N-4.001	MH(N)-9	3
N-4.002	MH(N)-10	3
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	3
N-6.001	MH(N)-15	3

Jacobs Eng	gineering I	imited							Page 16
			IE	RRT - N	orther	n Yard	ł		
_			011	tfall C	onditi	ions Re	plicat	ina	
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•					=				Micro
Date 05/08	3/2022		De	signed 1	oy Hel	len Hea	ather-S	Smith	Drainag
File Propo	osed Model	- Surcha	a  Ch	ecked b	y Tom	Watsor	ı		Diamay
Innovyze			Ne	twork 2	020.1.	.3			
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10	atuma Dani	ad Cumma	mu of C	witi aal	Decul	ta hu	Morim		l (Dople 1
<u>IU year R</u>	<u>eturn Perio</u>	<u>ja summa</u>	-			<u>y</u> a zu	Maximu	III Leve	el (Ralik l
			<u> </u>	or Storn	<u>n</u>				
	US/MH		Detur	Climate	Fina	+ (V)	Fine	L (37)	First (7)
	•	<b>a b b b b b b b b b b</b>		Climate				t (Y)	First (Z)
PN	Name	Storm	Perloc	l Change	Surc	harge	F.T.	ood	Overflow
N-6.002	MH(N)-16	720 Wint	er 10	) +25%	2/480	Winter			
N-1.004	MH(N)-17	720 Wint	er 10	) +25%	1/120	Summer			
N-7.000	MH(N)-18	720 Wint	er 10	) +25%	5/600	Winter			
N-8.000	MH(N)-19	720 Wint	er 10	) +25%	5/720	Winter	30/480	Winter	
N-8.001	MH(N)-20	720 Wint	er 10	) +25%	5/600	Winter	30/480	Winter	
N-8.002	MH(N)-21	720 Wint	er 10	) +25%	2/720	Winter	30/600	Winter	
N-8.003	MH(N)-22	720 Wint	er 10	) +25%	1/600	Winter			
N-1.005	. ,	720 Wint			,	Winter			
N-9.000	MH(N)-24	720 Wint	er 10	) +25%	5/720	Winter			
N-10.000	MH(N)-25	720 Wint	er 10	) +25%	5/720	Winter	30/480	Winter	
N-10.001	MH(N)-26	720 Wint	er 10	) +25%	5/480	Winter			
N-10.002	MH(N)-27	720 Wint	er 10	) +25%	2/480	Winter			
N-10.002	MU(N) _ 29	720 Wint	er 10	) +25%	1/15	Summer			
N-1.002 N-1.006	MA (N) -20					a			
N-1.006	MH(N)-EX-37		er 10	) +25%	1/15	Summer			
N-1.006	. ,		er 10	) +25%	1/15	Summer			
N-1.006	. ,	720 Wint							
N-1.006	MH(N)-EX-37	720 Wint	ater Sur		looded	L			Drain Pip Time Flo

			water	Surchargeu	riooded			Hall Diall	Fibe	
	US/MH	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	Act.	(m)	(m)	(m³)	Cap.	(1/s)	(mins)	(l/s)	
				0.061					10.0	
N-6.002	MH(N)-16		4.087	0.961	0.000	0.04			13.0	
N-1.004	MH(N)-17		4.085	1.485	0.000	0.05			26.1	
N-7.000	MH(N)-18		4.085	0.501	0.000	0.03			7.3	
N-8.000	MH(N)-19		4.094	0.294	0.000	0.07			16.5	
N-8.001	MH(N)-20		4.091	0.548	0.000	0.08			22.3	
N-8.002	MH(N)-21		4.088	0.845	0.000	0.09			27.9	
N-8.003	MH(N)-22		4.086	1.093	0.000	0.07			27.9	
N-1.005	MH(N)-23		4.083	1.572	0.000	0.04			26.7	
N-9.000	MH(N)-24		4.084	0.399	0.000	0.04			7.8	
N-10.000	MH(N)-25		4.088	0.288	0.000	0.04			9.7	
N-10.001	MH(N)-26		4.086	0.728	0.000	0.08			16.7	
N-10.002	MH(N)-27		4.083	1.004	0.000	0.04			15.9	
N-1.006	MH(N)-28		4.081	2.156	0.000	0.21			32.0	
N-1.007	MH(N)-EX-37		3.714	2.103	0.000	0.14			32.0	

	US/MH		Level
PN	Name	Status	Exceeded
N-6.002	MH(N)-16	SURCHARGED	
N-1.004	MH(N)-17	SURCHARGED	
N-7.000	MH(N)-18	SURCHARGED	
N-8.000	MH(N)-19	SURCHARGED	3
N-8.001	MH(N)-20	SURCHARGED	3
N-8.002	MH(N)-21	SURCHARGED	1
N-8.003	MH(N)-22	SURCHARGED	
	©1982-2020	Innovyze	

Jacobs Engineering Limited		Page 17
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Mirro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

<u>for Storm</u>

	US/MH		Level
PN	Name	Status	Exceeded
N-1.005	MH(N)-23	SURCHARGED	
N-9.000		SURCHARGED	
N-10.000	MH(N)-25	SURCHARGED	3
N-10.001	MH(N)-26	SURCHARGED	
N-10.002	MH(N)-27	SURCHARGED	
N-1.006	MH(N)-28	SURCHARGED	
N-1.007	MH(N)-EX-37	FLOOD RISK	

•	LIIGTICC	ring Limit	ced				Pag	e 18
	-	-		IERR	T - Norther	n Yard		
						ons Replicat	ing	
•						-	-	
•					rcharge of		Mī	
Date 05	5/08/202	2		Desi	gned by Hel	en Heather-S	mith	ainage
File Pr	roposed	Model - Sı	urcha	. Chec	ked by Tom	Watson		
Innovyz	ze			Netw	ork 2020.1.	3		
<u>15 yea</u>	r Return	n Period S <sup>.</sup>	ummary		tical Resul Storm	ts by Maximur	n Level (	Rank 1)
	H hole Head Foul Sewag Nu	Hot Start Le dot Start Le dloss Coeff ge per hecta mber of Inpu Number of On	on Facto et (mins evel (mm (Global are (1/s ut Hydro nline Co	r 1.000 ) 0 ) 0.500 ) 0.000 ographs ( ontrols 2	MADD Fa Flow per Pers ) Number of St 1 Number of T:	Flow - % of To ctor * 10m³/ha Inlet Coef: con per Day (1/p torage Structur ime/Area Diagra	Storage 2 fiecient 0 per/day) 0 res 5 mms 0	.000 .800
	Ν	umber of Of	fline Co	ontrols (	) Number of Re	eal Time Contro	ols O	
				thetic Ra	ainfall Detail			
		Rainfall		1		Ratio R 0.400		
				ingland a		(Summer) 0.750 (Winter) 0.840		
		140-00	0 (mm)		T1.000 CV	(**************************************		
	Margi	n for Flood	Risk Wa	arning (r	nm)		300.0	
	2			-		d Increment (Ex	tended)	
				DTS Stat	tus		OFF	
				DVD Stat	tus		ON	
			Inei	tia Stat	tus		ON	
			$i l \circ (\alpha)$			Summer a	nd Wintor	
		Prof	( )					
		ouration(s)	(mins)	L5, 30,		240, 360, 480,	600, 720	
	Return	ouration(s) Period(s) (	(mins) í years)	L5, 30,	1, 2	240, 360, 480, 2, 5, 10, 15, 2	600, 720 20, 25, 30	
	Return	ouration(s)	(mins) í years)	L5, 30,	1, 2	240, 360, 480,	600, 720 20, 25, 30	
WA	Return C	ouration(s) Period(s) ( Climate Chan	(mins) 1 years) ge (%)		1, 2 25, 25,	240, 360, 480, 2, 5, 10, 15, 2	600, 720 20, 25, 30 25, 25, 25	11.
	Return C RNING: Ha US/MH	Period(s) ( Period(s) ( Climate Chan Llf Drain Ti	(mins) : years) ge (%) me has r Return	not been Climate	1, 2 25, 25, calculated as First (X)	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y)	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflor
PN	Return C RNING: Ha US/MH Name	Period(s) ( Period(s) ( Climate Chan and Drain Time Storm	(mins) : years) ge (%) me has r Return Period	not been Climate Change	1, 2 25, 25 calculated as First (X) Surcharge	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood	600, 720 20, 25, 30 25, 25, 25 25, 25 25, 25	
<b>PN</b> N-1.000	Return C RNING: Ha US/MH Name MH(N)-1	Period(s) Period(s) ( limate Chan off Drain Ti Storm 720 Winter	(mins) : years) ge (%) me has r Return Period 15	not been Climate Change +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflow
<b>PN</b> N-1.000 N-1.001	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2	Period(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter	(mins) 1 years) ge (%) me has r Return Period 15 15	not been Climate Change +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflor
PN N-1.000 N-1.001 N-2.000	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3	Period(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter 720 Winter	(mins) 1 years) ge (%) me has r Return Period 15 15	not been Climate Change +25% +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflor
PN N-1.000 N-1.001 N-2.000 N-2.001	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4	Period(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	(mins) : years) ge (%) me has r Return Period 15 15 15	not been Climate Change +25% +25% +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-1.001 N-2.000 N-2.001 N-1.002	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4 MH(N)-5	Period(s) ( Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	(mins) 1 years) ge (%) me has r Return Period 15 15	<b>Climate</b> <b>Change</b> +25% +25% +25% +25% +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4 MH(N)-5 MH(N)-6	Period(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	(mins) : years) ge (%) me has r Return Period 15 15 15 15	<b>Climate</b> <b>Change</b> +25% +25% +25% +25% +25% +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4 MH(N)-5 MH(N)-6 MH(N)-7	Period(s) ( Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	(mins) : years) ge (%) me has r Return Period 15 15 15 15 15	not been Climate Change +25% +25% +25% +25% +25% +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/600 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-4 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8	Period(s) ( Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	(mins) : years) ge (%) me has r Return Period 15 15 15 15 15 15	not been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/480 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/600 Winter 5/600 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 s the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-4 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10	Period(s) Period(s) ( limate Chan alf Drain Ti Storm 720 Winter 720 Winter	(mins) : years) ge (%) me has r Return Period 15 15 15 15 15 15 15 15 15 15	Dot been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/720 Winter 5/600 Winter 5/720 Winter 5/600 Winter 5/600 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 <b>5 the structure</b> <b>First (Y)</b> <b>Flood</b> 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11	Period(s) Period(s) ( limate Chan alf Drain Ti Storm 720 Winter 720 Winter	(mins) : years) ge (%) me has r Return Period 15 15 15 15 15 15 15 15 15 15 15 15	not been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/720 Winter 5/600 Winter 5/720 Winter 5/600 Winter 5/600 Winter 5/600 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 2 5 the structure First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11 MH(N)-12	Period(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter	(mins) : years) ge (%) me has r Return Period 15 15 15 15 15 15 15 15 15 15 15 15 15	not been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/720 Winter 5/600 Winter 5/360 Winter 5/360 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 25 <b>5 the structure</b> <b>First (Y)</b> <b>Flood</b> 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000 N-5.001	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11 MH(N)-12 MH(N)-13	Period(s) Period(s) ( limate Chan alf Drain Ti Storm 720 Winter 720 Winter	(mins) : years) ge (%) me has r Return Period 15 15 15 15 15 15 15 15 15 15 15 15 15	not been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/360 Winter 5/360 Winter 5/720 Winter 5/720 Winter 5/600 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 25 <b>5 the structure</b> <b>First (Y)</b> <b>Flood</b> 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000 N-5.001 N-6.000	Return C RNING: Ha US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-3 MH(N)-5 MH(N)-5 MH(N)-6 MH(N)-7 MH(N)-7 MH(N)-8 MH(N)-9 MH(N)-10 MH(N)-11 MH(N)-12 MH(N)-13 MH(N)-14	Period(s) Period(s) ( limate Chan If Drain Ti Storm 720 Winter 720 Winter	(mins) : years) ge (%) me has r Return Period 15 15 15 15 15 15 15 15 15 15 15 15 15	not been Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	1, 2 25, 25, calculated as First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/720 Winter 5/600 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/720 Winter	240, 360, 480, 2, 5, 10, 15, 2 , 25, 25, 25, 25 <b>5 the structure</b> <b>First (Y)</b> <b>Flood</b> 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	600, 720 20, 25, 30 25, 25, 25 e is too fu First (Z)	Overflo

Jacobs Engineering Limited		Page 19
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Mirro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
N-1.000	MH(N)-1	4.427	0.627	0.000	0.05			3.6	SURCHARGED
N-1.001	MH(N)-2	4.425	0.818	0.000	0.06			5.9	SURCHARGED
N-2.000	MH(N)-3	4.430	0.555	0.000	0.07			5.8	SURCHARGED
N-2.001	MH(N)-4	4.426	1.034	0.000	0.12			7.9	SURCHARGED
N-1.002	MH(N)-5	4.423	1.156	0.000	0.14			13.5	SURCHARGED
N-3.000	MH(N)-6	4.422	0.622	0.000	0.03			4.4	SURCHARGED
N-3.001	MH(N)-7	4.421	0.895	0.000	0.03			7.1	SURCHARGED
N-4.000	MH(N)-8	4.428	0.628	0.000	0.06			5.0	SURCHARGED
N-4.001	MH(N)-9	4.425	0.944	0.000	0.08			9.4	SURCHARGED
N-4.002	MH(N)-10	4.422	1.158	0.000	0.06			11.4	SURCHARGED
N-1.003	MH(N)-11	4.419	1.669	0.000	0.11			21.5	SURCHARGED
N-5.000	MH(N)-12	4.416	0.616	0.000	0.03			4.8	SURCHARGED
N-5.001	MH(N)-13	4.415	0.897	0.000	0.02			7.8	SURCHARGED
N-6.000	MH(N)-14	4.422	0.622	0.000	0.04			6.5	SURCHARGED
N-6.001	MH(N)-15	4.420	1.065	0.000	0.09			15.5	SURCHARGED

	US/MH	Level
PN	Name	Exceeded
N-1.000	MH(N)-1	3
N-1.001	MH(N)-2	3
N-2.000	MH(N)-3	3
N-2.001	MH(N)-4	3
N-1.002	MH(N)-5	1
N-3.000	MH(N)-6	3
N-3.001	MH(N)-7	2
N-4.000	MH(N)-8	3
N-4.001	MH(N)-9	3
N-4.002	MH(N)-10	3
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	3
N-6.001	MH(N)-15	3

Jacobs Eng	gineering I	Limite	d							Page 2	20
				IEF	RRT - 1	lorther	n Yard	l			
				Out	fall (	Conditi	ons Re	plicat	ing		
							+3.7 m	-	5		
	. /					-			1	Micro	]
Date 05/08	8/2022			Des	signed	by Hel	.en Hea	ther-S	mith	Drain	
File Prop	osed Model	- Sur	cha	Che	ecked k	y Tom	Watson	L		Dian	luy
Innovyze				Net	work 2	2020.1.	3		I		
<u>15 year R</u>	<u>eturn Peri</u>	od Sum	<u>mary o</u>		<u>itical</u> or Stor		ts by	<u>Maximu</u>	m Leve	el (Rar	<u>1</u> k 1
	US/MH					e Firs		First		First	
PN	Name	Sto	rm Pe	rıod	Change	Surc	harge	Flc	od	Overfl	LOW
N-6.002	MH(N)-16	720 Wi	nter	15	+25	\$ 2/480	Winter				
N-1.004	MH (N) -17			15		\$ 1/120					
N-7.000	. ,			15		\$ 5/600					
N-8.000				15				30/480	Winter		
N-8.001	MH(N)-20	720 Wi	nter	15				30/480			
N-8.002	MH(N)-21	720 Wi	nter	15	+25	\$ 2/720	Winter	30/600	Winter		
N-8.003	MH(N)-22	720 Wi	nter	15	+25	1/600	Winter				
N-1.005	MH(N)-23	720 Wi	nter	15	+25	1/60	Winter				
N-9.000	MH(N)-24	720 Wi	nter	15	+25	\$ 5/720	Winter				
N-10.000	MH(N)-25	720 Wi	nter	15	+25	\$ 5/720	Winter	30/480	Winter		
N-10.001				15		\$ 5/480					
N-10.002				15		\$ 2/480					
N-1.006	. ,			15		\$ 1/15					
N-1.007	MH(N)-EX-37	720 Wi	nter	15	+25	\$ 1/15	Summer				
			Water	Surc	harged	Flooded			Half	Drain	Pip
	US/MH Ov	verflow	Level		epth		Flow /	Overfl		'ime	Flo
PN	Name	Act.	(m)		(m)	(m³)	Cap.	(l/s)	(n	ins)	(1/
N-6.002	MH(N)-16		4.416		1.290	0.000	0.04				14
N-1.004	MH(N)-17		4.413		1.813	0.000					28
N-7.000	MH(N)-18		4.413		0.829	0.000					7
N-8.000	MH(N)-19		4.426		0.626	0.000	0.08				18
N-8.001	MH(N)-20		4.422		0.879	0.000					24
N-8.002	MH(N)-21		4.418		1.175	0.000	0.09				30
N-8.003	MH(N)-22		4.414		1.421	0.000	0.07				30
N-1.005	MH(N)-23		4.411		1.900	0.000					36
N-9.000	MH(N)-24		4.412		0.727	0.000					8
	MH(N)-25		4.417		0.617	0.000					10
N-10.001	MH(N)-26		4.415		1.057	0.000					18
					1.332	0.000	0.04				18
	MH(N)-27		4.411								
N-10.002 N-1.006 N-1.007 MH	MH(N)-28		4.411 4.408 3.721		2.483	0.000	0.31				46 46

	US/MH		Level
PN	Name	Status	Exceeded
N-6.002	MH(N)-16	SURCHARGED	
N-1.004	MH(N)-17	SURCHARGED	
N-7.000	MH(N)-18	SURCHARGED	
N-8.000	MH(N)-19	SURCHARGED	3
N-8.001	MH(N)-20	SURCHARGED	3
N-8.002	MH(N)-21	SURCHARGED	1
N-8.003	MH(N)-22	SURCHARGED	
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•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Desinado
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

<u>for Storm</u>

	US/MH		Level
PN	Name	Status	Exceeded
N-1.005	MH(N)-23	SURCHARGED	
N-9.000		SURCHARGED	
N-10.000	MH(N)-25	SURCHARGED	3
N-10.001	MH(N)-26	SURCHARGED	
N-10.002	MH(N)-27	SURCHARGED	
N-1.006	MH(N)-28	SURCHARGED	
N-1.007	MH(N)-EX-37	FLOOD RISK	

Jacobs Enginee	ering Limit	ed				Pag	e 22
			TERR	T - Norther	n Yard		
•					ons Replicat	ing	
•					1		
•				rcharge of		Mi	
Date 05/08/202	2		Desi	gned by Hel	en Heather-S	mith DC	ainage
File Proposed	Model - Si	ircha		ked by Tom			
Innovyze			Netw	ork 2020.1.	3		
<u>20 year Return</u>	n Period S	ummary_		tical Resul Storm	ts by Maximur	m Level (	<u>Rank 1)</u>
Manhole Hea Foul Sewa Nu	Hot Start Hot Start Le dloss Coeff ge per hecta umber of Inp Number of O	n Factor t (mins) vel (mm) (Global) re (l/s) at Hydrog nline Cor	1.000 0 0.500 0.000 graphs ( ntrols 2	MADD Fa Flow per Pers ) Number of S 1 Number of T	Flow - % of To actor * 10m³/ha Inlet Coef son per Day (1/) torage Structur ime/Area Diagra eal Time Contro	Storage 2 fiecient 0 per/day) 0 ces 5 ams 0	.000 .800
	CARDOCT OF OF					10 0	
			hetic Ra	ainfall Detail			
	Rainfall		ngland :		Ratio R 0.400 (Summer) 0.750		
		) (mm)	iigiaila a		(Winter) 0.840		
		- ( )			<b>, , , , , , , , , ,</b>		
Margi	n for Flood		-			300.0	
		-		-	d Increment (Ex		
			DTS Stat DVD Stat			OFF	
			tia Stat			ON ON	
		INCI	cia bia	245		011	
-		ile(s)	F 20	CO 100 100		and Winter	
	Period(s) (		5, 30,		240, 360, 480, 2, 5, 10, 15, 2		
	Climate Chan				, 25, 25, 25, 2		
		5 . ,					
WARNING: Ha	alf Drain Ti	me has no	ot been	calculated as	s the structure	e is too fu	11.
US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow
PN Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.
N-1.000 MH(N)-1	720 Winter	20	+2.5%	5/720 Winter	30/480 Winter		
	720 Winter	20			30/480 Winter		
N-2.000 MH(N)-3	720 Winter	20	+25%	5/720 Winter	30/480 Winter		
. ,	720 Winter	20			30/480 Winter		
	720 Winter	20			30/600 Winter		
N-3.000 MH(N)-6 N-3.001 MH(N)-7	720 Winter	20 20			30/480 Winter 30/480 Winter		
N-3.001 MH(N)-7 N-4.000 MH(N)-8		20			30/480 Winter 30/480 Winter		
N-4.001 MH(N)-9		20			30/480 Winter		
	720 Winter	20			30/480 Winter		
N-4.002 MH(N)-10				1/180 Winter			
N-1.003 MH(N)-11	720 Winter	20	1200	1,100			
N-1.003 MH(N)-11 N-5.000 MH(N)-12	720 Winter	20	+25%	5/720 Winter	30/600 Winter		
N-1.003 MH(N)-11 N-5.000 MH(N)-12 N-5.001 MH(N)-13	720 Winter 720 Winter	20 20	+25% +25%	5/720 Winter 5/600 Winter	30/600 Winter		
N-1.003 MH(N)-11 N-5.000 MH(N)-12 N-5.001 MH(N)-13 N-6.000 MH(N)-14	720 Winter 720 Winter 720 Winter	20 20 20	+25% +25% +25%	5/720 Winter 5/600 Winter 5/720 Winter	30/600 Winter 30/480 Winter		
N-1.003 MH(N)-11 N-5.000 MH(N)-12 N-5.001 MH(N)-13	720 Winter 720 Winter 720 Winter	20 20	+25% +25% +25%	5/720 Winter 5/600 Winter 5/720 Winter	30/600 Winter		

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•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
N-1.000	MH(N)-1	4.717	0.917	0.000	0.05			3.8	FLOOD RISK
N-1.001	MH(N)-2	4.715	1.108	0.000	0.06			6.2	FLOOD RISK
N-2.000	MH(N)-3	4.721	0.846	0.000	0.07			6.2	FLOOD RISK
N-2.001	MH(N)-4	4.716	1.324	0.000	0.13			8.4	FLOOD RISK
N-1.002	MH(N)-5	4.711	1.444	0.000	0.15			14.2	FLOOD RISK
N-3.000	MH(N)-6	4.711	0.911	0.000	0.03			4.6	FLOOD RISK
N-3.001	MH(N)-7	4.710	1.184	0.000	0.03			7.5	FLOOD RISK
N-4.000	MH(N)-8	4.719	0.919	0.000	0.07			5.3	FLOOD RISK
N-4.001	MH(N)-9	4.715	1.234	0.000	0.08			10.0	FLOOD RISK
N-4.002	MH(N)-10	4.711	1.447	0.000	0.06			11.9	FLOOD RISK
N-1.003	MH(N)-11	4.707	1.957	0.000	0.12			21.6	FLOOD RISK
N-5.000	MH(N)-12	4.704	0.904	0.000	0.04			5.1	FLOOD RISK
N-5.001	MH(N)-13	4.702	1.184	0.000	0.02			8.7	FLOOD RISK
N-6.000	MH(N)-14	4.711	0.911	0.000	0.04			6.9	FLOOD RISK
N-6.001	MH(N)-15	4.708	1.353	0.000	0.10			16.4	FLOOD RISK

	US/MH	Level
PN	Name	Exceeded
N-1.000	MH(N)-1	3
N-1.001	MH(N)-2	3
N-2.000	MH(N)-3	3
N-2.001	MH(N)-4	3
N-1.002	MH(N)-5	1
N-3.000	MH(N)-6	3
N-3.001	MH(N)-7	2
N-4.000	MH(N)-8	3
N-4.001	MH(N)-9	3
N-4.002	MH(N)-10	3
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	3
N-6.001	MH(N)-15	3

Jacobs Eng	gineering L	imited							Page 24	
•			IEF	RRT - No	orther	n Yaro	1			
			Out	fall Co	onditi	ons Re	eplicat	ing		
				Surchard			-	_	Misso	
• Date 05/08	/2022			-	·			'mith	Micro	
				signed k	-				Drainag	ח
File Propo	osed Model	- Surcha.	Che	ecked by	7 Tom	Watsor	1		Drainag	2
Innovyze			Net	work 20	020.1.	3				
	<u>10</u>	<u>r Storm</u>	<u>-</u>							
	US/MH		Return	Climate				t (Y)	First (Z)	
PN	US/MH Name	Storm		Climate Change		t (X) harge		t (Y) ood	First (Z) Overflow	
<b>PN</b> N-6.002	Name	Storm 720 Winter		Change	Surc			• •	• •	
	<b>Name</b> MH(N)-16		Period	Change +25%	<b>Surc</b> 2/480	harge		• •	• •	
N-6.002	<b>Name</b> MH(N)-16 MH(N)-17	720 Winter	Period	<b>Change</b> +25% +25%	<b>Surc</b> 2/480 1/120	<b>harge</b> Winter		• •	• •	
N-6.002 N-1.004	<b>Name</b> MH(N)-16 MH(N)-17 MH(N)-18	720 Winter 720 Winter	<b>Period</b> 20 20	<b>Change</b> +25% +25% +25%	Surc 2/480 1/120 5/600	harge Winter Summer Winter		bod	• •	
N-6.002 N-1.004 N-7.000	<b>Name</b> MH(N)-16 MH(N)-17 MH(N)-18 MH(N)-19	720 Winter 720 Winter 720 Winter	<b>Period</b> 20 20 20 20	<b>Change</b> +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720	harge Winter Summer Winter Winter	Flo	Winter	• •	
N-6.002 N-1.004 N-7.000 N-8.000	Name MH(N)-16 MH(N)-17 MH(N)-18 MH(N)-19 MH(N)-20	720 Winter 720 Winter 720 Winter 720 Winter	<b>Period</b> 20 20 20 20 20	<b>Change</b> +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600	harge Winter Summer Winter Winter Winter	<b>Flo</b> 30/480	Winter Winter	• •	
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001	Name MH(N)-16 MH(N)-17 MH(N)-18 MH(N)-19 MH(N)-20 MH(N)-21	720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	<b>Period</b> 20 20 20 20 20 20 20	<b>Change</b> +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600 2/720	harge Winter Summer Winter Winter Winter	<b>Flo</b> 30/480 30/480	Winter Winter	• •	
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005	Name MH(N)-16 MH(N)-17 MH(N)-18 MH(N)-19 MH(N)-20 MH(N)-21 MH(N)-22 MH(N)-23	720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	<b>Period</b> 20 20 20 20 20 20 20 20 20 20 20 20 20	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600 2/720 1/600 1/60	harge Winter Summer Winter Winter Winter Winter Winter Winter	<b>Flo</b> 30/480 30/480	Winter Winter	• •	
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000	Name MH(N)-16 MH(N)-17 MH(N)-18 MH(N)-20 MH(N)-21 MH(N)-22 MH(N)-23 MH(N)-24	720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	<b>Period</b> 20 20 20 20 20 20 20 20 20 20 20 20 20	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600 2/720 1/600 1/60 5/720	harge Winter Summer Winter Winter Winter Winter Winter Winter	<b>Fl</b> 30/480 30/480 30/600	Winter Winter Winter	• •	
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000	Name MH (N) -16 MH (N) -17 MH (N) -18 MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25	720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter 720 Winter	<b>Period</b> 20 20 20 20 20 20 20 20 20 20 20 20 20	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 1/600 1/600 5/720 5/720	harge Winter Summer Winter Winter Winter Winter Winter Winter Winter	<b>Flo</b> 30/480 30/480	Winter Winter Winter	• •	
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001	Name MH (N) -16 MH (N) -17 MH (N) -18 MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -25 MH (N) -26	720 Winter 720 Winter	<b>Period</b> 20 20 20 20 20 20 20 20 20 20 20 20 20	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600 2/720 1/600 1/60 5/720 5/720 5/480	harge Winter Summer Winter Winter Winter Winter Winter Winter Winter Winter	<b>Fl</b> 30/480 30/480 30/600	Winter Winter Winter	• •	
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002	MH (N) -16 MH (N) -17 MH (N) -17 MH (N) -18 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27	720 Winter 720 Winter	<b>Period</b> 20 20 20 20 20 20 20 20 20 20 20 20 20	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600 2/720 1/600 1/60 5/720 5/720 5/480 2/480	harge Winter Summer Winter Winter Winter Winter Winter Winter Winter Winter Winter	<b>Fl</b> 30/480 30/480 30/600	Winter Winter Winter	• •	
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002 N-1.006	MH (N) -16 MH (N) -17 MH (N) -17 MH (N) -18 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27	720 Winter 720 Winter	<b>Period</b> 20 20 20 20 20 20 20 20 20 20 20 20 20	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600 2/720 1/600 1/60 5/720 5/720 5/480 2/480 1/15	harge Winter Summer Winter Winter Winter Winter Winter Winter Winter Winter	<b>Fl</b> 30/480 30/480 30/600	Winter Winter Winter	• •	

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	
N-6.002	MH(N)-16		4.704	1.578	0.000	0.04			16.2	
N-1.004	MH(N)-17		4.700	2.100	0.000	0.05			27.2	
N-7.000	MH(N)-18		4.700	1.116	0.000	0.03			8.4	
N-8.000	MH(N)-19		4.715	0.915	0.000	0.09			19.1	
N-8.001	MH(N)-20		4.711	1.168	0.000	0.09			25.6	
N-8.002	MH(N)-21		4.706	1.463	0.000	0.10			31.6	
N-8.003	MH(N)-22		4.701	1.708	0.000	0.08			31.5	
N-1.005	MH(N)-23		4.697	2.186	0.000	0.07			44.2	
N-9.000	MH(N)-24		4.698	1.013	0.000	0.04			9.1	
N-10.000	MH(N)-25		4.705	0.905	0.000	0.05			11.3	
N-10.001	MH(N)-26		4.702	1.344	0.000	0.09			19.5	
N-10.002	MH(N)-27		4.697	1.618	0.000	0.04			19.4	
N-1.006	MH(N)-28		4.693	2.768	0.000	0.38			56.7	
N-1.007	MH(N)-EX-37		3.725	2.114	0.000	0.25			56.7	

PN	US/MH Name	Status	Level Exceeded
N-6.002	MH(N)-16	FLOOD RISK	
N-1.004	MH(N)-17	FLOOD RISK	
N-7.000	MH(N)-18	FLOOD RISK	
N-8.000	MH(N)-19	FLOOD RISK	3
N-8.001	MH(N)-20	FLOOD RISK	3
N-8.002	MH(N)-21	FLOOD RISK	1
N-8.003	MH(N)-22	FLOOD RISK	
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•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

<u>for Storm</u>

	US/MH		Level
PN	Name	Status	Exceeded
N-1.005	MH(N)-23	SURCHARGED	
N-9.000	MH(N)-24	SURCHARGED	
N-10.000	MH(N)-25	FLOOD RISK	3
N-10.001	MH(N)-26	FLOOD RISK	
N-10.002	MH(N)-27	SURCHARGED	
N-1.006	MH(N)-28	SURCHARGED	
N-1.007	MH(N)-EX-37	FLOOD RISK	

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•			IERR	T - Norther	n Yard	
					ons Replicat	ing
•				rcharge of	-	
•						Micro
Date 05/08/2022					en Heather-S	Drainage
File Proposed M	Iodel - Su	ircha		ked by Tom		
Innovyze			Netw	ork 2020.1.	3	
<u>25 year Return</u>	Period St	ummary_		tical Resul Storm	ts by Maximu	m Level (Rank 1)
Ho Manhole Head Foul Sewage Num N	Hot Start Dt Start Le Loss Coeff e per hecta ber of Inpu umber of Or	n Factor t (mins) vel (mm) (Global) re (l/s) at Hydroo nline Com	1.000 0 0.500 0.000 graphs ( ntrols 1	MADD Fa Flow per Pers ) Number of S . Number of T	son per Day (l/ torage Structur ime/Area Diagra	Storage 2.000 fiecient 0.800 per/day) 0.000 res 5 ums 0
Nu	mber of Of:	fline Co	ntrols (	) Number of R	eal Time Contro	ols O
			hetic Ra	ainfall Detai		
	Rainfall		norland of		Ratio R 0.400 (Summer) 0.750	
		Region E ) (mm)	ngiand a		(Winter) 0.750 (Winter) 0.840	
	110 00	5 (mm)		17.000 00	(Wincer) 0.040	
Margin	for Flood	Risk Wa	rning (n	nm)		300.0
		-		-	d Increment (Ex	
			DTS Stat			OFF
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		Iller	LIA SLAI	us		ON
					_	
יות		ile(s) (mins) 1	5 30 0	50 120 180	Summer a 240, 360, 480,	and Winter
	Period(s) (		5, 50, 1		2, 5, 10, 15, 2	
	imate Chan	- ·		-	, 25, 25, 25, 2	
WARNING: Hal	f Drain Tin.	me has n	ot been	calculated a	s the structure	e is too full.
US/MH			Climate	• •	First (Y)	First (Z) Overflow
PN Name	Storm	Period	Change	Surcharge	Flood	Overflow Act.
N-1.000 MH(N)-1	720 Winter	25	+25%	5/720 Winter	30/480 Winter	
. ,	720 Winter	25			30/480 Winter	
	720 Winter	25			30/480 Winter	
	720 Winter	25			30/480 Winter	
N-1.002 MH(N)-5 N-3.000 MH(N)-6	720 Winter	25 25			30/600 Winter 30/480 Winter	
N-3.000 MH(N)-6 N-3.001 MH(N)-7		25 25			30/480 Winter 30/480 Winter	
N-4.000 MH(N)-8		25			30/480 Winter	
N-4.001 MH(N)-9		25			30/480 Winter	
N-4.002 MH(N)-10		25	+25%	5/360 Winter	30/480 Winter	
N-1.003 MH(N)-11		25		1/180 Winter		
N-5.000 MH(N)-12		25			30/600 Winter	
	(1) III in the second	25	+25%	5/600 Winter		
N-5.001 MH(N)-13					20/400 57	
N-6.000 MH(N)-14	720 Winter	25			30/480 Winter 30/480 Winter	
	720 Winter				30/480 Winter 30/480 Winter	

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•	IERRT - Northern Yard			
	Outfall Conditions Replicating			
	a Surcharge of +3.7 mAOD	Micro		
Date 05/08/2022	Designed by Helen Heather-Smith	Desinado		
File Proposed Model - Surcha	Checked by Tom Watson	Diamage		
Innovyze	Network 2020.1.3	•		

	US/MH	Water Level	Surcharged Depth	Flooded Volume		Overflow	Half Drain Time	Pipe Flow		
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Stat	us
N-1.000	MH(N)-1	4.965	1.165	0.000	0.05			4.0	FLOOD	RISK
N-1.001	MH(N)-2	4.963	1.356	0.000	0.06			6.6	FLOOD	RISK
N-2.000	MH(N)-3	4.970	1.095	0.000	0.08			6.5	FLOOD	RISK
N-2.001	MH(N)-4	4.964	1.572	0.000	0.14			8.8	FLOOD	RISK
N-1.002	MH(N)-5	4.959	1.692	0.000	0.15			14.7	FLOOD	RISK
N-3.000	MH(N)-6	4.958	1.158	0.000	0.04			4.9	FLOOD	RISK
N-3.001	MH(N)-7	4.957	1.431	0.000	0.03			7.9	FLOOD	RISK
N-4.000	MH(N)-8	4.967	1.167	0.000	0.07			5.6	FLOOD	RISK
N-4.001	MH(N)-9	4.963	1.482	0.000	0.09			10.4	FLOOD	RISK
N-4.002	MH(N)-10	4.958	1.694	0.000	0.06			12.3	FLOOD	RISK
N-1.003	MH(N)-11	4.954	2.204	0.000	0.12			21.8	FLOOD	RISK
N-5.000	MH(N)-12	4.950	1.150	0.000	0.04			5.3	FLOOD	RISK
N-5.001	MH(N)-13	4.948	1.430	0.000	0.02			10.3	FLOOD	RISK
N-6.000	MH(N)-14	4.958	1.158	0.000	0.05			7.3	FLOOD	RISK
N-6.001	MH(N)-15	4.955	1.600	0.000	0.10			17.4	FLOOD	RISK

PN	US/MH Name	Level Exceeded
N-1.000	MH(N)-1	3
N-1.001	MH(N)-2	3
N-2.000	MH(N)-3	3
N-2.001	MH(N)-4	3
N-1.002	MH(N)-5	1
N-3.000	MH(N)-6	3
N-3.001	MH(N)-7	2
N-4.000	MH(N)-8	3
N-4.001	MH(N)-9	3
N-4.002	MH(N)-10	3
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	3
N-6.001	MH(N)-15	3

Jacobs End	gineering 1	Limited						I	Page 2	8
			IE	rrt - N	orther	n Yard	l	٢		
			Ou	tfall C	onditi	ons Re	plicat	ing		
				Surchar			-	-		
					-				Micro	
Date 05/0				signed	-			mith	Drain	ап
File Prop	osed Model	- Surch	a  Ch	ecked b	y Tom	Watson	1		Jiani	٩IJ
Innovyze			Ne	twork 2	020.1.	3				
<u>25 year R</u>	<u>eturn Peri</u>	<u>od Summa</u>	-	<u>ritical</u> or Storr		ts by	Maximur	m Level	<u>l (Ran</u>	<u>k 1</u>
	US/MH		Return	Climate	Firs	t (X)	First	(Y)	First	(Z)
PN	Name	Storm	Period	Change	Surc	harge	Flo	od	Overfl	wo
N-6.002	MH(N)-16	5 720 Wint	.er 25	+25%	2/480	Winter				
N-1.004	MH(N)-17	720 Wint	er 25	+25%	1/120	Summer				
N-7.000		720 Wint		+25%	5/600	Winter				
N-8.000	MH(N)-19	720 Wint	.er 25	+25%	5/720	Winter	30/480	Winter		
N-8.001	MH(N)-20	720 Wint	.er 25	+25%	5/600	Winter	30/480	Winter		
N-8.002	MH(N)-21	. 720 Wint	.er 25	+25%	2/720	Winter	30/600	Winter		
N-8.003	MH(N)-22	720 Wint	er 25	+25%	1/600	Winter				
N-1.005	MH(N)-23	720 Wint	.er 25	+25%	1/60	Winter				
N-9.000	MH(N)-24	720 Wint	.er 25	+25%	5/720	Winter				
N-10.000	MH(N)-25	720 Wint	er 25	+25%	5/720	Winter	30/480	Winter		
N-10.001		5 720 Wint	er 25	+25%	5/480	Winter				
N-10.002		720 Wint		+25%	2/480	Winter				
N-1.006		720 Wint		+25%	1/15	Summer				
N-1.007	MH(N)-EX-37	720 Wint	.er 25	+25%	1/15	Summer				
		Ŵ	ater Sur	charged 1	Flooded			Half	Drain	Pip
	US/MH OT	verflow 1	Level D	epth	Volume	Flow /	Overflo		ime	Flo
	05/1411 00									
PN	Name	Act.	(m)	(m)	(m³)	Cap.	(1/s)	(m:	ins)	(1/
<b>PN</b> N-6.002	•		(m) 4.950	(m) 1.824	(m³) 0.000	Cap. 0.05		(m:	ins)	<b>(1/</b> 17

1. 0.005	1111 (11) ±0	1.500	1.001	0.000	0.00	± / • ±
N-1.004	MH(N)-17	4.946	2.346	0.000	0.06	30.2
N-7.000	MH(N)-18	4.946	1.362	0.000	0.04	8.8
N-8.000	MH(N)-19	4.963	1.163	0.000	0.09	20.0
N-8.001	MH(N)-20	4.958	1.415	0.000	0.09	26.8
N-8.002	MH(N)-21	4.952	1.709	0.000	0.10	33.6
N-8.003	MH(N)-22	4.947	1.954	0.000	0.08	33.4
N-1.005	MH(N)-23	4.942	2.431	0.000	0.08	50.8
N-9.000	MH(N)-24	4.944	1.259	0.000	0.05	9.5
N-10.000	MH(N)-25	4.951	1.151	0.000	0.05	11.8
N-10.001	MH(N)-26	4.948	1.590	0.000	0.10	20.4
N-10.002	MH(N)-27	4.942	1.863	0.000	0.05	20.2
N-1.006	MH(N)-28	4.938	3.013	0.000	0.43	65.3
N-1.007	MH(N)-EX-37	3.729	2.118	0.000	0.28	65.2
1						

	US/MH		Level
PN	Name	Status	Exceeded
N-6.002	MH(N)-16	FLOOD RISK	
N-1.004	MH(N)-17	FLOOD RISK	
N-7.000	MH(N)-18	FLOOD RISK	
N-8.000	MH(N)-19	FLOOD RISK	3
N-8.001	MH(N)-20	FLOOD RISK	3
N-8.002	MH(N)-21	FLOOD RISK	1
N-8.003	MH(N)-22	FLOOD RISK	
(	©1982-2020	Innovyze	

Jacobs Engineering Limited		Page 29
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

# 25 year Return Period Summary of Critical Results by Maximum Level (Rank 1)

<u>for Storm</u>

	US/MH		Level
PN	Name	Status	Exceeded
N-1.005	MH(N)-23	FLOOD BL	SK
N-9.000	MH (N) -24		
N-10.000	MH(N)-25	FLOOD RI	SK 3
N-10.001	MH(N)-26	FLOOD RI	SK
N-10.002	MH(N)-27	FLOOD RI	SK
N-1.006	MH(N)-28	FLOOD RI	SK
N-1.007	MH(N)-EX-37	FLOOD RI	SK

	Enginee		ted				Pag	e 30
•					T - Norther			
				Outf	all Conditi	ons Replicat	ing	
				a Su	rcharge of	+3.7 mAOD	Mi	
Date 0!	5/08/202	2		Desi	gned by Hel	en Heather-S	mith	
File P:	roposed	Model - Sı	ircha	. Chec	ked by Tom	Watson		ainag
Innovy	-				ork 2020.1.			
_								
<u>30 yea</u>	<u>r Return</u>	<u>Period S</u>	ummary		<u>Storm</u>	ts by Maximu	n level (	<u>kank 1</u>
			<u> </u>	Simulati	<u>on Criteria</u>			
	Are					Flow - % of To		
	Ľ	HOT Star Hot Start Le	t (mins)	0	MADD Fa	ctor * 10m³/ha. Inlet Coef		
	nhole Head		(Global)	0.500	Flow per Pers	on per Day (1/		
		-	-			torage Structur ime/Area Diagra		
						eal Time Contro		
		D		<u>hetic Ra</u>	ainfall Detail			
		Rainfall		naland -		Ratio R 0.400 (Summer) 0.750		
			0 (mm)	nyiana a		(Winter) 0.840		
	Margi	n for Flood	Risk Wa	rning (r	nm)		300.0	
				-		d Increment (E>		
				DTS Stat			OFF	
				DVD Stat			ON	
			Iner	tia Stat	cus		ON	
		Prof	ile(s)			Summer	und Winter	
	D		- ( - )	5, 30,	60, 120, 180,	240, 360, 480,		
		Period(s) (		-,,		2, 5, 10, 15, 2		
	С	limate Chan	ge (%)		25, 25,	, 25, 25, 25, 2	25, 25, 25	
				ot been	coloulated as	the structure		
WA	ARNING: Ha	lf Drain Ti	me has n		calculated as	s the structure	is too fu	11.
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflo
WA PN		lf Drain Ti: Storm		Climate				
<b>PN</b> N-1.000	<b>US/MH</b> <b>Name</b> MH(N)-1	<b>Storm</b> 720 Winter	Return Period 30	Climate Change +25%	First (X) Surcharge 5/720 Winter	First (Y) Flood 30/480 Winter	First (Z)	Overflo
<b>PN</b> N-1.000 N-1.001	<b>US/MH</b> <b>Name</b> MH (N) -1 MH (N) -2	Storm 720 Winter 720 Winter	Return Period 30 30	<b>Climate</b> <b>Change</b> +25% +25%	First (X) Surcharge 5/720 Winter 5/600 Winter	First (Y) Flood 30/480 Winter 30/480 Winter	First (Z)	Overfl
<b>PN</b> N-1.000 N-1.001 N-2.000	<b>US/MH</b> Name MH(N)-1 MH(N)-2 MH(N)-3	Storm 720 Winter 720 Winter 720 Winter	<b>Return</b> <b>Period</b> 30 30 30	Climate Change +25% +25% +25%	First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter	First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter	First (Z)	Overflo
<b>PN</b> J-1.000 J-1.001 J-2.000 J-2.001	<b>US/MH</b> Name MH (N) -1 MH (N) -2 MH (N) -3 MH (N) -4	Storm 720 Winter 720 Winter 720 Winter 720 Winter	<b>Return</b> <b>Period</b> 30 30 30 30	Climate Change +25% +25% +25% +25%	First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter	First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	First (Z)	Overfl
<b>PN</b> J-1.000 J-1.001 J-2.000 J-2.001 J-1.002	<b>US/MH</b> Name MH (N) -1 MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5	Storm 720 Winter 720 Winter 720 Winter 720 Winter 600 Winter	<b>Return</b> <b>Period</b> 30 30 30 30 30	Climate Change +25% +25% +25% +25% +25%	First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter	First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/600 Winter	First (Z)	Overfl
PN -1.000 -1.001 -2.000 -2.001 -1.002 -3.000	US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4 MH(N)-5 MH(N)-6	Storm 720 Winter 720 Winter 720 Winter 720 Winter 600 Winter 600 Winter	<b>Return</b> <b>Period</b> 30 30 30 30 30 30 30	Climate Change +25% +25% +25% +25% +25% +25%	First (X) Surcharge 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter	First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/600 Winter	First (Z)	Overfl
PN N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001	US/MH Name MH(N)-1 MH(N)-2 MH(N)-3 MH(N)-4 MH(N)-5 MH(N)-6 MH(N)-7	Storm 720 Winter 720 Winter 720 Winter 720 Winter 600 Winter	<b>Return</b> <b>Period</b> 30 30 30 30 30	Climate Change +25% +25% +25% +25% +25% +25% +25%	<b>First (X)</b> <b>Surcharge</b> 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/600 Winter	First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/600 Winter	First (Z)	Overfl
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000	US/MH Name MH (N) -1 MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -7 MH (N) -8	Storm 720 Winter 720 Winter 720 Winter 720 Winter 600 Winter 600 Winter	<b>Return</b> <b>Period</b> 30 30 30 30 30 30 30 30	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	<b>First (X)</b> <b>Surcharge</b> 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/600 Winter 5/720 Winter	First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	First (Z)	Overfl
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001	US/MH Name MH (N) -1 MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -7 MH (N) -8 MH (N) -9	Storm 720 Winter 720 Winter 720 Winter 720 Winter 600 Winter 600 Winter 600 Winter 720 Winter	<b>Return</b> <b>Period</b> 30 30 30 30 30 30 30 30 30	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	<b>First (X)</b> <b>Surcharge</b> 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/600 Winter 5/720 Winter	First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	First (Z)	Overfl
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003	US/MH Name MH (N) -1 MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -6 MH (N) -7 MH (N) -8 MH (N) -9 MH (N) -10 MH (N) -11	Storm 720 Winter 720 Winter 720 Winter 720 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter	Return Period 30 30 30 30 30 30 30 30 30 30 30 30 30	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	<b>First (X)</b> <b>Surcharge</b> 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/600 Winter 5/720 Winter 5/600 Winter 5/360 Winter 1/180 Winter	First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	First (Z)	Overfl
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000	US/MH Name MH (N) -1 MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -6 MH (N) -7 MH (N) -8 MH (N) -9 MH (N) -10 MH (N) -11 MH (N) -12	Storm 720 Winter 720 Winter 720 Winter 720 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter	Return Period 30 30 30 30 30 30 30 30 30 30 30 30 30	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	<b>First (X)</b> <b>Surcharge</b> 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/360 Winter 5/360 Winter 5/360 Winter	First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	First (Z)	Overfl
PN N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000 N-5.001	US/MH Name MH (N) -1 MH (N) -2 MH (N) -3 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -6 MH (N) -7 MH (N) -8 MH (N) -9 MH (N) -10 MH (N) -11 MH (N) -12 MH (N) -13	Storm 720 Winter 720 Winter 720 Winter 720 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter	Return           30	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	<b>First (X)</b> <b>Surcharge</b> 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/720 Winter 5/720 Winter 5/720 Winter 5/600 Winter 5/360 Winter 1/180 Winter 5/720 Winter 5/720 Winter	First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	First (Z)	Overfl
PN N-1.000 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000 N-5.001 N-6.000	US/MH Name MH (N) -1 MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -6 MH (N) -7 MH (N) -8 MH (N) -9 MH (N) -10 MH (N) -11 MH (N) -12 MH (N) -13 MH (N) -14	Storm 720 Winter 720 Winter 720 Winter 720 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter	Return Period 30 30 30 30 30 30 30 30 30 30 30 30 30	Climate Change +25% +25% +25% +25% +25% +25% +25% +25%	<b>First (X)</b> <b>Surcharge</b> 5/720 Winter 5/600 Winter 5/720 Winter 5/480 Winter 5/360 Winter 5/720 Winter 5/600 Winter 5/600 Winter 5/360 Winter 1/180 Winter 5/720 Winter 5/600 Winter	First (Y) Flood 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter 30/480 Winter	First (Z)	Overfl

Jacobs Engineering Limited		Page 31
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m <sup>3</sup> )	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
N-1.000	MH(N)-1	5.002	1.202	2.395	0.08			6.0	FLOOD
N-1.001	MH(N)-2	5.000	1.393	0.298	0.07			6.9	FLOOD
N-2.000	MH(N)-3	5.005	1.130	4.980	0.14			11.8	FLOOD
N-2.001	MH(N)-4	5.000	1.608	0.431	0.19			12.2	FLOOD
N-1.002	MH(N)-5	5.000	1.733	0.015	0.18			17.6	FLOOD
N-3.000	MH(N)-6	5.000	1.200	0.387	0.04			5.8	FLOOD
N-3.001	MH(N)-7	5.000	1.474	0.029	0.04			9.5	FLOOD
N-4.000	MH(N)-8	5.004	1.204	4.109	0.11			9.4	FLOOD
N-4.001	MH(N)-9	5.001	1.520	1.105	0.11			12.5	FLOOD
N-4.002	MH(N)-10	5.000	1.736	0.068	0.08			14.8	FLOOD
N-1.003	MH(N)-11	4.999	2.249	0.000	0.15			27.5	FLOOD RISK
N-5.000	MH(N)-12	5.000	1.200	0.012	0.05			6.4	FLOOD
N-5.001	MH(N)-13	4.997	1.479	0.000	0.02			10.4	FLOOD RISK
N-6.000	MH(N)-14	5.002	1.202	1.659	0.06			8.7	FLOOD
N-6.001	MH(N)-15	5.000	1.645	0.263	0.12			20.8	FLOOD

	US/MH	Level
PN	Name	Exceeded
N-1.000	MH(N)-1	3
N-1.001	MH (N) -2	3
N-2.000	MH(N)-3	3
N-2.001	MH(N)-4	3
N-1.002	MH(N)-5	1
N-3.000	MH(N)-6	3
N-3.001	MH(N)-7	2
N-4.000	MH(N)-8	3
N-4.001	MH(N)-9	3
N-4.002	MH(N)-10	3
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	3
N-6.001	MH(N)-15	3

Jacobs Eng	gineering L	imited							Page 32
•			IEF	RRT – No	orther	n Yaro	1		
			Out	fall Co	nditi	ons Re	plicat	ing	
				Surchard			-	-	
• Date 05/08				-	·			lun d to la	Micro
				signed b	-			mitn	Drainage
File Propo	osed Model	- Surcha.	Che	ecked by	7 Tom	Watsor	1		Brainacje
Innovyze			Net	work 20	020.1.	3			
<u>30 year R</u>	<u>eturn Peric</u>	od Summary		<u>itical</u> r Storm		<u>ts by</u>	<u>Maxımu</u>	<u>m Leve</u>	1 (Rank 1)
	US/MH		Return	Climate	Firs	t (X)	First	= (Y)	First (Z)
PN	US/MH Name	Storm		Climate Change		t (X) harge		- (Y) ood	First (Z) Overflow
<b>PN</b> N-6.002	Name	Storm 600 Winter		Change	Surc				• •
	<b>Name</b> MH(N)-16		Period	Change +25%	<b>Surc</b> 2/480	harge			• •
N-6.002	<b>Name</b> MH(N)-16 MH(N)-17	600 Winter	Period 30	<b>Change</b> +25% +25%	<b>Surc</b> 2/480 1/120	<b>harge</b> Winter			• •
N-6.002 N-1.004	<b>Name</b> MH(N)-16 MH(N)-17 MH(N)-18	600 Winter 600 Winter	<b>Period</b> 30 30	<b>Change</b> +25% +25% +25%	<b>Surc</b> 2/480 1/120 5/600	<b>harge</b> Winter Summer Winter		bod	• •
N-6.002 N-1.004 N-7.000	Name MH(N)-16 MH(N)-17 MH(N)-18 MH(N)-19	600 Winter 600 Winter 600 Winter	<b>Period</b> 30 30 30 30	<b>Change</b> +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720	harge Winter Summer Winter Winter	Flo	Winter	• •
N-6.002 N-1.004 N-7.000 N-8.000	Name MH(N)-16 MH(N)-17 MH(N)-18 MH(N)-19 MH(N)-20	600 Winter 600 Winter 600 Winter 720 Winter	<b>Period</b> 30 30 30 30 30	<b>Change</b> +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600	harge Winter Summer Winter Winter Winter	<b>Flo</b> 30/480	Winter Winter	• •
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003	MH (N) -16 MH (N) -17 MH (N) -18 MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22	600 Winter 600 Winter 600 Winter 720 Winter 600 Winter 600 Winter	<b>Period</b> 30 30 30 30 30 30 30 30 30 30 30 30 30	Change +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600 2/720 1/600	harge Winter Summer Winter Winter Winter Winter Winter	<b>Flo</b> 30/480 30/480	Winter Winter	• •
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005	MH (N) -16 MH (N) -17 MH (N) -18 MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23	600 Winter 600 Winter 600 Winter 720 Winter 600 Winter 600 Winter 600 Winter	<b>Period</b> 30 30 30 30 30 30 30 30 30 30 30 30 30	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600 2/720 1/600 1/60	harge Winter Summer Winter Winter Winter Winter Winter Winter	<b>Flo</b> 30/480 30/480	Winter Winter	• •
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000	MH(N)-16 MH(N)-17 MH(N)-18 MH(N)-19 MH(N)-20 MH(N)-21 MH(N)-22 MH(N)-23 MH(N)-24	600 Winter 600 Winter 600 Winter 720 Winter 600 Winter 600 Winter 600 Winter 600 Winter	<b>Period</b> 30 30 30 30 30 30 30 30 30 30 30 30 30	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 2/720 1/600 1/60 5/720	harge Winter Summer Winter Winter Winter Winter Winter Winter Winter	<b>Fl</b> 30/480 30/480 30/600	Winter Winter Winter	• •
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000	MH (N) -16 MH (N) -17 MH (N) -18 MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25	600 Winter 600 Winter 720 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter	<b>Period</b> 30 30 30 30 30 30 30 30 30 30 30 30 30	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 2/720 1/600 1/600 5/720 5/720	harge Winter Summer Winter Winter Winter Winter Winter Winter Winter	<b>Flo</b> 30/480 30/480	Winter Winter Winter	• •
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001	Mame MH (N) -16 MH (N) -17 MH (N) -18 MH (N) -19 MH (N) -20 MH (N) -22 MH (N) -22 MH (N) -23 MH (N) -25 MH (N) -26	600 Winter 600 Winter 720 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 720 Winter	<b>Period</b> 30 30 30 30 30 30 30 30 30 30 30 30 30	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600 2/720 1/600 1/60 5/720 5/720 5/720	harge Winter Summer Winter Winter Winter Winter Winter Winter Winter Winter	<b>Fl</b> 30/480 30/480 30/600	Winter Winter Winter	• •
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002	Mame MH (N) -16 MH (N) -17 MH (N) -18 MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27	600 Winter 600 Winter 720 Winter 600 Winter 600 Winter 600 Winter 600 Winter 600 Winter 720 Winter 720 Winter	<b>Period</b> 30 30 30 30 30 30 30 30 30 30 30 30 30	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600 2/720 1/600 1/60 5/720 5/720 5/720 5/480 2/480	harge Winter Summer Winter Winter Winter Winter Winter Winter Winter Winter	<b>Fl</b> 30/480 30/480 30/600	Winter Winter Winter	• •
N-6.002 N-1.004 N-7.000 N-8.000 N-8.001 N-8.002 N-8.003 N-1.005 N-9.000 N-10.000 N-10.001 N-10.002 N-1.006	Mame MH (N) -16 MH (N) -17 MH (N) -18 MH (N) -19 MH (N) -20 MH (N) -21 MH (N) -22 MH (N) -23 MH (N) -24 MH (N) -25 MH (N) -26 MH (N) -27	600 Winter 600 Winter 600 Winter 720 Winter 600 Winter 600 Winter 600 Winter 600 Winter 720 Winter 720 Winter 600 Winter	<b>Period</b> 30 30 30 30 30 30 30 30 30 30 30 30 30	Change +25% +25% +25% +25% +25% +25% +25% +25%	Surc 2/480 1/120 5/600 5/720 5/600 2/720 1/600 1/60 5/720 5/720 5/480 2/480 2/480 1/15	harge Winter Summer Winter Winter Winter Winter Winter Winter Winter Winter	<b>Fl</b> 30/480 30/480 30/600	Winter Winter Winter	• •

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	
N-6.002	MH(N)-16		4.997	1.871	0.000	0.06			20.5	
N-1.004	MH(N)-17		4.994	2.394	0.000	0.08			37.8	
N-7.000	MH(N)-18		4.996	1.412	0.000	0.04			10.6	
N-8.000	MH(N)-19		5.005	1.205	5.402	0.09			20.8	
N-8.001	MH(N)-20		5.001	1.458	0.786	0.11			31.9	
N-8.002	MH(N)-21		5.000	1.757	0.021	0.12			38.5	
N-8.003	MH(N)-22		4.996	2.003	0.000	0.09			38.2	
N-1.005	MH(N)-23		4.991	2.480	0.000	0.09			57.2	
N-9.000	MH(N)-24		4.997	1.312	0.000	0.06			11.4	
N-10.000	MH(N)-25		5.000	1.200	0.251	0.06			14.2	
N-10.001	MH(N)-26		4.998	1.640	0.000	0.10			20.9	
N-10.002	MH(N)-27		4.991	1.912	0.000	0.05			20.9	
N-1.006	MH(N)-28		4.987	3.062	0.000	0.47			70.3	
N-1.007	MH(N)-EX-37		3.731	2.120	0.000	0.30			70.1	

	US/MH		Level
PN	Name	Status	Exceeded
N-6.002	MH(N)-16	FLOOD RISK	
N-1.004	MH(N)-17	FLOOD RISK	
N-7.000	MH(N)-18	FLOOD RISK	
N-8.000	MH(N)-19	FLOOD	3
N-8.001	MH(N)-20	FLOOD	3
N-8.002	MH(N)-21	FLOOD	1
N-8.003	MH(N)-22	FLOOD RISK	
©	1982-2020	Innovyze	

Jacobs Engineering Limited		Page 33
•	IERRT - Northern Yard	
	Outfall Conditions Replicating	
	a Surcharge of +3.7 mAOD	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Model - Surcha	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

#### 30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

 US/MH
 Level

 PN
 Name
 Status
 Level

 N-1.005
 MH(N)-23
 FLOOD RISK

 N-9.000
 MH(N)-24
 FLOOD RISK

 N-10.000
 MH(N)-25
 FLOOD RISK

 N-10.001
 MH(N)-26
 FLOOD RISK

 N-10.002
 MH(N)-27
 FLOOD RISK

 N-10.003
 MH(N)-28
 FLOOD RISK

 N-1.006
 MH(N)-28
 FLOOD RISK

 N-1.007
 MH(N)-EX-37
 FLOOD RISK

Jacobs Engineering Limited		Page 1
•	Immingham Eastern	
	Ro-Ro Terminal	
	Northern Yard: Proposed	Micco
Date 05/08/2022	Designed by Helen Heather-Smi	.th Micro Drainage
File Proposed Model.MDX	Checked by Tom Watson	Digitidu
Innovyze	Network 2020.1.3	
STORM SEWER DES	IGN by the Modified Rational Metho	od
Des	<u>sign Criteria for Storm</u>	
Pipe Si	zes STANDARD Manhole Sizes ECC	
FSR Rai	nfall Model - England and Wales	
Return Period (ye		PIMP (%) 100
	(mm) 17.000 Add Flow / Climate	
	tio R 0.400 Minimum Backdrop	-
Maximum Rainfall (mm Maximum Time of Concentration (m	n/hr) 50 Maximum Backdrop nins) 30 Min Design Depth for Optimi	
Foul Sewage (1/s		
Volumetric Runoff Co		
De	esigned with Level Soffits	
<u>Simu</u>	lation Criteria for Storm	
Volumetric Runoff Co	eff 0.750 Additional Flow - % of Tota	
Areal Reduction Fac		
Hot Start (mi	ns) 0 Inlet Coeffi	ecient 0.800
	(mm) 0 Flow per Person per Day (1/pe	
Manhole Headloss Coeff (Glob Foul Sewage per hectare (1		
roui sewage per nectare (i	output interval	(111115) 1
	drographs 0 Number of Storage Structures	
	Controls 1 Number of Time/Area Diagrams	
Number of Offline	Controls 0 Number of Real Time Controls	5 U
Syn	thetic Rainfall Details	
Rainfall Model	FSR Profile Type	Summer
Return Period (years)	30 Cv (Summer)	
5	England and Wales Cv (Winter)	
M5-60 (mm)		30
Ratio R	0.400	

Jacobs Engineer:	ing Limit	ed				P	age 2
			Immin	gham Easterr	l		
			Ro-Ro	Terminal			
			North	ern Yard: Pi	coposed	N	Nicro
Date 05/08/2022			Desig	ned by Heler	Heather		
File Proposed Mo	odel.MDX		Check	ed by Tom Wa	atson		)rainage
Innovyze			Netwo	rk 2020.1.3			
<u>1 year Return B</u>	Period Sur	_	<u>for</u>	<u>.cal Results</u> <u>Storm</u> n Criteria	by Maxim	um Level	(Rank 1)
Ho Manhole Headl Foul Sewage Numk Nu	Hot Start t Start Lev oss Coeff ( per hectar per of Inpu- umber of On	Factor (mins) (Global) (Global) (Global) (Global) (Global) (Global) (Clobal	1.000 0 0.500 F 0.000 graphs 0 htrols 1	Additional Fl MADD Fact	or * 10m³/ Inlet Co per Day ( rage Struct e/Area Diag	ha Storage effiecient l/per/day) cures 5 grams 0	2.000 0.800
Mar	M5-60	Model egion Er (mm) pod Risk	ngland ar Warning ysis Tim	Infall Details FSR R Id Wales Cv (S 17.000 Cv (W (mm) 300.0 estep Fine In tatus ON	atio R 0.40 ummer) 0.75 inter) 0.84 DVD Stat	50 40 us OFF	
Return P	Profi ration(s) ( eriod(s) (y imate Chang	vears)		, 60, 120, 180 960, 1440, 21	), 240, 360 60, 2880,		, , 0 0
WARNING: Hal: US/MH PN Name	f Drain Tim Storm	Return	Climate Change	First (X) Surcharge		First (Z) Overflow	
	15 57	1					
	15 Winter 15 Winter		+25% +25%				
	15 Winter		+25%	30/15 Summer			
	15 Winter		+25%	30/15 Summer			
	15 Winter		+25%	30/15 Winter			
	5 15 Winter 7 15 Winter		+25% +25%				
	15 Winter 15 Winter			100/15 Summer			
	15 Winter			100/15 Summer			
N-4.002 MH(N)-10				100/60 Winter			
N-1.003 MH(N)-11			+25%	30/15 Summer			
		1	+25%				
N-5.000 MH(N)-12							
	15 Winter	1	+25%	100/15 Summer			
N-5.000 MH(N)-12 N-5.001 MH(N)-13	15 Winter 15 Winter	1 1	+25%	100/15 Summer 30/15 Summer			

0000 200	gineerin	<u> </u>		Turni					ge 3
				Immingh					
				Ro-Ro I					
						d: Propo		M	icro
te 05/0	8/2022			Designe	ed by I	Helen He	ather-Smit		raina
le Prop	osed Mod	el.MDX		Checked	l by To	om Watso	n		
novyze			I	Network	2020	.1.3			
year Re	<u>eturn Pe</u>	riod S	ummary of	<u>Critica</u> <u>for St</u>		ults by	<u>Maximum L</u>	evel	(Rank
		Wator	Surcharged	Flooded			Half Drain	Pine	
	US/MH	Level	Depth		Flow /	Overflow		Flow	
PN	Name	(m)	(m)	(m <sup>3</sup> )	Cap.	(1/s)	(mins)		Status
N 1 000	MIL(NI) 1	2 605	0 105	0 000	0.26			20.2	OF
	MH(N)-1 MH(N)-2		-0.195 -0.188	0.000 0.000	0.26 0.30			20.3 31.2	OK
	MH (N) - 3		-0.167		0.38			31.2	
		3.266	-0.126		0.63			40.5	
	MH(N)-5	3.130	-0.137	0.000	0.72		4		
		3.533	-0.267	0.000	0.18			24.6	OF
		3.250	-0.276	0.000	0.15			38.0	OF
	MH(N)-8	3.623	-0.177	0.000	0.34			28.0	Oľ
	MH(N)-9		-0.208	0.000	0.40			47.1	OF
		3.030	-0.234		0.30			58.3	Oľ
		2.607	-0.143		0.80		3	150.3	
	MH(N)-12		-0.262	0.000 0.000	0.19 0.09			26.9	
	MH(N)-13 MH(N)-14		-0.356 -0.250		0.09			42.0 36.3	
	MH(N)-14 MH(N)-15	3.125	-0.230	0.000	0.23			77.1	
				US/MH		vel			
			PN	Name		eded			
			N-1.000						
			N-1.00	1 MH(N)·					
				0 MH(N)· 1 MH(N)·					
				2 MH(N)·					
				0 MH(N)·					
				1 MH(N)·					
			N-4.000	0 MH(N)·	-8				
			N-4.001	1 MH(N)·	-9				
			N-4.002	2 MH(N)-	10				
				3 MH(N)-					
				0 MH(N)-					
				1 MH(N)-1 0 MH(N)-1					
				1 MH(N)-					
				(-*/					

	gineering	g Limite	d					Pá	age 4
,				Imming	ham Ea	stern			
,				Ro-Ro	Termin	al			
,				Northe	rn Yar	d: Pro	posed	N	licro
Date 05/0	8/2022			Design	ed by	Helen	Heather-S		
File Prop	osed Mode	el.MDX		Checke	d by T	om Wat	son		rainag
Innovyze				Networ	k 2020	.1.3		I	
<u>l year R</u> é	<u>eturn Per</u>	riod Sum	<u>mary of</u>	<u>Critic</u> <u>for S</u>		ults b	y Maximun	n Level	<u>(Rank 1)</u>
PN	US/MH Name	Storm		Climate Change		t (X) harge	First (Y) Flood	First (2 Overflo	
N-6.002	MU (N) 10	15 11:	~ 1	1050	100/20	Winter			
N-6.002 N-1.004	. ,	15 Winte 60 Winte		+25% +25%	100/30	Summer			
N-1.004 N-7.000		15 Winte		+25%		Samuel			
N-8.000	( )	15 Winte		+25%		Summer			
N-8.001		15 Winte		+25%		Summer			
N-8.002		15 Winte		+25%		Winter			
N-8.003 N-1.005		15 Winte 60 Winte		+25% +25%		Winter Summer			
N-9.000		15 Winte		+25%		builder			
1-10.000	MH(N)-25	15 Winte	r 1	+25%	100/15	Summer			
-10.001		15 Winte		+25%		Summer			
I-10.002		15 Winte			100/30				
N-1.006 N-1.007 MH		60 Winte		+25% +25%		Summer			
PN	US/M Name	H Lev		-		Flow / ( Cap.	Overflow	alf Drain Time	Pipe Flow (l/s)
EN		= \	, (1						(1/3)
	Tream				(	cap.	(1/s)	(mins)	
N-6.0	02 MH (N	)-16 2.8		0.311	0.000	0.21	(1/5)		76.8
N-1.0	02 MH (N 04 MH (N	)-17 2.3	88 -	0.311 0.212	0.000	0.21	(1/5)		76.8 97.1
N-1.0 N-7.0	02 MH (N 04 MH (N 00 MH (N	)-17 2.3 )-18 3.3	88 - 19 -	0.311 0.212 0.265	0.000 0.000 0.000	0.21 0.20 0.18	(1/5)		76.8 97.1 44.6
N-1.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N	)-17 2.3	88 - 19 - 65 -	0.311 0.212	0.000 0.000 0.000	0.21	(1/5)		76.8 97.1
N-1.0 N-7.0 N-8.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N	a) -17       2.3         a) -18       3.3         a) -19       3.5	888 – 19 – 65 – 68 – 71 –	0.311 0.212 0.265 0.235 0.275 0.272	0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47	(1/3)		76.8 97.1 44.6 101.0 127.3 152.1
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-8.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N	$\begin{array}{c} 2 \\ 3 \\ -17 \\ -18 \\ -19 \\ -19 \\ -19 \\ -20 \\ -20 \\ -21 \\ 2.9 \\ -22 \\ 2.6 \end{array}$	888 - 19 - 65 - 68 - 71 - 888 -	0.311 0.212 0.265 0.235 0.275 0.272 0.305	0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37	(1/3)	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-8.0 N-8.0 N-1.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 05 MH (N	$\begin{array}{c} 1 & -17 & 2 & .3 \\ 2 & -17 & 3 & .3 \\ 2 & -19 & 3 & .5 \\ 2 & -20 & 3 & .2 \\ 2 & -21 & 2 & .9 \\ 2 & -22 & 2 & .6 \\ 2 & -23 & 2 & .3 \end{array}$	888 - 19 - 65 - 68 - 71 - 88 - 88 -	0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18	(1/3)	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-8.0 N-8.0 N-1.0 N-9.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 05 MH (N 00 MH (N	$\begin{array}{c} 1 & -17 & 2 & .3 \\ 1 & -18 & 3 & .3 \\ 2 & -19 & 3 & .5 \\ 2 & -20 & 3 & .2 \\ 2 & -21 & 2 & .9 \\ 2 & -22 & 2 & .6 \\ 2 & -23 & 2 & .3 \\ 1 & -24 & 3 & .4 \end{array}$	888     -       19     -       65     -       665     -       768     -       888     -       885     -       85     -	0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126 0.200	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18 0.24	(1/3)	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9 48.6
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-8.0 N-8.0 N-1.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 05 MH (N 00 MH (N	$\begin{array}{c} 1 & -17 & 2 & .3 \\ 2 & -17 & 3 & .3 \\ 2 & -19 & 3 & .5 \\ 2 & -20 & 3 & .2 \\ 2 & -21 & 2 & .9 \\ 2 & -22 & 2 & .6 \\ 2 & -23 & 2 & .3 \end{array}$	88     -       19     -       65     -       68     -       771     -       88     -       885     -       85     -       05     -	0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18	(1/3)	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-8.0 N-1.0 N-1.0 N-9.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 05 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N	$\begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 $	88     -       119     -       65     -       68     -       771     -       88     -       85     -       05     -       21     -       69     -	0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126 0.200 0.295 0.237 0.237	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18 0.24 0.25	(1/3)	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9 48.6 58.8 93.5 93.9
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-1.0 N-9.0 N-10.0 N-10.0 N-10.0 N-1.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 02 MH (N 02 MH (N	$\begin{array}{c} \begin{array}{c} -17 \\ 2 \\ -18 \\ 3 \\ -19 \\ 3 \\ -19 \\ 3 \\ -20 \\ 3 \\ -21 \\ 2 \\ -21 \\ 2 \\ -22 \\ 2 \\ -22 \\ -23 \\ -24 \\ 3 \\ -25 \\ 3 \\ -25 \\ 3 \\ -26 \\ 3 \\ -27 \\ 2 \\ -7 \\ -28 \\ 2 \\ -28 \\ 2 \\ -28 \\ -23 \\ -23 \\ -$	88     -       119     -       65     -       668     -       771     -       88     -       885     -       005     -       21     -       69     -       80	0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126 0.200 0.295 0.237 0.237 0.310 0.455	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18 0.24 0.25 0.45 0.21 0.38	(1/3)	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9 48.6 58.8 93.5 93.9 57.1
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-1.0 N-9.0 N-10.0 N-10.0 N-10.0 N-1.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 05 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N	$\begin{array}{c} \begin{array}{c} -17 \\ 2 \\ -18 \\ 3 \\ -19 \\ 3 \\ -19 \\ 3 \\ -20 \\ 3 \\ -21 \\ 2 \\ -21 \\ 2 \\ -22 \\ 2 \\ -22 \\ -23 \\ -24 \\ 3 \\ -25 \\ 3 \\ -25 \\ 3 \\ -26 \\ 3 \\ -27 \\ 2 \\ -7 \\ -28 \\ 2 \\ -28 \\ 2 \\ -28 \\ -23 \\ -23 \\ -$	88     -       119     -       65     -       668     -       771     -       88     -       885     -       005     -       21     -       69     -       80	0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126 0.200 0.295 0.237 0.237	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18 0.24 0.25 0.45 0.21	(1/3)	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9 48.6 58.8 93.5 93.9
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-1.0 N-9.0 N-10.0 N-10.0 N-10.0 N-1.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 02 MH (N 02 MH (N	$\begin{array}{c} \begin{array}{c} -17 \\ 2 \\ -18 \\ 3 \\ -19 \\ 3 \\ -19 \\ 3 \\ -20 \\ 3 \\ -21 \\ 2 \\ -21 \\ 2 \\ -22 \\ 2 \\ -22 \\ -23 \\ -24 \\ 3 \\ -25 \\ 3 \\ -25 \\ 3 \\ -26 \\ 3 \\ -27 \\ 2 \\ -7 \\ -28 \\ 2 \\ -28 \\ 2 \\ -28 \\ -23 \\ -23 \\ -$	88 - 19 - 65 - 68 - 71 - 88 - 85 - 85 - 21 - 69 - 80 62 - US	0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126 0.200 0.295 0.237 0.237 0.310 0.455	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18 0.24 0.25 0.45 0.21 0.38 0.25	evel eeded	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9 48.6 58.8 93.5 93.9 57.1
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-1.0 N-9.0 N-10.0 N-10.0 N-10.0 N-1.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 02 MH (N 02 MH (N	P-17       2.3         P-18       3.3         P-19       3.5         P-20       3.2         P-21       2.9         P-22       2.6         P-23       2.3         P-24       3.4         P-25       3.5         P-26       3.1         P-27       2.7         P-28       2.3         X-37       1.2	88 - 19 - 65 - 68 - 771 - 88 - 85 - 85 - 85 - 21 - 69 - 80 - 80 - 62 - <b>US</b>	0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126 0.200 0.295 0.237 0.310 0.455 0.349	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18 0.24 0.25 0.45 0.21 0.38 0.25	evel	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9 48.6 58.8 93.5 93.9 57.1
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-1.0 N-9.0 N-10.0 N-10.0 N-10.0 N-1.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 02 MH (N 02 MH (N	P) -17       2.3         P) -18       3.3         P) -19       3.5         P) -20       3.2         P) -21       2.9         P) -22       2.6         P) -23       2.3         P) -24       3.4         P) -25       3.5         P) -26       3.1         P) -27       2.7         P) -28       2.3         X-37       1.2		0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126 0.200 0.295 0.237 0.310 0.455 0.349 S/MH ame H(N) -16	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18 0.24 0.25 0.45 0.21 0.38 0.25	evel	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9 48.6 58.8 93.5 93.9 57.1
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-1.0 N-9.0 N-10.0 N-10.0 N-10.0 N-1.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 02 MH (N 02 MH (N	PN-6. N-10.		0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126 0.200 0.295 0.237 0.310 0.455 0.349 S/MH ame H(N) -16 H(N) -17	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18 0.24 0.25 0.45 0.21 0.38 0.25 <b>Let</b> <b>s Exc</b> OK OK	evel	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9 48.6 58.8 93.5 93.9 57.1
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-1.0 N-9.0 N-10.0 N-10.0 N-10.0 N-1.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 02 MH (N 02 MH (N	P) -17       2.3         P) -18       3.3         P) -19       3.5         P) -20       3.2         P) -21       2.9         P) -22       2.6         P) -23       2.3         P) -24       3.4         P) -25       3.5         P) -26       3.1         P) -27       2.7         P) -28       2.3         X-37       1.2		0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126 0.200 0.295 0.237 0.310 0.455 0.349 S/MH ame H(N) -16	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18 0.24 0.25 0.45 0.21 0.38 0.25	evel	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9 48.6 58.8 93.5 93.9 57.1
N-1.0 N-7.0 N-8.0 N-8.0 N-8.0 N-1.0 N-9.0 N-10.0 N-10.0 N-10.0 N-1.0	02 MH (N 04 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 03 MH (N 00 MH (N 00 MH (N 01 MH (N 02 MH (N 02 MH (N 02 MH (N	PN-6. N-7.		0.311 0.212 0.265 0.235 0.275 0.272 0.305 0.126 0.200 0.295 0.237 0.310 0.455 0.349 S/MH fame H(N) -16 H(N) -17 H(N) -18	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	0.21 0.20 0.18 0.45 0.44 0.47 0.37 0.18 0.24 0.25 0.45 0.21 0.38 0.25 <b>Le</b> <b>s Exc</b> OK OK	evel	44	76.8 97.1 44.6 101.0 127.3 152.1 152.9 115.9 48.6 58.8 93.5 93.9 57.1

Jacobs Engineering Limited		Page 5
•	Immingham Eastern	
	Ro-Ro Terminal	
	Northern Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Proposed Model.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	•

### 1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)

<u>for Storm</u>

PN	US/MH Name	Status	Level Exceeded
N-1.005	MH(N)-23	OK	
N-9.000	MH(N)-24	OK	
N-10.000	MH(N)-25	OK	
N-10.001	MH(N)-26	OK	
N-10.002	MH(N)-27	OK	
N-1.006	MH(N)-28	SURCHARGED	
N-1.007	MH(N)-EX-37	OK	

uacous E	Ingineer	ing Limite	ed				Pa	age 6
•				Immin	gham Eastern			
				Ro-Ro	Terminal			
				North	ern Yard: Pr	oposed		licco
Date 05/	08/2022				ned by Helen	=		licro
		dol MDY			ed by Tom Wa			Irainage
	-	odel.MDX			-	LSOII		J
Innovyze	2			Netwo	rk 2020.1.3			
<u>30 year</u>	Return	Period Sur	nmary c	of Crit:	cal Results	by Maxim	um Level	(Rank 1)
				for S	<u>Storm</u>			
			S	imulation	<u>Criteria</u>			
	Area				Additional Fl			
	HO	Hot Start t Start Lev			MADD Fact	or * 10m³/ł Inlet Coe	effiecient	
	ole Headl		Global)	0.500 F	low per Person			
	Numb	er of Input	Hydrog	raphs 0	Number of Stor	age Struct	ures 5	
	Nu	mber of Onl	ine Con	trols 1	Number of Time Number of Real	e/Area Diag	rams O	
			Sunth	etic Pai	nfall Details			
		Rainfall M	-	CUIC Ral		atio R 0.40	0	
		Re	egion En	gland an	d Wales Cv (Su			
		M5-60	(mm)		17.000 Cv (Wi	nter) 0.84	0	
	Mar	gin for Flo	od Risk	Warning	(mm) 300.0	DVD Statu	ıs OFF	
			Analy		step Fine In	ertia Statı	is OFF	
				DIS SU	atus ON			
		Profi	le(s)			Summer	and Winter	c
	Du	ration(s) (	mins)	-	, 60, 120, 180 960, 1440, 21			
				,20,	500, 1110, 21		8640, 10080	
		eriod(s) (y					1, 30, 100	
	Cl	imate Chang	e (%)				25, 25, 25	5
MAD	NINC. Half	- Drain Time	has no	t boon a	alculated as t	bo structu	ro is too	£111
WAIN	ing. nari		- 1143 110	t been t	arcurated as t	ine structu	16 13 000	LULL.
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.
N-1.000	MH(N)-1	15 Winter	30	+25%				
			30 30	+25% +25%				
N-1.000 N-1.001 N-2.000	MH(N)-2 MH(N)-3	15 Winter 15 Winter	30 30	+25% +25%	30/15 Summer			
N-1.000 N-1.001 N-2.000 N-2.001	MH (N) -2 MH (N) -3 MH (N) -4	15 Winter 15 Winter 15 Winter	30 30 30	+25% +25% +25%	30/15 Summer			
N-1.000 N-1.001 N-2.000 N-2.001 N-1.002	MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5	15 Winter 15 Winter 15 Winter 15 Winter	30 30 30 30	+25% +25% +25% +25%				
N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000	MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6	15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	30 30 30 30 30	+25% +25% +25% +25% +25%	30/15 Summer			
N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001	MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6	15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	30 30 30 30	+25% +25% +25% +25% +25% +25%	30/15 Summer			
N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001	MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -7 MH (N) -8	15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	30 30 30 30 30 30	+25% +25% +25% +25% +25% +25% +25%	30/15 Summer 30/15 Winter			
N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002	MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -7 MH (N) -8 MH (N) -9 MH (N) -10	15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	30 30 30 30 30 30 30 30 30	+25% +25% +25% +25% +25% +25% +25% +25%	30/15 Summer 30/15 Winter 100/15 Summer 100/15 Summer 100/60 Winter			
N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003	MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -7 MH (N) -8 MH (N) -10 MH (N) -11	15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	30 30 30 30 30 30 30 30 30 30	+25% +25% +25% +25% +25% +25% +25% +25%	30/15 Summer 30/15 Winter 100/15 Summer 100/15 Summer			
N-1.000 N-1.001 N-2.000 N-2.001 N-1.002 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000	MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -7 MH (N) -8 MH (N) -10 MH (N) -11 MH (N) -12	15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 120 Winter 15 Winter	30 30 30 30 30 30 30 30 30 30 30	+25% +25% +25% +25% +25% +25% +25% +25%	30/15 Summer 30/15 Winter 100/15 Summer 100/15 Summer 100/60 Winter			
N-1.000 N-1.001 N-2.000 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000	MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -7 MH (N) -8 MH (N) -10 MH (N) -11 MH (N) -12 MH (N) -13	15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 120 Winter 15 Winter 15 Winter	30 30 30 30 30 30 30 30 30 30 30 30	+25% +25% +25% +25% +25% +25% +25% +25%	30/15 Summer 30/15 Winter 100/15 Summer 100/60 Winter 30/15 Summer			
N-1.000 N-1.001 N-2.000 N-2.001 N-3.000 N-3.001 N-4.000 N-4.001 N-4.002 N-1.003 N-5.000 N-5.001 N-6.000	MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -7 MH (N) -8 MH (N) -10 MH (N) -11 MH (N) -12 MH (N) -13	15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 120 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	30 30 30 30 30 30 30 30 30 30 30 30 30	+25% +25% +25% +25% +25% +25% +25% +25%	30/15 Summer 30/15 Winter 100/15 Summer 100/15 Summer 100/60 Winter			
N-1.000 N-1.001 N-2.000 N-2.001 N-3.000 N-3.001 N-4.000 N-4.002 N-1.003 N-5.000 N-5.001 N-6.000	MH (N) -2 MH (N) -3 MH (N) -4 MH (N) -5 MH (N) -6 MH (N) -7 MH (N) -8 MH (N) -10 MH (N) -11 MH (N) -12 MH (N) -13 MH (N) -14	15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter 120 Winter 15 Winter 15 Winter 15 Winter 15 Winter 15 Winter	30 30 30 30 30 30 30 30 30 30 30 30 30	+25% +25% +25% +25% +25% +25% +25% +25%	30/15 Summer 30/15 Winter 100/15 Summer 100/60 Winter 30/15 Summer 100/15 Summer			

Jacobs H	Engineer	ing Li	mited					1	Page 7
•				Immin	gham E	lastern		[	
•				Ro-Ro	Termi	nal			
•				North	ern Ya	rd: Prop	osed		Micro
Date 05/	/08/2022			Desig	ned by	Helen H	eather-Sm	++h	
File Pro	posed M	odel.M	DX	Check	ed by	Tom Wats	on		Drainage
Innovyze	9			Netwo	rk 202	0.1.3			
					Storm		<u> </u>		<u>l (Rank 1)</u>
		Water	Surcharged	Floodod					
1		water	Surcharged	ricoded			Half Drain	Pipe	
	US/MH	Level	-		Flow /	Overflow	Half Drain Time	Pipe Flow	
PN	US/MH Name		-		Flow / Cap.	Overflow	Time	-	Status
<b>PN</b> N-1.000	Name	Level (m)	Depth (m)	Volume (m³)		Overflow	Time	Flow	
N-1.000	Name	Level (m) 3.677	Depth (m) -0.123	Volume (m³)	Cap.	Overflow	Time	Flow (1/s)	

2	.000	MH(N)-3	3.930	0.055	0.000	0.89	73.3	SURCHARGED
2	.001	MH(N)-4	3.525	0.133	0.000	1.45	94.0	SURCHARGED
1	.002	MH(N)-5	3.271	0.004	0.000	1.13	6 108.9	SURCHARGED
3	.000	MH(N)-6	3.600	-0.200	0.000	0.43	59.6	OK
3	.001	MH(N)-7	3.319	-0.207	0.000	0.40	99.2	OK
4	.000	MH(N)-8	3.716	-0.084	0.000	0.84	68.4	OK
4	.001	MH(N)-9	3.481	0.000	0.000	1.00	119.4	OK
4	.002	MH(N)-10	3.137	-0.127	0.000	0.77	148.4	OK
1	.003	MH(N)-11	3.041	0.291	0.000	0.66	64 123.1	SURCHARGED
5	.000	MH(N)-12	3.609	-0.191	0.000	0.47	65.5	OK
5	.001	MH(N)-13	3.222	-0.296	0.000	0.25	110.8	OK
6	.000	MH(N)-14	3.633	-0.167	0.000	0.57	88.9	OK
6	.001	MH(N)-15	3.464	0.109	0.000	1.19	199.8	SURCHARGED

PN	US/MH Name	Level Exceeded
N-1.000	MH(N)-1	
N-1.001	MH(N)-2	
N-2.000	MH(N)-3	
N-2.001	MH(N)-4	
N-1.002	MH(N)-5	
N-3.000	MH(N)-6	
N-3.001	MH(N)-7	
N-4.000	MH(N)-8	
N-4.001	MH(N)-9	
N-4.002	MH(N)-10	
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	
N-6.001	MH(N)-15	

Jacobs En	ngineerin	g Limite	d						Page 8	3
•				Immin	ngham	Easte	rn			
				Ro-Ro	o Teri	minal				
_				North	hern	Yard:	Propos	ed	Mine	( ) ···
• Date 05/0	10/2022				Northern Yard: Proposed Micro Designed by Helen Heather-Smith					
		1				-			<sup>th</sup> Drair	nade
	posed Mod	el.MDX					Watson			
Innovyze				Netwo	ork 2	020.1.	3			
<u>30 year</u>	<u>Return Pe</u>	eriod Sur	nmary d		<u>storr</u>		ts by	<u>Maximum 3</u>	Level (Ra	<u>nk 1)</u>
	US/M	н		Return	Climat	e Fi	rst (X)	First (	Y) First (	Z)
PN	Nam			Period			rcharge			
					2		2			
N-6.C		1)-16 120		30			30 Wint			
N-1.0		I)-17 120		30	+25	,	15 Summ	er		
N-7.0		I) - 18 15		30	+25		15 0			
N-8.0		()-19 15 ()-20 15		30 30	+25 +25		15 Summ 15 Summ			
N-8.0 N-8.0		() -20 15 () -21 15		30	+25		15 Summ 15 Wint			
N-8.0		() -22 120		30	+25		60 Wint			
N-1.0		I) -23 120		30	+25		15 Summ			
N-9.C		1)-24 15		30	+25					
N-10.0	000 MH (N	1)-25 15	Winter	30	+25	8 100/	15 Summ	er		
N-10.C	001 MH(N	I)-26 15	Winter	30	+25	8 30/	15 Summ	er		
N-10.0	002 MH (N	1)-27 120	Winter	30	+25	i% 100/	30 Wint	er		
N-1.C		1)-28 120		30			15 Summ	er		
N-1.C	007 MH(N)-E	X-37 120	Winter	30	+25	20				
			Water	Surcha	rged H	looded			Half Drain	Pipe
	US/MH	Overflow	Level	Dept	ch (	Volume	Flow /	Overflow	Time	Flow
PN	Name	Act.	(m)	(m)	)	(m³)	Cap.	(l/s)	(mins)	(l/s)
N-6.002	MH(N)-16		3.033	-0	.093	0.000	0.19			70.2
N-1.004	MH (N) -17		3.026		.426	0.000			124	
N-7.000	MH (N) -18		3.388		.196	0.000			121	108.9
N-8.000	MH(N)-19		3.879				1.06			236.9
N-8.001	MH (N) -20		3.597		.054	0.000				300.8
N-8.002	MH(N)-21		3.264		.021	0.000				348.8
N-8.003	MH(N)-22		3.028		.035	0.000	0.31			131.1
N-1.005	MH(N)-23		3.018		.507	0.000			140	100.4
N-9.000	MH(N)-24		3.552		.133	0.000				118.9
N-10.000	MH(N)-25		3.611		.189	0.000				143.8
N-10.001	MH (N) -26		3.411		.053	0.000				230.0
N-10.002	MH(N)-27		3.019		.060	0.000				81.1
N-1.006	MH(N)-28 1H(N)-EX-37		3.009 1.364		.084 .247	0.000				127.2
TN T.00/ N	(11) / 11		1.304	-0	. 27 /	0.000	0.00			161.2
				US/MH	<b>C</b> 1	atus	Leve] Exceed			
			r					ea		
		PN	ſ	Name	51	acus	Exceed			
		<b>PN</b> N-6.		<b>Name</b> MH(N)-1		OK				
			002		6	OK				
		N-6. N-1. N-7.	002 004 000	MH(N)-1 MH(N)-1 MH(N)-1	6 7 SURC 8	OK HARGED OK				
		N-6. N-1. N-7. <mark>N-8</mark> .	002 004 000 000	MH(N)-1 MH(N)-1 MH(N)-1 MH(N)-1	6 7 SURC 8 9 SURC	OK HARGED OK <mark>HARGED</mark>				
		N-6. N-1. N-7. N-8. N-8.	002 004 000 000 001	MH (N) -1 MH (N) -1 MH (N) -1 MH (N) -1 MH (N) -2	6 7 SURC 8 9 SURC 0 SURC	OK HARGED OK HARGED				
		N-6. N-1. N-7. <mark>N-8</mark> .	002 004 000 000 001 002	MH(N)-1 MH(N)-1 MH(N)-1 MH(N)-1	6 7 SURC 8 9 SURC 0 SURC 1 SURC	OK CHARGED OK CHARGED CHARGED				

Jacobs Engineering Limited		Page 9
•	Immingham Eastern	
	Ro-Ro Terminal	
	Northern Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Proposed Model.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

## 30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)

<u>for Storm</u>

PN	US/MH Name	Status	Level Exceeded
N-1.005	MH(N)-23	SURCHARGED	
N-9.000	MH(N)-24	OK	
N-10.000	MH(N)-25	OK	
N-10.001	MH(N)-26	SURCHARGED	
N-10.002	MH(N)-27	OK	
N-1.006	MH(N)-28	SURCHARGED	
N-1.007	MH(N)-EX-37	OK	

Jacobs Engineering Li	nited			Page 10
•		ngham Eastern		
	Ro-Ro	) Terminal		
	North	nern Yard: Pr	oposed	Micco
Date 05/08/2022			Heather-Smith	
File Proposed Model.M		ed by Tom Wa		Drainage
Innovyze		ork 2020.1.3		
<u>100 year Return Peri</u>		<u>itical Resul</u> r Storm	ts by Maximum	Level (Rank
Hot S Hot Start Manhole Headloss Coe Foul Sewage per he Number of	tion Factor 1.000 tart (mins) 0 Level (mm) 0 ff (Global) 0.500 1	MADD Facto Clow per Person Number of Stor	or * 10m <sup>3</sup> /ha Stor Inlet Coeffieci per Day (l/per/d age Structures 5	cage 2.000 ent 0.800 day) 0.000
	Offline Controls 0		-	
		infall Details		
	ll Model Region England a -60 (mm)			
Margin for	-		DVD Status OFF ertia Status OFF	
			Summer and Wi , 240, 360, 480, 50, 2880, 4320, 5 7200, 8640, 1	600, 5760,
Return Period(s Climate C			1, 30, 25, 25	
WARNING: Half Drain	Time has not been	calculated as t	he structure is '	too full.
US/MH PN Name Sto	Return Climate m Period Change	• •	First (Y) First Flood Overf	
N-1.000 MH(N)-1 15 Wi	nter 100 +25 <sup>9</sup>	ŝ		
N-1.001 MH(N)-2 15 Wi				
N-2.000 MH(N)-3 15 Wi N-2.001 MH(N)-4 15 Wi				
N-2.001 MH(N)-4 15 W1 N-1.002 MH(N)-5 120 Wi				
N-3.000 MH(N)-6 15 Wi				
N-3.001 MH(N)-7 120 Wi				
N-4.000 MH(N)-8 15 Wi		100/15 Summer		
N-4.001 MH(N)-9 15 Wi N-4.002 MH(N)-10 120 Wi		100/15 Summer 100/60 Winter		
N-1.003 MH(N)-11 120 Wi				
N-5.000 MH(N)-12 15 Wi				
N-5.001 MH(N)-13 120 Wi				
N-6.000 MH(N)-14 15 Wi N-6.001 MH(N)-15 15 Wi		100/15 Summer 30/15 Summer		
	©1982-202			

Jacobs Engineering Limited		Page 11
•	Immingham Eastern	
	Ro-Ro Terminal	
	Northern Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith Checked by Tom Watson	
File Proposed Model.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank <u>1) for Storm</u>

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (1/s)	Status
N-1.000	MH(N)-1	3.712	-0.088	0.000	0.82			64.0	OK
N-1.001	MH(N)-2	3.574	-0.033	0.000	0.97			101.2	OK
N-2.000	MH(N)-3	4.301	0.426	0.000	1.10			91.1	SURCHARGED
N-2.001	MH(N)-4	3.674	0.282	0.000	1.75			113.3	SURCHARGED
N-1.002	MH(N)-5	3.355	0.088	0.000	0.83		36	80.1	SURCHARGED
N-3.000	MH(N)-6	3.629	-0.171	0.000	0.56			76.9	OK
N-3.001	MH(N)-7	3.358	-0.168	0.000	0.17			41.5	OK
N-4.000	MH(N)-8	3.967	0.167	0.000	1.02			83.8	SURCHARGED
N-4.001	MH(N)-9	3.614	0.133	0.000	1.27			150.8	SURCHARGED
N-4.002	MH(N)-10	3.362	0.098	0.000	0.35			68.8	SURCHARGED
N-1.003	MH(N)-11	3.350	0.600	0.000	0.72		84	135.8	SURCHARGED
N-5.000	MH(N)-12	3.640	-0.160	0.000	0.61			84.5	OK
N-5.001	MH(N)-13	3.377	-0.141	0.000	0.10			45.9	OK
N-6.000	MH(N)-14	3.911	0.111	0.000	0.71			110.3	SURCHARGED
N-6.001	MH(N)-15	3.691	0.336	0.000	1.50			252.1	SURCHARGED

PN	US/MH Name	Level Exceeded
N-1.000	MH(N)-1	
N-1.001	MH(N)-2	
N-2.000	MH(N)-3	
N-2.001	MH(N)-4	
N-1.002	MH(N)-5	
N-3.000	MH(N)-6	
N-3.001	MH(N)-7	
N-4.000	MH(N)-8	
N-4.001	MH(N)-9	
N-4.002	MH(N)-10	
N-1.003	MH(N)-11	
N-5.000	MH(N)-12	
N-5.001	MH(N)-13	
N-6.000	MH(N)-14	
N-6.001	MH(N)-15	

Jacobs En	gineerin	g Limite	d						Page 1	12
•				Immi	ngham	Easter	n			
				Ro-R	o Term	inal				
				Nort	hern Y	ard: F	ropos	ed	Mico	
Date 05/0	8/2022							ther-Smit		
File Prop		el.MDX			y ked by	-			" Drair	lage
Innovyze		011111			ork 20					
-	r Return	Period S	Summary					/ Maximum	Level (	<u>Rank</u>
				<u>1) fo</u>	<u>r Stor</u>	<u>m</u>				
	US/M				Climate		st (X)	-	) First (	
PN	Name	e S1	torm	Period	Change	Sur	charge	Flood	Overflo	W
N-6.00		1)-16 120		100			0 Winte			
N-1.00		I)-17 120		100	+25%		5 Summe	er		
N-7.00 N-8.00		I)-18 15 I)-19 15	Winter	100 100	+25% +25%		5 Summe	ar a		
N-8.00 N-8.00		1) - 19 15 1) - 20 15		100	+25% +25%		5 Summe 5 Summe			
N-8.00		I)-21 15		100	+25%		5 Winte			
N-8.00		I)-22 120		100	+25%		0 Winte			
N-1.00		I)-23 120		100	+25%		5 Summe	er		
N-9.00 N-10.00		I)-24 15 I)-25 15		100 100	+25% +25%		5 Summe	r		
N-10.00		I)-26 15		100	+25%		5 Summe			
N-10.00	02 MH (N	I)-27 120	Winter	100	+25%	100/3	0 Winte	er		
N-1.00		1)-28 120		100	+25%		5 Summe	er		
N-1.00	07 MH(N)-E	M-37 120	WILLEI	100	+25%					
	US/MH	Overflow			rged Fl		Flow /	H Overflow	alf Drain Time	Pipe Flow
PN	Name	Act.	(m)	(m		(m³)	Cap.	(1/s)	(mins)	(1/s)
N-6.002	MH(N)-16		3.414	C	.288	0.000	0.24			86.7
N-1.004	MH(N)-17		3.403		.803	0.000	0.20		144	
N-7.000	MH(N)-18		3.418		0.166	0.000	0.58			140.5
N-8.000 N-8.001	MH(N)-19 MH(N)-20		4.434 4.014		.634 .471	0.000	1.28 1.30			285.4
N-8.002	MH (N) -21		3.474		.231	0.000	1.38			450.2
N-8.003	MH(N)-22		3.408	C		0.000	0.39			163.8
N-1.005	MH(N)-23		3.401		.890	0.000	0.21			135.0
N-9.000 N-10.000	MH (N) -24 MH (N) -25		3.583 3.880		).102 ).080	0.000	0.76 0.74			153.4
N-10.000	MH (N) -25 MH (N) -26		3.628			0.000	1.39			290.
N-10.002	MH (N) -27		3.408			0.000	0.23			100.5
N-1.006	MH(N)-28		3.393		.468	0.000	1.04			155.7
N-1.007 MH	H(N)-EX-37		1.407	-0	.204	0.000	0.67			154.9
				US/MH			Level			
		PN		Name	Sta	tus 1	Exceede	d		
		N-6.	002	MH(N)-1	.6 SURCH	ARGED				
		N-1.			7 SURCH					
		N-7.		MH(N)-1		OK				
		N-8.	000	MH(N)-1	.9 SURCH	ARGED				
			0.01	MH(M) = 2	O GIIDOU	ARCED				
		N-8.			20 SURCE 21 SURCE					
			002	MH(N)-2	0 SURCH 1 SURCH 2 SURCH	ARGED				

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•	Immingham Eastern	
	Ro-Ro Terminal	
	Northern Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Proposed Model.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	1

#### 100 year Return Period Summary of Critical Results by Maximum Level (Rank <u>1) for Storm</u>

	US/MH		Level
PN	Name	Status	Exceeded
N-1.005	MH(N)-23	SURCHARGED	
N-9.000	MH(N)-24	OK	
N-10.000	MH(N)-25	SURCHARGED	
N-10.001	MH(N)-26	SURCHARGED	
N-10.002	MH(N)-27	SURCHARGED	
N-1.006	MH(N)-28	SURCHARGED	
N-1.007	MH(N)-EX-37	OK	

Jacobs Engineering Limited		Page 1
	Immingham Eastern	
	Ro-Ro Terminal	
	Southern Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed SouthEast - Surcharged +1.9m v2	. Checked by Tom Watson	Drainage
Innovyze	Network 2020.1.3	
STORM SEWER DES	SIGN by the Modified Rational Method	
	Criteria for Proposed Storm	
	Sizes STANDARD Manhole Sizes ECC	
	infall Model - England and Wales	
Return Period (years) 30	Foul Sewage (1/s/ha) 0.000 Maximum Backdrop Heigh	nt (m) 1.500
M5-60 (mm) 17.000	Volumetric Runoff Coeff. 0.750 Min Design Depth for Optimisatio	
Ratio R 0.400 Maximum Rainfall (mm/hr) 50 Add 1	PIMP (%) 100 Min Vel for Auto Design only Flow / Climate Change (%) 0 Min Slope for Optimisation	
	nimum Backdrop Height (m) 0.200	(1·A) DUU
	Designed with Level Soffits	
Network D	esign Table for Proposed Storm	
« –	Indicates pipe capacity < flow	
PN Length Fall Slope I.A (m) (m) (1:X) (h	rea T.E. Base k HYD DIA Section Type Auto a) (mins) Flow (1/s) (mm) SECT (mm) Design	
SE-1.000 34.890 0.092 379.2 0.	· · · · · · · · · · · · · · · · · · ·	
SE-1.001 33.567 0.098 342.5 0. SE-1.002 64.269 0.148 434.3 0.	221 0.00 0.0 0.600 o 375 Pipe/Conduit 🔒 000 0.00 0.0 0.600 o 600 Pipe/Conduit 🔒	
3E-1.002 04.209 0.146 434.5 0.		
SE-2.000 60.376 0.283 213.3 0.		
SE-2.001 60.143 0.220 273.4 0.	243 0.00 0.0 0.600 o 375 Pipe/Conduit 🔒	
SE-1.003 40.913 0.082 498.9 0.	000 0.00 0.0 0.600 o 600 Pipe/Conduit 🔒	
	176 5.00 0.0 0.600 o 300 Pipe/Conduit 🔮 189 0.00 0.0 0.600 o 450 Pipe/Conduit 🔮	
SE-3.001 55.477 0.111 499.8 0. SE-3.002 55.477 0.111 499.8 0.		
SE-1.004 25.000 0.050 500.0 0.	000 0.00 0.0 0.600 o 750 Pipe/Conduit 🧯	
SE-4.000 35.820 0.119 301.0 0.	177 5.00 0.0 0.600 o <u>300</u> Pipe/Conduit 🔒	
	185 0.00 0.0 0.600 o 450 Pipe/Conduit 🍎	
	192 0.00 0.0 0.600 o 525 Pipe/Conduit 🔒	
SE-4.003 21.384 0.073 294.9 0.		
SE-5.000 15.829 0.063 250.0 0.	199 5.00 0.0 0.600 o 300 Pipe/Conduit 🔒	
	000 0.00 0.0 0.600 o 300 Pipe/Conduit	
	_	
SE-4.004 14.815 0.073 204.4 0.	000 0.00 0.0 0.600 o 525 Pipe/Conduit 🔒	
SE-1.005 34.248 0.068 503.6 0.	137 0.00 0.0 0.600 o 750 Pipe/Conduit 🔒	
SE-6.000 40.178 0.154 260.9 0.	092 5.00 0.0 0.600 o 225 Pipe/Conduit 🔒	
	Network Results Table	
PN Rain T.C. US/I	L $\Sigma$ I.Area $\Sigma$ Base Foul Add Flow Vel Cap Flow	
PN Rain T.C. US/I (mm/hr) (mins) (m)	(ha) Flow (l/s) (l/s) (l/s) (m/s) (l/s) (l/s)	

(mm/hr) (mins) (m)(ha)Flow (1/s) (1/s)(1/s)(m/s) (1/s)(1/s)SE-1.00050.005.733.2400.2720.00.00.00.8056.636.9SE-1.00150.006.303.0730.4930.00.00.00.97107.566.8
SE-1.001 50.00 6.30 3.073 0.493 0.0 0.0 0.0 0.97 107.5 66.8
SE-1.001 50.00 6.30 3.073 0.493 0.0 0.0 0.0 0.97 107.5 66.8
SE-1.002 50.00 7.22 2.750 0.493 0.0 0.0 0.0 1.16 328.6 66.8
SE-2.000 50.00 5.94 3.330 0.257 0.0 0.0 0.0 1.07 75.8 34.8
SE-2.001 50.00 6.86 2.972 0.500 0.0 0.0 0.0 1.09 120.5 67.7
SE-1.003 50.00 7.85 2.602 0.993 0.0 0.0 0.0 1.08 306.3 134.5
SE-3.000 50.00 5.68 3.330 0.176 0.0 0.0 0.0 0.90 63.7 23.8
SE-3.001 50.00 6.71 3.057 0.365 0.0 0.0 0.0 0.90 143.5 49.4
SE-3.002 50.00 7.64 2.871 0.616 0.0 0.0 0.0 1.00 215.4 83.4
SE-1.004 50.00 8.19 2.370 1.609 0.0 0.0 0.0 1.24 549.9 217.9
SE-4.000 50.00 5.66 3.330 0.177 0.0 0.0 0.0 0.90 63.7 24.0
SE-4.001 50.00 6.65 3.061 0.362 0.0 0.0 0.0 0.90 143.5 49.0
SE-4.002 50.00 7.56 2.879 0.554 0.0 0.0 0.0 0.99 214.9 75.1
SE-4.003 50.00 7.83 2.772 0.615 0.0 0.0 0.0 1.30 281.2 83.3
SE-5.000 50.00 5.27 <b>3.100</b> 0.199 0.0 0.0 0.0 0.99 70.0 27.0
SE-5.001 50.00 5.52 3.037 0.199 0.0 0.0 0.0 0.99 70.0 27.0
SE-4.004 50.00 7.99 2.700 0.814 0.0 0.0 0.0 1.56 338.4 110.3
SE-1.005 50.00 8.65 2.320 2.560 0.0 0.0 0.0 1.24 547.9 346.7
SE-6.000 50.00 5.83 <mark>3.505</mark> 0.092 0.0 0.0 0.0 0.80 32.0 12.5
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5 5	ted												Page
						-	nam Easter	rn 🗌					
							Ferminal						
						Souther	rn Yard: H	Propo	sed				N
ate 05/08/2022						Designe	ed by Hele	en Hea	ather	-Smi	th		
ile Proposed SouthEast	- Sur	charge	ed +1	.9m v2	2	Checked	d by Tom V	Vatso	n				
nnovyze						Networł	c 2020.1.3	3					
			N	etwor]	k Des:	ign Tab	ole for Pr	soqo	ed St	orm			
	PN	Length (m)					Base Flow (l/s)	k (mm)	HYD SECT		Section Type	Auto Design	
S	E-7.000	28.186	0.154	183.0	0.083	5.00	0.0	0.600	0	225	Pipe/Conduit	•	
S	E-6.001	20.864	0.111	188.0	0.000	0.00	0.0	0.600	0	225	Pipe/Conduit	۲	
S	E-8.000	40.339	0.155	260.3	0.124	£ 5.00	0.0	0.600	0	225	Pipe/Conduit	0	
S	E-9.000	26.843	0.155	173.2	0.082	2 5.00	0.0	0.600	0	225	Pipe/Conduit	•	
S	E-6.002	8.156	0.086	94.8	0.000	0.00	0.0	0.600	0	300	Pipe/Conduit	۵	
		30.316						0.600			Pipe/Conduit		
S	E-6.004	33.388	0.067	500.0	0.000	0.00	0.0	0.600	0	375	Pipe/Conduit		
SE	-10.000	19.301	0.097	200.0	0.151	5.00	0.0	0.600	0	225	Pipe/Conduit	۵	
S	E-6.005	67.013	0.134	500.0	0.000	0.00	0.0	0.600	0	375	Pipe/Conduit	<b>a</b>	
		62.384						0.600			Pipe/Conduit		
SE	-11.000	63.458	0.160	396.6	0.487	5.00	0.0	0.600	0	375	Pipe/Conduit	۵	
		50.895						0.600			Pipe/Conduit		
	10 005	40 555	0 1	0.00	0 0 0 0			0 606					
		43.771 43.117						0.600			Pipe/Conduit Pipe/Conduit	2	
SE.	12.001	±2.⊥⊥/	0.131	JZJ.I	0.221	, 0.00	0.0	0.000	0	515	FIPE/CONduit	•	
SE	-11.002	35.463	0.141	251.5	0.000	0.00	0.0	0.600	0	525	Pipe/Conduit	•	
		65.749					0.0	0.600	0	375	Pipe/Conduit	8	
		20.866						0.600			Pipe/Conduit	0	
SE	-13.002	50.101	0.167	300.0	0.174	£ 0.00	0.0	0.600	0	450	Pipe/Conduit	۵	
SE	-14.000	43.633	0.167	261.3	0.207	7 5.00	0.0	0.600	0	225	Pipe/Conduit	0	
		43.633						0.600			Pipe/Conduit	ŏ	
SE	-11.003	33.711	0.067	503.1	0,000	0.00	0.0	0.600	0	675	Pipe/Conduit		
	11.000	55.711	2.007	555.1	0.000	5.00	0.0	2.000	0	5,5	- ipe, conduit	•	
	-15.000	43.615	0.167	261.2	0.205	5 5.00		0.600			Pipe/Conduit Pipe/Conduit	\$	
		43.615	-			0.00		0.600	0				

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (1/s)	Vel (m/s)	Cap (1/s)	Flow (1/s)
SE-7.000	50.00	5.49	3.505	0.083	0.0	0.0	0.0	0.96	38.3	11.2
SE-6.001	50.00	6.20	3.351	0.175	0.0	0.0	0.0	0.95	37.8	23.7
SE-8.000	50.00	5.83	3.395	0.124	0.0	0.0	0.0	0.81	32.0	16.8
SE-9.000	50.00	5.45	3.395	0.082	0.0	0.0	0.0	0.99	39.4	11.2
SE-6.002 SE-6.003 SE-6.004	50.00 50.00 50.00	6.91	3.165 3.004 2.943	0.382 0.382 0.382	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0	1.61 0.80 0.80	114.1 88.7 88.7	51.7 51.7 51.7
SE-10.000	50.00	5.35	3.545	0.151	0.0	0.0	0.0	0.92	36.6	20.4
SE-6.005 SE-6.006	50.00 50.00	8.99 10.29	2.876 2.742	0.533 0.533	0.0	0.0	0.0	0.80 0.80	88.7 88.7	72.1 72.1
SE-11.000 SE-11.001	50.00 50.00	••=•	2.875 2.640	0.487 0.801	0.0	0.0	0.0	0.90 1.05	99.8 167.4	65.9 108.4

SE-12.000	50.00	5.75 2.950	0.309	0.0	0.0		0.97		41.8
SE-12.001	50.00	6.48 2.708	0.528	0.0	0.0	0.0	0.99	109.7	71.6
SE-11.002	50.00	7.40 2.427	1.329	0.0	0.0	0.0	1.41	304.8	180.0
SE-13.000	50.00	5.90 2.975	0.522	0.0	0.0	0.0	1.22	134.7	70.7
SE-13.001	50.00	6.23 <mark>2.675</mark>	0.625	0.0	0.0	0.0	1.04	115.3	84.6
SE-13.002	50.00	6.95 2.530	0.799	0.0	0.0	0.0	1.17	185.8	108.2
SE-14.000	50.00	5.90 <mark>3.155</mark>	0.207	0.0	0.0	0.0	0.80	32.0	28.0
SE-14.001	50.00	6.81 2.913	0.356	0.0	0.0	0.0	0.80	56.9	48.2
SE-11.003	50.00	7.88 2.136	2.484	0.0	0.0	0.0	1.16	415.7	336.4
SE-15.000	50.00	5.90 <mark>3.155</mark>	0.205	0.0	0.0	0.0	0.80	32.0	27.8
SE-15.001	50.00	6.81 2.913	0.355	0.0	0.0	0.0	0.80	56.9	48.1

				1 -		nam Easter					
						Terminal					
				5	Souther	n Yard: H	ropo	sed			
e 05/08/2022						ed by Hele			-Smi	th	
e Proposed SouthEast - S	ircharge	-d +1	9m v2			d by Tom W					
lovyze			• > • 2			x 2020.1.3					
10 V y Z e				1	NECWOI1	2020.1.5	)				
		N	etworl	c Desi	gn Tab	le for Pr	opose	ed St	orm		
PN	Length (m)			I.Area (ha)		Base Flow (l/s)	k (mm)	HYD SECT		Section Type	Auto Design
	(11)	()	()	(114)	(11110)	1100 (1/0)	(1111)	5201	(11211)		Debigii
SE-16.0	00 61.503	0.166	370.5	0.284	5.00	0.0	0.600	0	300	Pipe/Conduit	0
SE-11.0	04 17.826	0.036	495.2	0.000	0.00	0.0	0.600	0	825	Pipe/Conduit	0
	5 87.286						0.600			Pipe/Conduit	
	6 59.507						0.600			Pipe/Conduit	ĕ
SE-17.0	0 65.551	0.328	200.0	0.141	5.00	0.0	0.600	0	225	Pipe/Conduit	
											_
SE-18.0	9.758	0.049	200.0	0.075	5.00	0.0	0.600	0	225	Pipe/Conduit	0
SE-17.0	01 8.847	0.044	200.0	0.000	0.00	0.0	0.600	0	225	Pipe/Conduit	8
SE-11.0	)7 29.755	0.059	504.3	0.000	0.00	0.0	0.600	0	825	Pipe/Conduit	6
SE-19.0	0 24.297	0.093	260.8	0.085	5.00	0.0	0.600	0	225	Pipe/Conduit	
	1 43.610						0.600			Pipe/Conduit	ă
SE-19.0	02 43.610	0.115	379.2	0.150	0.00	0.0	0.600	0	300	Pipe/Conduit	ō
SE-20.0	0 27.782	0.143	194.3	0.000	5.00	0.0	0.600	0	225	Pipe/Conduit	۵
SE-20.0	01 37.265	0.140	266.2	0.242	0.00	0.0	0.600	0		Pipe/Conduit	ē
SE-19.0	3 34.369	0.193	178.1	0.000	0.00	0.0	0.600	0	300	Pipe/Conduit	0
GE 21 0	0 24 000	0 100	210 7	0 206	F 00	0.0	0 600		FOF	Dine (Canduit	•
	)0 34.088 )1 36.058						0.600			Pipe/Conduit Pipe/Conduit	8
		0.517	103.3	0.103	5.00	0.0	5.000	0	525	- ipe, conduit	-
SE-19.0	04 65.941	0.132	499.6	0.223	0.00	0.0	0.600	0	600	Pipe/Conduit	0
	5 65.941				0.00	0.0	0.600	0		Pipe/Conduit	- ē
SE-19.0	06 29.513	0.084	351.3	0.219	0.00	0.0	0.600	0	750	Pipe/Conduit	۰
	0 27 510	0 105	200 0	0 100	F 00	0.0	0 600		200	Dine (Canduit	
	0 37.512 01 35.430				5.00 0.00		0.600			Pipe/Conduit Pipe/Conduit	<u> </u>
	)2 31.001				0.00		0.600			Pipe/Conduit Pipe/Conduit	
											-
SE-23.0	0 51.137	0.170	300.8	0.294	5.00	0.0	0.600	0	375	Pipe/Conduit	٠
SE-23.0	01 41.934	0.140	300.0	0.154	0.00	0.0	0.600	0	375	Pipe/Conduit	ē
SE-23.0	02 56.296	0.113	500.0	0.344	0.00	0.0	0.600	0	450	Pipe/Conduit	ē
					-	_					
				Net	work R	esults Ta	ble				

PN	Rain	T.C.	US/IL	Σ I.Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow	
	(mm/hr)	(mins)	(m)	(ha)	Flow (l/s)	(l/s)	(1/s)	(m/s)	(l/s)	(l/s)	
SE-16.000	50.00	6.26	2.947	0.284	0.0	0.0	0.0	0.81	57.3	38.5	
SE-11.004	50.00	8.10	1.919	3.124	0.0	0.0	0.0	1.33	709.6	423.0	
SE-11.005	50.00	9.20	1.883	3.124	0.0	0.0	0.0	1.32	707.0	423.0	
SE-11.006	50.00	9.95	1.708	3.124	0.0	0.0	0.0	1.32	706.1	423.0	
SE-17.000	50.00	6.19	2.600	0.141	0.0	0.0	0.0	0.92	36.6	19.1	
SE-18.000	50.00	5.18	3.155	0.075	0.0	0.0	0.0	0.92	36.6	10.2	
SE-17.001	50.00	6.35	2.272	0.216	0.0	0.0	0.0	0.92	36.6	29.3	
SE-11.007	50.00	10.33	1.589	3.340	0.0	0.0	0.0	1.32	703.0	452.3	
SE-19.000 SE-19.001 SE-19.002	50.00 50.00 50.00	6.25	3.155 2.987 2.820	0.085 0.255 0.405	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.80 0.97 0.80	32.0 68.4 56.6	11.5 34.5 54.8	
SE-20.000 SE-20.001	50.00 50.00		3.155 2.937	0.000 0.242	0.0	0.0 0.0	0.0	0.93 0.96	37.2 67.8	0.0 32.8	

SE-19.003	50.00	7.65 2.705	0.647	0.0	0.0	0.0	1.18	83.1«	87.7
SE-21.000	50.00	5.45 2.745	0.206	0.0	0.0	0.0	1.26	273.0	27.9
SE-21.001	50.00	5.72 2.636	0.369	0.0	0.0	0.0	2.20	477.0	50.0
SE-19.004	50.00	8.66 2.212	1.239	0.0	0.0	0.0	1.08	306.1	167.8
SE-19.005	50.00	9.55 <b>1.930</b>	1.467	0.0	0.0	0.0	1.25	550.1	198.7
SE-19.006	50.00	9.88 1.798	1.686	0.0	0.0	0.0	1.49	657.0	228.3
SE-22.000	50.00	5.69 <mark>3.050</mark>	0.198	0.0	0.0	0.0	0.90	63.8	26.8
SE-22.001	50.00	6.31 2.850	0.198	0.0	0.0	0.0	0.96	106.3	26.8
SE-22.002	50.00	6.88 2.674	0.198	0.0	0.0	0.0	0.90	142.9	26.8
SE-23.000	50.00	5.82 2.975	0.294	0.0	0.0	0.0	1.04	114.8	39.8
SE-23.001	50.00	6.49 2.805	0.448	0.0	0.0	0.0	1.04	115.0	60.6
SE-23.002	50.00	7.53 2.590	0.792	0.0	0.0	0.0	0.90	143.5	107.2
		©1	982-202	0 Innovyz	е				

	imited												Page 4
						5	ham Easte	rn					
							Terminal						
·							rn Yard:	-					— Micro
Date 05/08/2022			_			-	ed by Hel			-Smi	th		Drainag
File Proposed SouthEa	ast - Sur	charge	ed +1	.9m v			d by Tom		n				Brainiac
Innovyze					1	Jetwor	k 2020.1.	3					
			N	otwor	k Dogi	an Tak	la far D		d Cto	1 m			
			1	etwor	k Desi	gii iai	ole for Pi	opose	eu sto				
	PN	Length	Fall	Slope	I.Area	T.E.	Base	k	HYD	DIA	Section Typ	e Auto	
		(m)	(m)	(1:X)	(ha)	(mins)	Flow (l/s)	(mm)	SECT	(mm )		Design	L
	SE-22.003	40.186	0.080	500.0	0.000	0.00	0.0	0.600	0	450	Pipe/Condui	t 🔒	
	SE-22.004					0.00	0.0	0.600	0	525	Pipe/Condui	t 遵	
	SE-22.005							0.600			Pipe/Condui		
	SE-22.006	59.139	0.118	501.2	0.16/	0.00	0.0	0.600	0	600	Pipe/Condui	t	
	SE-24.000	35.267	0.176	200.0	0.129	5.00		0.600	0		Pipe/Condui	_	
	SE-24.001							0.600			Pipe/Condui	_	
	SE-24.002	72.256	0.144	501.8	0.000	0.00	0.0	0.600	0	375	Pipe/Condui	t 🔒	
	SE-25.000	34.362	0.137	250.0	0.412	5.00	0.0	0.600	0	300	Pipe/Condui	t 🔒	
	SE-22.007	24.808	0.050	500.0	0.000	0.00	0.0	0.600	0	675	Pipe/Condui	t 🔒	
	SE-19.007	39.872	0.080	500.0	0.000	0.00	0.0	0.600	0	750	Pipe/Condui	_	
	SE-11.008							0.600			Pipe/Condui		
											_		
	SE-26.000	63.522	0.380	167.2	1.947	5.00	0.0	0.600	0	225	Pipe/Condui	t 🔒	
	SE-6.007					0.00		0.600			Pipe/Condui		
	SE-6.008 SE-6.009							0.600 0.600	0 0		Pipe/Condui Pipe/Condui		
	SE-6.009 SE-6.010							0.600			Pipe/Condui Pipe/Condui		
	<b>ap 1 6 5</b>	F4 4 ···	0 1	E 0 1	0 00-	• • •	<u> </u>	0 555		0.00		-	
	SE-1.006 SE-1.007							0.600			Pipe/Condui Pipe/Condui		
	22 1.00/		~·-44		3.000	0.00	0.0				-		
	SE-27.000							0.600			Pipe/Condui	_	
	SE-27.001	11.492	0.077	150.0	0.000	0.00	0.0	0.600	0	300	Pipe/Condui	t	
	SE-1.008	50.144	0.167	300.3	0.000	0.00	0.0	0.600	0	525	Pipe/Condui	t	
					Net	work H	Results Ta	able					
	<b>T</b> 37	<b>D</b>	n -				Σ Base		Add 191 -			Flow	
	PN	Rai (mm/)		ins)	S/IL Σ (m)		Σ Base Flow (l/s)		Add Flo (l/s)		el Cap /s) (l/s)	flow (l/s)	
	SE-22.00	)3 50	.00	8.27 2	.477	0.990	0.0	0.0	0.	0 0	.90 143.5	134.1	
	SE-22.00			8.91 2							.00 215.6		
		50				1.105	0.0	0.0	0.				
	SE-22.00	)5 50	.00	9.90 2	.246	1.396	0.0	0.0	0.		.99 215.1		
	SE-22.00 SE-22.00	)5 50	.00		.246				0.	0 0 0 1		189.1 211.7	
		)5 50 )6 50	.00 .00 1	9.90 2	.246 .053	1.396	0.0	0.0	0. 0.		.08 305.6		
	SE-22.00 SE-24.00 SE-24.00	05     50       06     50       00     50       01     50	.00 .00 1 .00 .00	9.90 2 0.81 2 5.64 3 6.66 2	.246 .053 .125 .874	1.396 1.564 0.129 0.305	0.0 0.0 0.0 0.0	0.0 0.0 0.0	0. 0. 0.	0 1 0 0 0 0	.08 305.6 .92 36.6 .94 66.6	211.7 17.5 41.3	
	SE-22.00	05     50       06     50       00     50       01     50	.00 .00 1 .00 .00	9.90 2 0.81 2 5.64 3	.246 .053 .125 .874	1.396 1.564 0.129	0.0 0.0 0.0	0.0 0.0 0.0	0. 0. 0.	0 1 0 0	.08 305.6 .92 36.6 .94 66.6	211.7 17.5	
	SE-22.00 SE-24.00 SE-24.00	05     50       06     50       00     50       01     50       02     50	.00 .00 1 .00 .00 .00	9.90 2 0.81 2 5.64 3 6.66 2	.246 .053 .125 .874 .589	1.396 1.564 0.129 0.305	0.0 0.0 0.0 0.0	0.0 0.0 0.0	0. 0. 0. 0.	0 1 0 0 0 0	.08 305.6 .92 36.6 .94 66.6 .80 88.6	211.7 17.5 41.3	
	SE-22.00 SE-24.00 SE-24.00 SE-24.00	05     50       06     50       00     50       01     50       02     50       00     50	.00 .00 1 .00 .00 .00	9.90 2 0.81 2 5.64 3 6.66 2 8.16 2	.246 .053 .125 .874 .589 .100	1.396 1.564 0.129 0.305 0.305	0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0	0. 0. 0. 0. 0.	0 1 0 0 0 0 0 0 0 0	.08 305.6 .92 36.6 .94 66.6 .80 88.6	211.7 17.5 41.3 41.3	
	SE-22.00 SE-24.00 SE-24.00 SE-24.00 SE-25.00 SE-22.00	05     50       06     50       00     50       01     50       02     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50	.00 .00 1 .00 .00 .00 .00	9.90 2 .0.81 2 5.64 3 6.66 2 8.16 2 5.58 3 .1.17 1	.246 .053 .125 .874 .589 .100 .860	1.396 1.564 0.129 0.305 0.305 0.412 2.281	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0. 0. 0. 0. 0. 0.	0 1 0 0 0 0 0 0 0 0 0 0 0 1	.08 305.6 .92 36.6 .94 66.6 .80 88.6 .99 70.0 .17 417.0	211.7 17.5 41.3 41.3 55.8 308.8	
	SE-22.00 SE-24.00 SE-24.00 SE-25.00 SE-25.00 SE-22.00 SE-19.00	05     50       06     50       00     50       01     50       02     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50	.00 .00 1 .00 .00 .00 .00 1 .00 1	9.90 2 0.81 2 5.64 3 6.66 2 8.16 2 5.58 3 1.17 1 1.70 1	.246 .053 .125 .874 .589 .100 .860 .714	1.396 1.564 0.129 0.305 0.305 0.412 2.281 3.967	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0. 0. 0. 0. 0. 0. 0.	0 1 0 0 0 0 0 0 0 0 0 1 0 1	.08 305.6 .92 36.6 .94 66.6 .80 88.6 .99 70.0 .17 417.0 .24 549.9	211.7 17.5 41.3 41.3 55.8 308.8 537.1	
	SE-22.00 SE-24.00 SE-24.00 SE-25.00 SE-22.00 SE-19.00 SE-11.00	05     50       06     50       00     50       01     50       02     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50	.00 .00 1 .00 .00 .00 .00 1 .00 1 .00 1	9.90 2 0.81 2 5.64 3 6.66 2 8.16 2 5.58 3 1.17 1 1.70 1 2.25 1	.246 .053 .125 .874 .589 .100 .860 .714 .530	1.396 1.564 0.129 0.305 0.305 0.412 2.281 3.967 7.307	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0. 0. 0. 0. 0. 0. 0. 0.	0 1 0 0 0 0 0 0 0 0 0 1 0 1 0 0	.08 305.6 .92 36.6 .94 66.6 .80 88.6 .99 70.0 .17 417.0 .24 549.9 .91 144.1«	211.7 17.5 41.3 41.3 55.8 308.8 537.1 989.4	
	SE-22.00 SE-24.00 SE-24.00 SE-25.00 SE-25.00 SE-22.00 SE-19.00	05     50       06     50       00     50       01     50       02     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50       00     50	.00 .00 1 .00 .00 .00 .00 1 .00 1 .00 1	9.90 2 0.81 2 5.64 3 6.66 2 8.16 2 5.58 3 1.17 1 1.70 1	.246 .053 .125 .874 .589 .100 .860 .714 .530	1.396 1.564 0.129 0.305 0.305 0.412 2.281 3.967	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0. 0. 0. 0. 0. 0. 0. 0.	0 1 0 0 0 0 0 0 0 0 0 1 0 1 0 0	.08 305.6 .92 36.6 .94 66.6 .80 88.6 .99 70.0 .17 417.0 .24 549.9	211.7 17.5 41.3 41.3 55.8 308.8 537.1 989.4	
	SE-22.00 SE-24.00 SE-24.00 SE-25.00 SE-25.00 SE-19.00 SE-11.00 SE-26.00	5     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50	.00 .00 1 .00 .00 .00 .00 1 .00 1 .00 1 .00 1	9.90 2 0.81 2 5.64 3 6.66 2 8.16 2 5.58 3 1.17 1 1.70 1 2.25 1 6.05 3 2.71 1	.246 .053 .125 .874 .589 .100 .860 .714 .530 .200 .471	1.396 1.564 0.129 0.305 0.412 2.281 3.967 7.307 1.947 9.786	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	0       1         0       0       0         0       0       0         0       0       1         0       0       1         0       1       0         0       1       1         0       1       1         0       1       1         0       1       1	.08 305.6 .92 36.6 .94 66.6 .80 88.6 .99 70.0 .17 417.0 .24 549.9 .91 144.1« .01 40.1«	211.7 17.5 41.3 41.3 55.8 308.8 537.1 989.4 263.6 1325.1	
	SE-22.00 SE-24.00 SE-24.00 SE-25.00 SE-22.00 SE-19.00 SE-11.00 SE-26.00	5     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50       50     50	.00 .00 1 .00 .00 .00 .00 1 .00 1 .00 1 .00 1 .00 1 .00 1	9.90 2 0.81 2 5.64 3 6.66 2 8.16 2 5.58 3 1.17 1 1.70 1 2.25 1 6.05 3	.246 .053 .125 .874 .589 .100 .860 .714 .530 .200 .471 .395	1.396 1.564 0.129 0.305 0.305 0.412 2.281 3.967 7.307 1.947	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	0       1         0       0         0       0         0       0         0       1         0       1         0       1         0       1         0       1         0       1         0       1	.08 305.6 .92 36.6 .94 66.6 .80 88.6 .99 70.0 .17 417.0 .24 549.9 .91 144.1« .01 40.1«	211.7 17.5 41.3 41.3 55.8 308.8 537.1 989.4 263.6 1325.1 1325.1	

 SE-1.006
 50.00
 15.13
 0.799
 12.346
 0.0
 0.0
 1.39
 885.8<</td>
 1671.8

 SE-1.007
 50.00
 15.86
 0.697
 12.346
 0.0
 0.0
 1.40
 887.7<</td>
 1671.8

SE-27.000 SE-27.001	50.005.693.33050.005.833.102	0.504 0.504	0.0 0.0 0.0 0.0		3.3 3.3
SE-1.008	50.00 16.51 0.575	12.850	0.0 0.0	0.0 1.29 <mark>278.7</mark> « 1740	0.1
		©1982-2020	Innovyze		

Jacobs Engineering Limite	ea				aham T-	+ 0.222		Page 5
					ngham Eas o Termina			
						l: Propose	-d	Misso
Date 05/08/2022							ther-Smith	Micro
File Proposed SouthEast -	- Surcharged +1.9m	ı v2.				om Watson		Drainage
Innovyze					ork 2020.			
		Area	a Sum	mary	for Pro	posed Sto	orm	
	Pipe	DTMD	<b>БТМ</b> Б	DTMD	Gross	Imp.	Pipe Total	
					Area (ha)		(ha)	
	1.000	User	_	100	0.272	0.272	0.272	
	1.001		-	100	0.158	0.158	0.158	
	1.002	User -		100 100	0.063 0.000	0.063 0.000	0.221 0.000	
	2.000			100	0.257	0.257	0.257	
	2.001			100	0.207	0.207	0.207	
	1.003	User -		100 100	0.035 0.000	0.035 0.000	0.243 0.000	
	3.000			100	0.176	0.176	0.176	
	3.001 3.002			100 100	0.189 0.185	0.189 0.185	0.189 0.185	
	5.002	User		100	0.066	0.066	0.251	
	1.004 4.000	- Ilger		100 100	0.000	0.000 0.177	0.000	
	4.000			100	0.177 0.185	0.177	0.177 0.185	
	4.002	User	-	100	0.192	0.192	0.192	
	4.003 5.000			100 100	0.061 0.199	0.061 0.199	0.061 0.199	
	5.001	-	-	100	0.000	0.000	0.000	
	4.004 1.005	- User		100 100	0.000 0.137	0.000 0.137	0.000 0.137	
	6.000	User	-	100	0.092	0.092	0.092	
	7.000 6.001	User -		100 100	0.083 0.000	0.083 0.000	0.083 0.000	
	8.000			100	0.124		0.124	
	9.000			100	0.082	0.082	0.082	
	6.002 6.003	-	_	100 100	0.000 0.000	0.000 0.000	0.000 0.000	
	6.004	-	-	100	0.000	0.000	0.000	
	10.000 6.005	User -	-	100 100	0.151 0.000	0.151 0.000	0.151 0.000	
	6.006	-	-	100	0.000	0.000	0.000	
	11.000	User User	-	100 100	0.393 0.094	0.393 0.094	0.393 0.487	
	11.001		-	100	0.314	0.314	0.314	
	12.000		-	100 100	0.309	0.309	0.309 0.220	
	12.001 11.002	user -	-	100	0.220 0.000	0.220 0.000	0.000	
	13.000		-	100	0.522	0.522	0.522	
	13.001 13.002		-	100 100	0.102 0.174	0.102 0.174	0.102 0.174	
	14.000	User	-	100	0.207	0.207	0.207	
	14.001 11.003	User -	-	100 100	0.149 0.000	0.149 0.000	0.149 0.000	
	15.000		_	100	0.205	0.205	0.205	
	15.001		-	100	0.150	0.150	0.150	
	16.000	User User	-	100 100	0.172 0.112	0.172 0.112	0.172 0.284	
	11.004	-	-	100	0.000	0.000	0.000	
	11.005 11.006	-	-	100 100	0.000 0.000	0.000 0.000	0.000 0.000	
	17.000		-	100	0.141	0.141	0.141	
	18.000		-	100	0.075	0.075	0.075	
	17.001 11.007	-	-	100 100	0.000 0.000	0.000 0.000	0.000 0.000	
	19.000		-	100	0.085	0.085	0.085	
	19.001 19.002			100 100	0.170 0.150	0.170 0.150	0.170 0.150	
	20.000	-	-	100	0.000	0.000	0.000	
	20.001	User User	-	100 100	0.115 0.127	0.115 0.127	0.115 0.242	
	19.003	-	-	100	0.127	0.127	0.242	
	21.000		-	100	0.206	0.206	0.206	
	21.001 19.004		-	100 100	0.163 0.223	0.163 0.223	0.163 0.223	
	19.005	User	-	100	0.228	0.228	0.228	
	19.006 22.000		-	100 100	0.219 0.198	0.219 0.198	0.219 0.198	
	22.001	-	-	100	0.000	0.000	0.000	
	22.002 23.000	- Ilger	-	100 100	0.000	0.000	0.000	
	23.000		-	100 100	0.294 0.154	0.294 0.154	0.294 0.154	
	23.002	User	-	100	0.344	0.344	0.344	
	22.003 22.004	- User		100 100	0.000 0.115	0.000 0.115	0.000 0.115	
	22.005	User	-	100	0.291	0.291	0.291	
	22.006 24.000		-	100 100	0.167 0.129	0.167 0.129	0.167 0.129	
	24.001		-	100	0.129	0.129	0.176	
	24.002	- Ligor	-	100	0.000	0.000	0.000	
	25.000	User User	-	100 100	0.394 0.018	0.394 0.018	0.394 0.412	
	22.007	-	-	100	0.000	0.000	0.000	
	19.007	-	-	100	0.000	0.000	0.000	

Jacobs Engineering Limited	Pag	еб
•	Immingham Eastern	
	Ro-Ro Terminal	
	Southern Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Proposed SouthEast - Surcharged +1.9m v2	. Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	
<u>Area</u>	Summary for Proposed Storm	
Pipe PIMP PI	IMP PIMP Gross Imp. Pipe Total	
	ame (%) Area (ha) Area (ha) (ha)	
11.008 -		
26.000 User	- 100 0.000 0.000 0.000 - 100 1.947 1.947 1.947	
6.007 -	- 100 0.000 0.000 0.000	
6.008 -	- 100 0.000 0.000 0.000	
6.009 - 6.010 -	- 100 0.000 0.000 0.000 - 100 0.000 0.000 0.000	
1.006 -	- 100 0.000 0.000 0.000	
1.007 -	- 100 0.000 0.000 0.000	
27.000 User	- 100 0.504 0.504 0.504	
27.001 - 1.008 -	- 100 0.000 0.000 0.000 - 100 0.000 0.000 0.000	
1.000 -	Total Total Total	
	12.850 12.850 12.850	
Pipe Number Na SE-1.008 MH(S Dat	(m) GE)- 3.000 0.408 0.000 0 0 um (m) 0.000 Offset (mins) 0	
	TimeDepthTimeDepthTimeDepthTimeDepth(mins)(m)(mins)(m)(mins)(m)(mins)(m)	
630 1.900 3150 1.900 5670 1.900	8190 1.900 10710 1.900 13230 1.900 15750 1.900 18270 1.900	
1260 1.900 3780 1.900 6300 1.900	8190         1.900         13230         1.900         13730         1.900         16270         1.900           8820         1.900         11340         1.900         13860         1.900         16380         1.900         18900         1.900	
1890 1.900 4410 1.900 6930 1.900	9450 1.900 11970 1.900 14490 1.900 17010 1.900 19530 1.900	
2520 1.900 5040 1.900 7560 1.900	10080 1.900 12600 1.900 15120 1.900 17640 1.900 20160 1.900	
Simulatic	on Criteria for Proposed Storm	
Areal Reduction Factor 1.000 Foul Sewa Hot Start (mins) 0 Additional Fl Hot Start Level (mm) 0 MADD Fact Number of Input Hydrographs 0 N Number of Online Controls 3 Num	Number of Offline Controls O Number of Time/Area Diagrams O Wher of Storage Structures 3 Number of Real Time Controls O	0
Syn	thetic Rainfall Details	
Rainfall Model Return Period (years) Region England a	FSRM5-60 (mm)17.000Cv (Summer)0.75030Ratio R0.400Cv (Winter)0.840nd WalesProfile TypeSummerStormDuration (mins)30	

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acobs Engineerin	g Limite	ed								Pa	age 7
					Immingha	m Easterr	L				
				1	Ro-Ro Te:	rminal					
						Yard: Pr	bobocco				
											Micro
ate 05/08/2022					5	-	Heather-	Smith			Drainage
ile Proposed Sou	thEast ·	- Surcha	arged +1.9	9m v2  0	Checked 1	by Tom Wa	tson				Diamage
nnovyze				1	Network	2020.1.3					
				Online Co	ntrols f	or Propos	sed Storm				
	Hvdr	ro-Brake	e® Optimum	Manhole:	MH(SE)-	23. DS/PI	J: SE-6.00	3. Volum	e (m³): (	2.7	
	<u>117 01</u>									<u>.,</u>	
			eference MD-	SHE-0105-50				Sump Availa			
	т	Design Flo	Head (m)		1.0	.0	Tn	Diameter ( vert Level			
	L	-	ush-Flo™				Outlet Pipe				
		Ol	bjective Mi lication	nimise upst		ge Sugges	sted Manhole				
		Control	Points	Head (m) F	?low (l/s)	Conti	col Points	Head (	m) Flow (l	/s)	
	Desid	yn Point	(Calculated)	1.000	5.0		Kick-H	7lo® 0.6	37	4.1	
			Flush-Flo™			Mean Flow	over Head Ra			4.3	
type of control dev Depth (m) Flo											
0.100	3.6	0.600	4.3	1.600	6.2	2.600	7.8	5.000	10.6	7.500	12.9
0.200	4.8	0.800	4.5	1.800	6.6	3.000	8.4	5.500	11.1	8.000	13.3
0.200 0.300	4.8 5.0	0.800 1.000	4.5 5.0	1.800 2.000	6.6 6.9	3.000 3.500	8.4 9.0	5.500 6.000	11.1 11.6	8.000 8.500	13.3 13.7
0.200 0.300 0.400	4.8 5.0 4.9	0.800 1.000 1.200	4.5 5.0 5.4	1.800 2.000 2.200	6.6 6.9 7.2	3.000 3.500 4.000	8.4 9.0 9.6	5.500 6.000 6.500	11.1 11.6 12.1	8.000 8.500 9.000	13.3 13.7 14.1
0.200 0.300	4.8 5.0	0.800 1.000	4.5 5.0	1.800 2.000 2.200	6.6 6.9	3.000 3.500	8.4 9.0	5.500 6.000	11.1 11.6	8.000 8.500 9.000	13.3 13.7
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 1.400	4.5 5.0 5.4	1.800 2.000 2.200 2.400	6.6 6.9 7.2 7.5	3.000 3.500 4.000 4.500	8.4 9.0 9.6 10.1	5.500 6.000 6.500 7.000	11.1 11.6 12.1 12.5	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 1.400	4.5 5.0 5.4 5.8 Optimum	1.800 2.000 2.200 2.400 Manhole:	6.6 6.9 7.2 7.5 <u>MH(SE)-6</u> e	3.000 3.500 4.000 4.500	8.4 9.0 9.6 10.1	5.500 6.000 6.500 7.000	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 3	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 1.400	4.5 5.0 5.4 5.8 Optimum Un Des	1.800 2.000 2.200 2.400 Manhole: Mit Reference Sign Head (m	6.6 6.9 7.2 7.5 <u>MH(SE)-6</u> e	3.000 3.500 4.000 4.500	8.4 9.0 9.6 10.1	5.500 6.000 6.500 7.000 8, Volum	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 2 -3000-5000 3.000	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 1.400	4.5 5.0 5.4 5.8 Optimum Un Des	1.800 2.000 2.200 2.400 Manhole: Manhole: Manhole: Manhole: Manhole:	6.6 6.9 7.2 7.5 MH(SE)-6 e ) )	3.000 3.500 4.000 4.500	8.4 9.0 9.6 10.1	5.500 6.000 6.500 7.000 18, Volum	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 2 3000-5000 3.000 50.0	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 1.400	4.5 5.0 5.4 5.8 Optimum Un Des	1.800 2.000 2.200 2.400 Manhole: Manhole: Manhole: Flush-Flow Flush-Flow	6.6 6.9 7.2 7.5 MH(SE)-6 e ) )	3.000 3.500 4.000 4.500	8.4 9.0 9.6 10.1	5.500 6.000 6.500 7.000 18, Volum	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 3 3000-5000 3.000 50.0 Calculated	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 1.400	4.5 5.0 5.4 5.8 Optimum Un Des	1.800 2.000 2.200 2.400 Manhole: Manhole: Manhole: Manhole: Manhole: Sign Head (m m Flow (l/s Flush-Flo Objective	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) T™ e	3.000 3.500 4.000 4.500	8.4 9.0 9.6 10.1	5.500 6.000 6.500 7.000 18, Volum	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 2 -3000-5000 3.000 50.0 Calculated um storage	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 1.400	4.5 5.0 5.4 5.8 Optimum Un Des Desig	1.800 2.000 2.200 2.400 Manhole: Manhol	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ™ e n	3.000 3.500 4.000 4.500	8.4 9.0 9.6 10.1	5.500 6.000 6.500 7.000 18, Volum	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 3 3000-5000 3.000 50.0 Calculated mm storage Surface	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 1.400	4.5 5.0 5.4 5.8 Optimum Un Des Desig	1.800 2.000 2.200 2.400 Manhole: Manhol	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ™ e n e	3.000 3.500 4.000 4.500	8.4 9.0 9.6 10.1	5.500 6.000 6.500 7.000 18, Volum	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 3 3000-5000 3.000 50.0 Calculated mm storage Surface Yes	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 1.400	4.5 5.0 5.4 5.8 Optimum Un Des Desig	1.800 2.000 2.200 2.400 Manhole: Manhol	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ™ e n e )	3.000 3.500 4.000 4.500	8.4 9.0 9.6 10.1	5.500 6.000 6.500 7.000 18, Volum	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 3 -3000-5000 3.000 50.0 Calculated um storage Surface Yes 266	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 0-Brake@	4.5 5.0 5.4 5.8 Optimum Un Desig Desig Su Durve utlet Pipe D	1.800 2.000 2.200 2.400 Manhole: Manhol	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ™ e n e ) ) ) *	3.000 3.500 4.000 4.500 5, DS/PN	8.4 9.0 9.6 10.1	5.500 6.000 6.500 7.000 -0266-5000- ise upstrea	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 2 -3000-5000 3.000 50.0 Calculated um storage Surface Yes 266 1.530 300	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 0-Brake@	4.5 5.0 5.4 5.8 Optimum Un Desig Desig Su Dusig Unve utlet Pipe D ed Manhole D	1.800 2.000 2.200 2.400 Manhole: Manhol	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ) ™ e n e ) ) ) ) ) ) Site Spe	3.000 3.500 4.000 4.500 5, DS/PN	8.4 9.0 9.6 10.1	5.500 6.000 6.500 7.000 18, Volum -0266-5000- 0 ise upstrea	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 2 -3000-5000 3.000 50.0 Calculated um storage Surface Yes 266 1.530 300	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 0-Brake@ Minimum O Suggest Control	4.5 5.0 5.4 5.8 Optimum Un Desig Desig Su Dusig Unve utlet Pipe D ed Manhole D	1.800 2.000 2.200 2.400 Manhole: dit Reference ign Head (m m Flow (1/s Flush-Flo Objective Application mp Available Diameter (mm prt Level (m Diameter (mm Diameter (mm Head (m) F	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ) ™ e n e ) ) ) ) ) ) Site Spe	3.000 3.500 4.000 4.500 5, DS/PN	8.4 9.0 9.6 10.1 : SE-11.00 MD-SHE Minim	5.500 6.000 6.500 7.000 98, Volum -0266-5000- 0 ise upstrea Hydro Inter Head (	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 2 3000-5000 3.000 50.0 Calculated um storage Surface Yes 266 1.530 300 mational) m) Flow (1	8.000 8.500 9.000 9.500	13.3 13.7 14.1
0.200 0.300 0.400	4.8 5.0 4.9 4.7	0.800 1.000 1.200 0-Brake@ Minimum O Suggest Control	4.5 5.0 5.4 5.8 Optimum Un Desig Unve Unve utlet Pipe D ed Manhole D Points	1.800 2.000 2.200 2.400 Manhole: dit Reference sign Head (m m Flow (1/s Flush-Flo Objective Application mp Available Diameter (mm Diameter (mm Diameter (mm Diameter (mm Diameter (mm Diameter (mm Diameter (mm Diameter (mm	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ) ™ e n e n e ) ) ) Site Spe Flow (1/s) 50.0	3.000 3.500 4.000 5, DS/PN 5, DS/PN cific Desig	8.4 9.0 9.6 10.1 : SE-11.00 MD-SHE Minim gn (Contact <b>col Points</b>	5.500 6.000 6.500 7.000 98, Volum -0266-5000- 0 ise upstrea Hydro Inter Head ( Flo® 1.8	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 2 3000-5000 3.000 50.0 2alculated um storage Surface Yes 266 1.530 300 mational) m) Flow (1 29 3	8.000 8.500 9.000 9.500 39.6 /s)	13.3 13.7 14.1
0.200 0.300 0.400 0.500	4.8 5.0 4.9 4.7 <u>Hydro</u>	0.800 1.000 1.200 0-Brake@ 0-Brak@ 0-Brak@ 0-Brake@ 0-Brak@ 0-Brake@ 0-Brake@ 0-Brak	4.5 5.0 5.4 5.8 O Optimum Un Desig Unve Utlet Pipe D ed Manhole D Points (Calculated) Flush-Flo™	1.800 2.000 2.200 2.400 Manhole: Manhol	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ) ™ e n e ) ) ) ) Site Spe 7low (1/s) 50.0 50.0	3.000 3.500 4.000 5, DS/PN 5, DS/PN Contr Mean Flow	8.4 9.0 9.6 10.1 MD-SHE Minim gn (Contact <b>col Points</b> Kick-H over Head Ra	5.500 6.000 6.500 7.000 18, Volum -0266-5000- ise upstrea Hydro Inter Head ( Flo® 1.8 ange	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 3 3000-5000 3.000 50.0 3.000 50.0 Calculated im storage Surface Yes 266 1.530 300 mational) m) Flow (l 29 3 - 4	8.000 8.500 9.000 <u>9.500</u> <u>39.6</u> / <b>s)</b> 9.4 3.6	13.3 13.7 14.1 14.5
0.200 0.300 0.400 0.500 The hydrological ca	4.8 5.0 4.9 4.7 <u>Hydro</u> Desig	0.800 1.000 1.200 0-Brake@ 0-Brak@ 0-Brak@ 0-Brake@ 0-Brake@ 0-Brake@ 0-Brake@ 0-Bra	4.5 5.0 5.4 5.8 Optimum Un Desig Unve Utlet Pipe D ed Manhole D Points (Calculated) Flush-Flo™ een based on	1.800 2.000 2.200 2.400 Manhole: Manhol	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ) ™ e n e ) ) ) ) Site Spe Flow (1/s) 50.0 50.0	3.000 3.500 4.000 5, DS/PN 5, DS/PN 5, DS/PN 0.00 5, DS/PN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	8.4 9.0 9.6 10.1 MD-SHE Minim gn (Contact <b>col Points</b> Kick-H over Head Ra for the Hyd	5.500 6.000 6.500 7.000 18, Volum -0266-5000- () ise upstrea Hydro Inter Head () Flo® 1.8 unge ro-Brake® ()	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 2 3000-5000 3.000 50.0 Calculated um storage Surface Yes 266 1.530 300 mational) m) Flow (1 29 3 - 4 Optimum as	8.000 8.500 9.000 9.500 39.6 (/s) 9.4 3.6 specified.	13.3 13.7 14.1 14.5 Should anothe
0.200 0.300 0.400 0.500 The hydrological ca	4.8 5.0 4.9 4.7 Hydro Design lculation ice other	0.800 1.000 1.200 0-Brake@ 0-Brake@ 0-Brake@ 0-Brake@ 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.40000 0-Brake@ 1.40000 0-Brake@ 1.4000000000000000000000000000000000000	4.5 5.0 5.4 5.8 Optimum Un Desig Unve Utlet Pipe D ed Manhole D Points (Calculated) Flush-Flo™ een based on Iydro-Brake (	1.800 2.000 2.200 2.400 Manhole: Manhol	<pre>6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ) m e n e n e ) ) ) Site Spe Flow (1/s) 50.0 50.0 50.0</pre>	3.000 3.500 4.000 5, DS/PN 5,	8.4 9.0 9.6 10.1 MD-SHE Minim more state Minim Minim Minim	5.500 6.000 6.500 7.000 98, Volum -0266-5000- () ise upstrea Hydro Inter Head () Flo® 1.8 unge ro-Brake® () ing calcula	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 2 3000-5000 3.000 50.0 Calculated um storage Surface Yes 266 1.530 300 mational) m) Flow (1 29 3 - 4 Optimum as ations will	8.000 8.500 9.000 9.500 39.6 39.6 9.4 3.6 specified. be invali	13.3 13.7 14.1 14.5 Should anothe dated
0.200 0.300 0.400 0.500 The hydrological ca type of control dev	4.8 5.0 4.9 4.7 Hydro Design lculation ice other	0.800 1.000 1.200 0-Brake@ 0-Brake@ 0-Brake@ 0-Brake@ 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.4000 0-Brake@ 1.40000 0-Brake@ 1.40000 0-Brake@ 1.4000000000000000000000000000000000000	4.5 5.0 5.4 5.8 Optimum Un Desig Unve Utlet Pipe D ed Manhole D Points (Calculated) Flush-Flo™ een based on Iydro-Brake (	1.800 2.000 2.200 2.400 Manhole: Manhol	<pre>6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ) m e n e n e ) ) ) Site Spe Flow (1/s) 50.0 50.0 50.0</pre>	3.000 3.500 4.000 4.500 5, DS/PN 5, DS/PN 0.5, DS/PN 0.	8.4 9.0 9.6 10.1 MD-SHE Minim more state Minim Minim Minim	5.500 6.000 6.500 7.000 98, Volum -0266-5000- () ise upstrea Hydro Inter Head () Flo® 1.8 unge ro-Brake® () ing calcula	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 2 3000-5000 3.000 50.0 Calculated um storage Surface Yes 266 1.530 300 mational) m) Flow (1 29 3 - 4 Optimum as ations will	8.000 8.500 9.000 9.500 39.6 39.6 9.4 3.6 specified. be invali	13.3 13.7 14.1 14.5 Should anothe dated
0.200 0.300 0.400 0.500 The hydrological ca type of control dev Depth (m) Flo	4.8 5.0 4.9 4.7 Hydro Desig	0.800 1.000 1.200 0-Brake@ 0-Brak@ 0-Brak@ 0-Brake@ 0-Brake@ 0-Brake@ 0-Brake@ 0-Bra	4.5 5.0 5.4 5.8 O Optimum Un Desig Unve Utlet Pipe D ed Manhole D Points (Calculated) Flush-Flow een based on Hydro-Brake ( Flow (1/s)	1.800 2.000 2.200 2.400 Manhole: Man	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ) m e n e n e ) ) ) Site Spe 7low (1/s) 50.0 50.0 50.0 50.0	3.000 3.500 4.000 4.500 5, DS/PN 5, DS/PN 5, DS/PN 0.00 5, DS/PN 0.00 5, DS/PN 0.00 5, DS/PN 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	8.4 9.0 9.6 10.1 SE-11.00 MD-SHE Minim gn (Contact col Points Kick-H over Head Ra for the Hyd storage rout Flow (1/s)	5.500 6.000 6.500 7.000 18, Volum -0266-5000- () ise upstrea () Hydro Inter Head () Flo® 1.8 ange ro-Brake® () ing calcula Depth (m) 1	11.1 11.6 12.1 12.5 e (m <sup>3</sup> ): 2 3000-5000 3.000 50.0 2alculated um storage Surface Yes 266 1.530 300 mational) m) Flow (l 29 3 - 4 Optimum as ations will Flow (l/s)	8.000 8.500 9.000 9.500 39.6 39.6 9.4 3.6 specified. be invali Depth (m)	13.3 13.7 14.1 14.5 Should anothe dated Flow (1/s)
0.200 0.300 0.400 0.500 The hydrological ca type of control dev Depth (m) Flo 0.100	4.8 5.0 4.9 4.7 Hydro Mydro Designation Designation Designation Mydro My	0.800 1.000 1.200 0-Brake@ 0-Brake@ 0-Brake@ 0.500 0.600	4.5 5.0 5.4 5.8 O Optimum Un Desig Unve Ulet Pipe D ed Manhole D Points (Calculated) Flush-Flo™ een based on Hydro-Brake (C Flow (1/s) 48.8	1.800 2.000 2.200 2.400 Manhole: Manhole: Manhole: Jit Reference Sign Head (m m Flow (1/s Flush-Floy Objective Application Manhole Manhole: Manhole Manhol	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) ) m e n e n e ) ) ) Site Spe 7low (1/s) 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.	3.000 3.500 4.000 4.500 5, DS/PN 5, DS/PN 5, DS/PN 0.00 Contr Mean Flow Contr Mean flow Contr Co	8.4 9.0 9.6 10.1 SE-11.00 MD-SHE Minim gn (Contact col Points Kick-H over Head Ra for the Hyd storage rout Flow (1/s) 46.7	5.500 6.000 6.500 7.000 18, Volum -0266-5000- () ise upstrea () ise upstrea () flo@ 1.8 unge ro-Brake@ () ing calcula Depth (m) 1 5.000	<pre>11.1 11.6 12.1 12.5 e (m<sup>3</sup>): 2 3000-5000 3.000 50.0 2alculated um storage Surface Yes 266 1.530 300 mational) m) Flow (1 29 3 - 4 Optimum as ations will Flow (1/s) 64.0</pre>	<pre>8.000 8.500 9.000 9.500 39.6 39.6 9.4 3.6 specified. be invali Depth (m) 7.500</pre>	13.3 13.7 14.1 14.5 Should anothe dated Flow (1/s) 77.9
0.200 0.300 0.400 0.500 The hydrological ca type of control dev Depth (m) Flo 0.100 0.200	4.8 5.0 4.9 4.7 Hydro Design Loulation Design My (1/s) I 8.5 27.4	0.800 1.000 1.200 1.400 D-Brake@ D-Brake@ Suggest Control gn Point s have be than a H Depth (m) 0.600 0.800	4.5 5.0 5.4 5.8 O Optimum Un Desig Unve Ulet Pipe D ed Manhole D Points (Calculated) Flush-Flo™ een based on Hydro-Brake (C Flow (1/s) 48.8 49.9	1.800 2.000 2.200 2.400 Manhole: Manhol	6.6 6.9 7.2 7.5 MH(SE)-6 e ) ) T™ e n e n e ) ) ) Site Spe 7low (1/s) 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.	3.000 3.500 4.000 4.500 5, DS/PN 5, DS/PN 5, DS/PN 0.00 1.500 3.000	8.4 9.0 9.6 10.1 SE-11.00 MD-SHE Minim gn (Contact col Points Kick-H over Head Ra for the Hyd storage rout Flow (1/s) 46.7 50.0	5.500 6.000 6.500 7.000 18, Volum -0266-5000- () ise upstrea () Hydro Inter Head () Flo® 1.8 unge ro-Brake® () ing calcula Depth (m) 1 5.000 5.500	<pre>11.1 11.6 12.1 12.5 e (m<sup>3</sup>): 2 3000-5000 3.000 50.0 2alculated um storage Surface Yes 266 1.530 300 mational) m) Flow (1 29 3 - 4 Optimum as ations will Flow (1/s) 64.0 67.0</pre>	<pre>8.000 8.500 9.000 9.500 39.6 39.6 9.4 3.6 specified. be invali Depth (m) 7.500 8.000</pre>	13.3 13.7 14.1 14.5 Should anothe dated Flow (1/s) 77.9 80.4

Orifice Manhole: MH(SE)-72, DS/PN: SE-1.008, Volume (m<sup>3</sup>): 48.9

Diameter (m) 0.300 Discharge Coefficient 0.600 Invert Level (m) 0.575

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Jacobs Engineering Limited		Page 8
•	Immingham Eastern	
	Ro-Ro Terminal	
	Southern Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	
Storage Str	ructures for Proposed Storm	
Cellular Storage M	Manhole: MH(SE)-23, DS/PN: SE-6.003	
Invert Level (m) 3.0 Infiltration Coefficient Base (m/hr) 0.000	004 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.9 000 Safety Factor 2.0	95
Depth (m) Area (m <sup>2</sup> ) Inf. Area (m <sup>2</sup> ) Depth (1	(m) Area (m <sup>2</sup> ) Inf. Area (m <sup>2</sup> ) Depth (m) Area (m <sup>2</sup> ) Inf. Area (m	1 <sup>2</sup> )
0.000 500.0 0.0 0.3	300 500.0 0.0 0.301 0.0 0	0.0
<u>Cellular Storage Ma</u>	anhole: MH(SE)-65, DS/PN: SE-11.008	
Invert Level (m) 1.5 Infiltration Coefficient Base (m/hr) 0.000	530 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.9 000 Safety Factor 2.0	95
Depth (m) Area (m <sup>2</sup> ) Inf. Area (m <sup>2</sup> ) Depth (	(m) Area (m²) Inf. Area (m²) Depth (m) Area (m²) Inf. Area (m	1 <sup>2</sup> )
0.000 2500.0 0.0 1.5	500 2500.0 0.0 1.501 0.0 0	0.0
<u>Cellular Storage M</u>	Manhole: MH(SE)-72, DS/PN: SE-1.008	
Invert Level (m) 0.5 Infiltration Coefficient Base (m/hr) 0.000	575 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.9 000 Safety Factor 2.0	95
Depth (m) Area (m <sup>2</sup> ) Inf. Area (m <sup>2</sup> ) Depth (1	(m) Area (m <sup>2</sup> ) Inf. Area (m <sup>2</sup> ) Depth (m) Area (m <sup>2</sup> ) Inf. Area (m	1 <sup>2</sup> )
0.000 1250.0 0.0 1.8	300     1250.0     0.0     1.801     0.0     0	0.0

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				Simu	lation	Criteria							
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			Analysis	Timest	ep Fin	e DVD Statu	s OFF						
		Prof	ile(s)					Summe	r and Wir	iter			
		Duration(s)	(mins) 15,	30, 60	, 120,	180, 240, 36	50, 480,	600, 72	0, 960, 1	440			
		Return Period(s) ( Climate Chan	-						, 10, 20, , 25, 25,				
					Water	Surcharged	Flooded				Maximum	Pipe	
PN	US/MH Name	Event		US/CL (m)	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.		Maximum Vol (m³)	-		Status
SE-1.000		15 minute 1 year Wi	nter Tippe					0.74		0.220	• • •	38.8	
SE-1.000 SE-1.001	MH(SE)-2	15 minute 1 year Wi	nter I+25%	4.740	3.300	-0.148	0.000	0.68		0.982	0.9	65.1	OK
SE-1.002 SE-2.000	MH(SE)-3 MH(SE)-4	15 minute 1 year Wi 15 minute 1 year Wi			2.969 3.485	-0.381 -0.145	0.000 0.000	0.21 0.50		0.328 0.170	0.7 1.0	62.4 36.1	OK OK
SE-2.001	MH(SE)-5	15 minute 1 year Wi	nter I+25%	4.830	3.178	-0.169	0.000	0.56		0.537	1.1	63.6	OK
SE-1.003 SE-3.000	MH(SE)-6 MH(SE)-7	15 minute 1 year Wi 15 minute 1 year Wi			2.900 3.470	-0.302 -0.160	0.000	0.44 0.43		6.995 0.153	0.9 0.8	114.3 25.4	OK OK
SE-3.001	MH(SE)-8	15 minute 1 year Wi	nter I+25%.	4.830	3.247	-0.260	0.000	0.35		0.249	0.8	46.5	OK
SE-3.002 SE-1.004	MH(SE)-9 MH(SE)-10	15 minute 1 year Wi 15 minute 1 year Wi			3.096	-0.300 -0.317	0.000 0.000	0.38 0.45		1.644 4.973	0.8 0.7	74.7 182.6	
SE-4.000 SE-4.001	MH(SE)-11 MH(SE)-12	15 minute 1 year Wi 15 minute 1 year Wi			3.471 3.251	-0.159 -0.260	0.000 0.000	0.44 0.35		0.153 0.248	0.8 0.8	25.6 46.3	OK OK
SE-4.001	MH(SE)-12 MH(SE)-13	15 minute 1 year Wi			3.095	-0.309	0.000	0.34		1.432	0.8	65.3	OK
SE-4.003 SE-5.000	MH(SE)-14 MH(SE)-LC-EAST	15 minute 1 year Wi 15 minute 1 year Wi			2.984 3.250	-0.313 -0.150	0.000	0.32 0.49		3.099 0.164	0.9 0.8	71.0 28.8	OK OK
SE-5.001	MH(SE)-16	15 minute 1 year Wi			3.186	-0.151	0.000	0.49		0.528	0.8	29.0	OK
SE-4.004 SE-1.005	MH(SE)-14-1 MH(SE)-15	15 minute 1 year Wi 15 minute 1 year Wi			2.923 2.761	-0.302 -0.309	0.000 0.000	0.38 0.65		1.513 6.295	1.1 1.0	93.8 282.0	OK OK
SE-6.000 SE-7.000	MH(SE)-16 MH(SE)-17	15 minute 1 year Wi 15 minute 1 year Wi				-0.119 -0.134	0.000 0.000	0.43 0.34		0.114 0.098	0.7 0.8	13.1 12.0	
SE-6.001	MH(SE)-18	15 minute 1 year Wi	nter I+25%	4.930	3.491	-0.085	0.000	0.70		0.867	0.9	24.2	OK
SE-8.000 SE-9.000	MH(SE)-19 MH(SE)-20	15 minute 1 year Wi 15 minute 1 year Wi			3.522 3.485	-0.098 -0.135	0.000 0.000	0.58 0.33		0.138 0.096	0.8 0.8	17.6 11.9	OK OK
SE-6.002	MH(SE)-21	15 minute 1 year Wi			3.354	-0.111	0.000	0.72		0.820	1.1		
SE-6.003 SE-6.004	MH(SE)-23 MH(SE)-23-1	360 minute 1 year Wi 15 minute 1 year Wi				-0.279 -0.320	0.000 0.000	0.04 0.02		45.474 0.237	0.4 0.3	3.2 1.4	OK OK
SE-10.000 SE-6.005	MH(SE)-22 MH(SE)-24	15 minute 1 year Wi 15 minute 1 year Wi			3.681 3.002	-0.089 -0.249	0.000 0.000	0.66 0.23		0.149 0.765	0.9 0.6	21.9 19.1	OK OK
SE-6.006	MH(SE)-25	15 minute 1 year Wi	nter I+25%	5.000	2.862	-0.255	0.000	0.22		0.881	0.6	18.6	OK
SE-11.000 SE-11.001	MH(SE)-26 MH(SE)-27	15 minute 1 year Wi 15 minute 1 year Wi			3.123 2.911	-0.127 -0.179	0.000 0.000	0.70 0.65		0.275 2.166	0.9 1.0	66.0 99.1	
SE-12.000	MH(SE)-28	15 minute 1 year Wi	nter I+25%	4.450	3.139	-0.111	0.000	0.69		0.208	1.0	44.0	OK
SE-12.001 SE-11.002	MH(SE)-29 MH(SE)-30	15 minute 1 year Wi 15 minute 1 year Wi			2.940 2.737	-0.143 -0.215	0.000 0.000	0.68 0.62		0.911 3.880		68.7 162.2	OK
SE-13.000 SE-13.001	MH(SE)-31-1 MH(SE)-31	15 minute 1 year Wi 15 minute 1 year Wi			3.187 2.944	-0.163 -0.106	0.000 0.000	0.58 0.86		0.234 2.474	1.2 1.0	73.5 83.5	OK OK
SE-13.002	MH(SE)-32	15 minute 1 year Wi	nter I+25%	4.580	2.784	-0.196	0.000	0.60		1.011	1.1	100.5	OK
SE-14.000 SE-14.001	MH(SE)-33 MH(SE)-34	15 minute 1 year Wi 15 minute 1 year Wi			3.337 3.132	-0.043 -0.081	0.000 0.000	0.95 0.87		0.200 0.657	0.9 0.8	29.0 46.3	OK OK
SE-11.003 SE-15.000	MH(SE)-35 MH(SE)-36	15 minute 1 year Wi 15 minute 1 year Wi			2.640 3.335	-0.171 -0.045	0.000 0.000	0.88 0.94		7.967 0.198	1.0 0.9	295.0 28.8	OK OK
SE-15.001	MH(SE)-37	15 minute 1 year Wi	nter I+25%	4.580	3.131	-0.082	0.000	0.87		0.654	0.8	46.3	OK
SE-16.000 SE-11.004	MH(SE)-39 MH(SE)-40	15 minute 1 year Wi 15 minute 1 year Wi				-0.101 -0.209	0.000 0.000	0.76 0.91		0.219 8.478	0.8 0.9	41.3 363.2	
SE-11.005	MH(SE)-41	15 minute 1 year Wi	nter I+25%.	4.750	2.343	-0.365	0.000	0.55		4.918	1.2	348.3	OK
SE-11.006 SE-17.000	MH(SE)-42 MH(SE)-43-1	15 minute 1 year Wi 15 minute 1 year Wi			2.189 2.725	-0.344 -0.100	0.000 0.000	0.54 0.55		22.363 0.135	1.1 0.9	324.4 19.4	OK OK
SE-18.000	MH(SE)-43-2	15 minute 1 year Wi	nter I+25%.	4.580	3.250 2.454	-0.130	0.000	0.36		0.101	0.7	11.0 29.7	OK
SE-17.001 SE-11.007		15 minute 1 year Wi 1440 minute 1 year Wi	nter I+25%.	4.650	2.454 2.060	-0.043 -0.354	0.000 0.000	0.99 0.05		0.761 15.263	0.9 0.4	26.4	OK OK
SE-19.000 SE-19.001	MH(SE)-44-1 MH(SE)-44	15 minute 1 year Wi 15 minute 1 year Wi			3.258 3.141	-0.122 -0.146	0.000 0.000	0.42 0.50		0.111 0.316	0.7 0.9	12.3 32.2	OK OK
SE-19.002	MH(SE)-45	15 minute 1 year Wi	nter I+25%	4.580	3.048	-0.072	0.000	0.90		1.617	0.9	47.9	OK
SE-20.000 SE-20.001	MH(SE)-46 MH(SE)-47	15 minute 1 year Su 15 minute 1 year Wi			3.155 3.085	-0.225 -0.152	0.000 0.000	0.00 0.47		0.000 0.260	0.0 0.9	0.0 29.7	OK OK
SE-19.003	MH(SE)-48	15 minute 1 year Wi	nter I+25%.	4.580	2.940	-0.065	0.000	0.97		2.541	1.3	74.1	OK
SE-21.000 SE-21.001	MH(SE)-51 MH(SE)-52	15 minute 1 year Wi 15 minute 1 year Wi				-0.399 -0.403	0.000 0.000	0.13 0.12		0.173 0.728	0.8 1.3	29.7 49.9	OK OK
SE-19.004 SE-19.005	MH(SE)-53 MH(SE)-54	15 minute 1 year Wi 15 minute 1 year Wi	nter I+25%	4.580	2.517	-0.295 -0.396	0.000	0.50		1.267 4.065	1.0	137.1	OK
UH 17.UUD		I MILIUCE I YEAL WI	LICCE LTGOG	1.000	4.404	0.390	0.000	0.31		U03	0.0	147.3	OK

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	US/MH		US/CL		Depth		Flow /	Overflow	Maximum	Velocity	-	
PN	Name	Event	(m)	(m)	- (m)	(m <sup>3</sup> )	Cap.	(l/s)	Vol (m³)	(m/s)	(l/s)	Status
SE-19.006	MH(SE)-55	15 minute 1 year Winter I+25%		2.215	-0.333	0.000	0.30		13.422		152.2	0
SE-22.000	MH(SE)-56	15 minute 1 year Winter I+25%		3.200	-0.150	0.000	0.48		0.164		28.4	C
SE-22.001	MH(SE)-57	15 minute 1 year Winter I+25%	4.550	2.989	-0.236	0.000	0.29		0.300	0.8	27.8	C
SE-22.002	MH(SE)-58	15 minute 1 year Winter I+25%	4.550	2.842	-0.282	0.000	0.21		0.539	0.6	26.0	C
SE-23.000	MH(SE)-59-5	15 minute 1 year Winter I+25%	4.550	3.142	-0.208	0.000	0.39		0.183	0.9	41.7	C
SE-23.001	MH(SE)-59-4	15 minute 1 year Winter I+25%	4.550	3.008	-0.172	0.000	0.56		1.693	1.0	58.4	C
SE-23.002	MH(SE)-59-3	15 minute 1 year Winter I+25%	4.550	2.883	-0.157	0.000	0.69		1.939	0.9	90.8	C
SE-22.003	MH(SE)-59-2	15 minute 1 year Winter I+25%	4.550	2.802	-0.125	0.000	0.86		6.928	0.9	109.8	C
SE-22.004	MH(SE)-59-1	15 minute 1 year Winter I+25%	4.565	2.650	-0.197	0.000	0.62		3.191	0.8	115.1	C
SE-22.005	MH(SE)-59	15 minute 1 year Winter I+25%	4.580	2.565	-0.206	0.000	0.66		4.373	1.0	128.7	C
SE-22.006	MH(SE)-60	15 minute 1 year Winter I+25%	4.580	2.369	-0.284	0.000	0.49		4.203	0.9	133.8	C
SE-24.000	MH(SE)-61-1	15 minute 1 year Winter I+25%	4.550	3.245	-0.105	0.000	0.54		0.130	0.9	18.6	C
SE-24.001	MH(SE)-61	15 minute 1 year Winter I+25%	4.550	3.048	-0.126	0.000	0.61		0.357	0.9	38.5	0
SE-24.002	MH(SE)-62	15 minute 1 year Winter I+25%	4.700	2.766	-0.198	0.000	0.46		0.482	0.7	38.3	0
SE-25.000 M	IH(SE)-LC-WEST	15 minute 1 year Winter I+25%	4.400	3.331	-0.069	0.000	0.94		0.255	1.0	60.2	C
SE-22.007	MH(SE)-63	15 minute 1 year Winter I+25%	4.580	2.253	-0.282	0.000	0.56		7.266	0.9	176.8	C
SE-19.007	MH(SE)-64	15 minute 1 year Winter I+25%	4.750	2.192	-0.272	0.000	0.73		11.497	1.1	327.8	C
SE-11.008	MH(SE)-65	1440 minute 1 year Winter I+25%		2.060	0.080	0.000	0.22		1276.290	0.4	27.8	SURCHARGE
SE-26.000	MH(SE)-EX-66	30 minute 1 year Winter I+25%		4.732	1.307	31.517	2.11		33.208	2.1	82.0	FLOC
SE-6.007		1440 minute 1 year Winter I+25%		1.958	-0.038	0.000	0.23		5.028	0.7	46.3	C
		1440 minute 1 year Winter I+25%		1.954	0.034	0.000	0.23		6.903	0.7		SURCHARGE
SE-6.008	,,	-		1.949	0.169	0.000	0.28		15.804			SURCHARGE
SE-6.008 SE-6.009	MH(SE)-69	1440 minute 1 year Winter I+25%							1	5.0	/	
SE-6.009		1440 minute 1 year Winter I+25% 1440 minute 1 year Winter I+25%		1,946	0.206	0.000	0.23		4.367	07	44.3	SURCHARGE
SE-6.009 SE-6.010	MH(SE)-69-1	1440 minute 1 year Winter I+25%	4.830	1.946 1.942	0.206	0.000	0.23		4.367 8.017	0.7		
SE-6.009 SE-6.010 SE-1.006	MH(SE)-69-1 MH(SE)-70	1440 minute 1 year Winter I+25% 1440 minute 1 year Winter I+25%	4.830 4.830	1.942	0.243	0.000	0.09		8.017	0.5	63.8	SURCHARGE
SE-6.009 SE-6.010 SE-1.006 SE-1.007	MH(SE)-69-1 MH(SE)-70 MH(SE)-71	1440 minute 1 year Winter I+25% 1440 minute 1 year Winter I+25% 1440 minute 1 year Winter I+25%	4.830 4.830 4.830	1.942 1.940	0.243 0.343	0.000 0.000	0.09 0.08		8.017 34.543	0.5	63.8 61.5	SURCHARGE SURCHARGE
SE-6.009 SE-6.010 SE-1.006	MH(SE)-69-1 MH(SE)-70	1440 minute 1 year Winter I+25% 1440 minute 1 year Winter I+25% 1440 minute 1 year Winter I+25%	4.830 4.830 4.830 4.830	1.942	0.243	0.000	0.09		8.017	0.5 0.5 1.2	63.8	SURCHARGE SURCHARGE SURCHARGE

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Innovyze								2020.1.3							
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	5 year Retu	ırn Period	Summar	ry of	Crit	cical	Result	s by Max	imum Le	vel (R	lank 1)	for Prop	posed St	corm	
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	US/MH					បន/៣	Water Level	Surcharged Depth		Flow /	Overflow	v Maximum	Maximum Velocity	-	
PN	Name		Event			(m)	(m)	(m)	(m <sup>3</sup> )	Cap.		Vol (m <sup>3</sup> )	-	(1/s)	Status
SE-1.000	MH(SE)-1	15 minute	5 year W	inter	I+25%	4.740	3.587	0.047	0.000	1.22		0.387	0.9	63.9	SURCHARGEI
<mark>SE-1.001</mark> SE-1.002		15 minute 15 minute						0.006	0.000 0.000	1.07 0 33		2.497 0.864			SURCHARGEI
SE-2.000	MH(SE)-4	15 minute	-					-0.080	0.000	0.84		0.243		60.4	01
SE-2.001 SE-1.003	MH(SE)-5 MH(SE)-6	15 minute 15 minute	-					-0.081 -0.160	0.000 0.000	0.94 0.67		1.426 14.758		105.7 175.2	01
SE-3.000	MH(SE)-7	15 minute	-					-0.106	0.000	0.72		0.213		42.2	0
SE-3.001 SE-3.002	MH(SE)-8 MH(SE)-9	15 minute 15 minute	-					-0.195 -0.220	0.000 0.000	0.59 0.62		0.631 3.412		77.4 121.3	01 01
SE-1.004	MH(SE)-10	15 minute	5 year W	inter	I+25%	4.830	2.970	-0.150	0.000	0.69		11.807	0.8	284.2	03
SE-4.000 SE-4.001	MH(SE)-11 MH(SE)-12	15 minute 15 minute	-					-0.105 -0.195	0.000 0.000	0.72 0.59		0.215 0.626		42.6 77.2	01
SE-4.002	MH(SE)-13	15 minute	5 year W	inter	I+25%	4.830	3.170	-0.234	0.000	0.56		3.063	0.9	108.1	Ol
SE-4.003 SE-5.000	MH(SE)-14 MH(SE)-LC-EAST	15 minute 15 minute	-					-0.237 -0.089	0.000 0.000	0.53 0.82		5.189 0.233		117.9 48.2	01 01
SE-5.001	MH(SE)-16	15 minute	-					-0.091	0.000	0.83		0.844		48.6	Ol
SE-4.004 SE-1.005	MH(SE)-14-1 MH(SE)-15	15 minute 15 minute	-					-0.224 -0.139	0.000 0.000	0.62 1.00		2.401 10.592		154.6 435.2	01 01
SE-6.000	MH(SE)-16	15 minute	-					-0.073	0.000	0.72		0.166		21.7	0
SE-7.000 SE-6.001	MH(SE)-17 MH(SE)-18	15 minute 15 minute	-					-0.097 0.017	0.000 0.000	0.56 1.06		0.139 2.094	1.0	19.9 <mark>36.4</mark>	O SURCHARGE
SE-8.000 SE-9.000	MH(SE)-19 MH(SE)-20	15 minute 15 minute	-					-0.038 -0.104	0.000 0.000	0.96 0.54		0.206 0.131	0.9	29.3 19.9	01 01
SE-6.002	MH(SE)-21	15 minute	-					0.003	0.000	1.05		2.662			SURCHARGE
SE-6.003 SE-6.004	MH(SE)-23 MH(SE)-23-1	240 minute 15 minute	-					-0.224 -0.275	0.000 0.000	0.05 0.04		71.949 0.452	0.4 0.4	4.1 3.1	01 01
SE-10.000	MH(SE)-22	15 minute	5 year W	inter	I+25%	4.970	3.785	0.015	0.000	1.11		0.266	0.9	36.6	SURCHARGE
SE-6.005 SE-6.006	MH(SE)-24 MH(SE)-25	15 minute 15 minute	-					-0.208 -0.216	0.000 0.000	0.39 0.37		1.254 1.648		32.2 31.2	0
SE-11.000	MH(SE)-26	15 minute	5 year W	inter	I+25%	4.450	3.327	0.077	0.000	1.17		0.506	1.1	109.3	SURCHARGE
SE-11.001 SE-12.000	MH(SE)-27 MH(SE)-28	15 minute 15 minute	-					0.015 0.050	0.000 0.000	0.98 1.12		6.245 0.391			SURCHARGE SURCHARGE
SE-12.001	MH(SE)-29 MH(SE)-30	<mark>15 minute</mark> 15 minute	-					0.014 0.036	0.000	<mark>1.07</mark> 0.91		<b>2.761</b>			SURCHARGE
SE-11.002 SE-13.000	MH(SE)-30 MH(SE)-31-1	15 minute 15 minute	-					0.036 0.013	0.000 0.000	0.91		12.249 0.433			SURCHARGE
SE-13.001 SE-13.002	MH(SE)-31 MH(SE)-32	15 minute 15 minute	-					<mark>0.058</mark> 0.019	<mark>0.000</mark> 0.000	1.36 0.91		5.734 2.551			SURCHARGE
SE-14.000	MH(SE)-33	15 minute	5 year W	inter	I+25%	4.580	3.670	0.290	0.000	1.46		0.577	1.1	44.4	SURCHARGE
SE-14.001 SE-11.003	MH(SE)-34 MH(SE)-35	15 minute 15 minute	-					0.081 0.056	0.000 0.000	1.34 1.33		1.916 15.727			SURCHARGE SURCHARGE
SE-15.000	MH(SE)-36	15 minute	5 year W	inter	I+25%	4.580	3.664	0.284	0.000	1.45		0.570	1.1	44.1	SURCHARGE
SE-15.001 SE-16.000	MH(SE)-37 MH(SE)-39	15 minute 15 minute	-					0.080 0.085	0.000 0.000	1.35 1.25		1.910 0.430			SURCHARGE SURCHARGE
SE-11.004	MH(SE)-40	15 minute	5 year W	inter	I+25%	4.580	2.744	0.000	0.000	1.41		12.749	1.1	561.9	0
SE-11.005 SE-11.006	MH(SE)-41 MH(SE)-42	15 minute 15 minute	_					-0.213 -0.181	0.000 0.000	0.85 0.82		7.270 33.913		535.0 492.2	0
SE-17.000	MH(SE) - 43 - 1	15 minute	5 year W	inter	I+25%	4.580	2.842	0.017	0.000	0.89		0.268	1.0		SURCHARGE
SE-18.000 SE-17.001	MH(SE)-43-2 MH(SE)-43-3	15 minute 15 minute	-				3.283 <mark>2.562</mark>	-0.097 0.065	0.000 0.000	0.61 <mark>1.63</mark>		0.140 1.666	0.8 1.2	18.5 <mark>48.6</mark>	O SURCHARGE
SE-11.007 SE-19.000		1440 minute 15 minute					2.270 3.456	-0.144	0.000	0.07 0.67		25.389	0.5	37.3 19.8	0 SURCHARGE
SE-19.000 SE-19.001	MH(SE)-44-1 MH(SE)-44	15 minute	5 year W	inter	I+25%	4.580	3.456 3.424	0.076 0.137	0.000 0.000	0.70		0.335 1.407	0.8 0.9	44.9	SURCHARGE
SE-19.002 SE-20.000	MH(SE)-45 MH(SE)-46	15 minute 15 minute	-				<mark>3.349</mark> 3.204	<mark>0.229</mark> -0.176	<mark>0.000</mark> 0.000	1.26 0.01		<mark>3.590</mark> 0.050	<b>1.0</b> 0.2	<mark>66.9</mark> 0.3	SURCHARGE
SE-20.000 SE-20.001	MH(SE)-46 MH(SE)-47	15 minute	5 year W	inter	I+25%	4.580	3.204 3.214	-0.176	0.000	0.78		0.910	1.0	48.8	0
<mark>SE-19.003</mark> SE-21.000	MH(SE)-48 MH(SE)-51	<mark>15 minute</mark> 15 minute	-				<mark>3.162</mark> 2.911	<mark>0.157</mark> -0.359	0.000 0.000	1.37 0.21		<mark>5.846</mark> 0.231	1.5 0.9	104.5 49.7	SURCHARGE
SE-21.001	MH(SE)-51 MH(SE)-52	15 minute	5 year W	inter	I+25%	4.680	2.911 2.797	-0.359	0.000	0.20		1.282		49.7 83.6	0.
SE-19.004	MH(SE)-53	15 minute	-				2.614 2.496	-0.198 -0.184	0.000	0.76 0.45		2.644 12.221		209.0 216.7	01 01
SE-19.005	MH(SE)-54	15 minute	5 vear W	TULER						0 4 5		12 221			

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							Water	Surcharged	Flooded				Maximum	Pipe	
	US/MH					US/CL	Level	Depth	Volume	Flow /	Overflow	Maximum	Velocity	Flow	
PN	Name		Eve	nt		(m)	(m)	(m)	(m³)	Cap.	(l/s)	Vol (m³)	(m/s)	(l/s)	Status
an 10 00c		1 -				4 500	0 467	-0.081	0.000	0.40		25.361	0 7	205.2	0
SE-19.006 SE-22.000	MH(SE)-55 MH(SE)-56		minute 5 ye minute 5 ye				2.467 3.261	-0.081	0.000	0.40		25.361	0.7	47.5	
SE-22.000 SE-22.001	MH(SE)-50 MH(SE)-57		minute 5 ye				3.201	-0.089		0.81		0.233	0.9	47.5	(
	. ,		-				2.982								
SE-22.002	MH(SE)-58		minute 5 ye					-0.142		0.30		2.102	0.6	36.8	(
SE-23.000	MH(SE)-59-5		minute 5 ye				3.210	-0.140		0.65		0.261	1.0	69.6	C
SE-23.001	MH(SE)-59-4		minute 5 ye				3.159	-0.021	0.000	0.81		4.417	1.0	85.3	C
SE-23.002	MH(SE)-59-3		minute 5 ye				3.084	0.044		1.05		4.721			SURCHARGE
SE-22.003	MH(SE)-59-2		minute 5 ye				2.967	0.040	0.000	1.31		12.309			SURCHARGE
SE-22.004	MH(SE)-59-1		minute 5 ye				2.793	-0.054		0.93		5.704		172.5	C
SE-22.005	MH(SE)-59		minute 5 ye				2.699	-0.072		0.99		6.956		193.3	C
SE-22.006	MH(SE)-60		minute 5 ye				2.571	-0.082		0.73		10.334		198.9	C
SE-24.000	MH(SE)-61-1		minute 5 ye				3.296	-0.054		0.90		0.188	1.0	31.1	C
SE-24.001	MH(SE)-61		minute 5 ye				3.155	-0.019	0.000	0.99		1.007	1.0	62.5	C
SE-24.002	MH(SE)-62		minute 5 ye				2.831	-0.133	0.000	0.74		1.083	0.8	62.1	C
	MH(SE)-LC-WEST		minute 5 ye				3.568	0.168		1.51		0.523	1.4		SURCHARGE
SE-22.007	MH(SE)-63		minute 5 ye				2.495	-0.040	0.000	0.86		15.529		272.8	C
SE-19.007	MH(SE)-64		minute 5 ye				2.442	-0.022		1.00		20.224		448.7	C
SE-11.008			minute 5 ye				2.269	0.289	0.000	0.24		1781.883	0.4		SURCHARGE
SE-26.000	MH(SE)-EX-66		minute 5 ye				4.823		123.365	2.17		125.053	2.1		FLOC
SE-6.007	. ,		minute 5 ye				2.068	0.072		0.28		5.327	0.7		SURCHARGE
SE-6.008	. ,		minute 5 ye				2.056	0.136	0.000	0.28		7.330	0.7		SURCHARGE
SE-6.009			minute 5 ye				2.039	0.259		0.33		15.955	0.6		SURCHARGE
SE-6.010	MH(SE)-69-1	1440	minute 5 ye	ar Winter	I+25%	4.830	2.029	0.289	0.000	0.26		4.486	0.7		SURCHARGI
	MH(SE)-70	1440	minute 5 ye	ar Winter	_I+25%	4.830	2.018	0.319	0.000	0.11		8.210	0.4	80.8	SURCHARGE
SE-1.006	111(02) / 0						0 010	0 415	0 000	0.11		24 707	0 5	<b>-</b>	attpattapat
SE-1.006 SE-1.007		1440	minute 5 ye	ar Winter	`I+25%	4.830	2.012	0.415	0.000	0.11		34.727	0.5	79.6	SURCHARGE
			minute 5 ye minute 5 ye				2.012 4.018	0.415	0.000	1.48		0.772			SURCHARGE SURCHARGE
SE-1.007	MH(SE)-71	15	-	ar Winter	'I+25%	4.830								108.7	

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	Hot	Start (mins)	) 0	Fo	ul Sew	age pei	hectar	e (l/s) 0.0	000		Inl	et Coeffied	cient 0.8	00	
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PN	US/MH Name		Event			US/CL (m)	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.		v Maximum Vol (m³)	-	Flow (l/s)	Status
SE-1.000		15 minute :			T + 0 F ↔					1.39		0.528			
SE-1.001	MH(SE)-2	15 minute	10 year	Winter	I+25%	4.740	3.523	0.172 0.075	0.000	1.34		2.820	1.2	128.8	SURCHARGE SURCHARGE
SE-1.002 SE-2.000		15 minute 15 minute 1						-0.136 0.019	0.000 0.000			2.417		117.3 67.1	
SE-2.000 SE-2.001		15 minute 15 minute 1	-					0.019	0.000	0.93 1.10		0.356 <mark>3.201</mark>			SURCHARGE
SE-1.003		15 minute	-					-0.016	0.000	0.73		22.164		190.5	C
SE-3.000 SE-3.001	MH(SE)-7 MH(SE)-8	15 minute 15 minute 1	-				3.545	-0.085 -0.145	0.000 0.000	0.83 0.73		0.238 0.981		48.8 96.6	C
SE-3.002	, ,	15 minute 1	-					-0.158	0.000	0.80		4.974		154.9	C
SE-1.004 SE-4.000		15 minute 15 minute 1	-					-0.005 -0.083	0.000 0.000	0.73 0.84		18.789 0.239		298.2 49.3	C
SE-4.000		15 minute 1	-					-0.146	0.000	0.74		0.235		96.5	C
SE-4.002	. ,	15 minute 1	-					-0.183	0.000	0.71		4.277		137.5	C
SE-4.003 SE-5.000	MH(SE)-14 MH(SE)-LC-EAST	15 minute 1 15 minute 1	-					-0.157 -0.065	0.000 0.000	0.64 0.94		7.445 0.260		141.4 55.8	C
SE-5.001	MH(SE)-16		-					-0.067	0.000	0.96		0.959		56.2	C
SE-4.004 SE-1.005	MH(SE)-14-1 MH(SE)-15	15 minute . 15 minute :	-					-0.117 0.000	0.000 0.000	0.77 1.06		3.928 13.634		190.4 459.9	C
SE-6.000		15 minute 1	-					0.000	0.000	0.79		0.248		23.9	C
SE-7.000 SE-6.001		15 minute : 15 minute :	-					-0.031 0.077	0.000 0.000	0.63 1.18		0.214 2.757	0.9 1.0	22.5 <mark>40.6</mark>	SURCHARGE
SE-8.000	MH(SE)-19	15 minute	10 year	Winter	I+25%	4.820	3.675	0.055	0.000	1.08		0.311	0.9	32.8	SURCHARGE
SE-9.000 SE-6.002		15 minute 1 15 minute 1	-					-0.069 0.032	0.000	0.62 1.24		0.171 2.981	1.0 1.3		SURCHARGE
SE-6.003	MH(SE)-23	240 minute	10 year	Winter	I+25%	4.970	3.183	-0.196	0.000	0.06		85.094	0.4	4.5	C
SE-6.004 E-10.000	MH(SE)-23-1 MH(SE)-22	15 minute 15 minute 1	-					-0.263 0.057	0.000	0.04 1.29		0.549 0.313	0.4		SURCHARGI
SE-6.005	MH(SE)-24	15 minute i	10 year	Winter	I+25%	5.000	3.058	-0.193	0.000	0.44		1.433	0.7	36.8	(
SE-6.006 E-11.000		15 minute 15 minute 1	-					-0.204 0.241	0.000	0.43 1.27		1.902 0.691		35.8 119.5	SURCHARG
E-11.001	MH(SE)-27	15 minute	10 year	Winter	I+25%	4.450	3.282	0.192	0.000	1.16		7.596	1.2	176.1	SURCHARG
E-12.000 E-12.001		15 minute 15 minute 1						0.223 0.189	0.000 0.000	1.23 1.27		0.586 3.630			SURCHARG
E-11.002	MH(SE)-30	15 minute	10 year	Winter	I+25%	4.450	3.102	0.150	0.000	1.10		13.412	1.4	287.5	SURCHARGI
E-13.000 E-13.001	MH(SE)-31-1 MH(SE)-31	15 minute 15 minute 1	-					0.177 0.200	0.000 0.000	1.03 1.45		0.618 7.460			SURCHARGI SURCHARGI
E-13.002	MH(SE)-32	15 minute	10 year	Winter	I+25%	4.580	3.102	0.122	0.000	1.01		2.810	1.2	171.2	SURCHARGI
E-14.000 E-14.001		15 minute 15 minute 1						0.512 0.179	0.000 0.000	1.67 1.59		0.828 2.205			SURCHARG
S-14.001 S-11.003		15 minute . 15 minute :	-					0.179	0.000	1.59		16.953			SURCHARG
E = 15.000		15 minute 1						0.505	0.000	1.66		0.820			SURCHARG
E-15.001 E-16.000		15 minute : 15 minute :						0.179 0.172	0.000 0.000	1.62 1.45		2.204 0.528			SURCHARG
E-11.004	MH(SE) $-40$	15 minute	10 year	Winter	I+25%	4.580	2.773	0.029	0.000	1.66		13.098			SURCHARG
E-11.005 E-11.006		15 minute 1 15 minute 1	-					0.000 -0.020	0.000 0.000	1.00 0.92		10.073 43.756		627.5 551.5	(
E-17.000	MH(SE)-43-1	15 minute	10 year	Winter	I+25%	4.580	2.965	0.140	0.000	1.02		0.407	1.0	36.0	SURCHARGI
E-18.000 E-17.001	MH(SE)-43-2 MH(SE)-43-3		-				3.297 2.596	-0.083 0.099	0.000	0.70 1.85		0.154 1.957	0.8 1.4	21.4	( SURCHARGI
E-11.007	MH(SE)-43	15 minute 1	10 year	Winter	I+25%	4.650	2.386	-0.028	0.000	1.00		30.236		530.3	(
E-19.000 E-19.001	MH(SE)-44-1 MH(SE)-44		-				3.873	0.493	0.000	0.70		0.806	0.8		SURCHARGE
E-19.001 E-19.002		15 minute 1 15 minute 1	-				3.831 <mark>3.706</mark>	0.544 0.586	0.000 0.000	0.83 1.57		1.867 3.994	0.9		SURCHARGI
E-20.000	MH(SE)-46	15 minute :	10 year	Winter	I+25%	4.580	3.504	0.124	0.000	0.05		0.389	0.3	1.8	SURCHARGE
E-20.001 E-19.003		15 minute 15 minute 1	-				3.510 3.399	0.273 0.394	0.000	0.92 1.74		1.699 6.326	1.0 1.9		SURCHARGE
		15 minute 1	10 year	Winter	I+25%	4.550	2.926	-0.344	0.000	0.25		0.251	0.9	57.6	C
SE-21.000					T+25%	4 680	2.818	-0.343	0.000	0.25		1.579	1.6	103.7	C
SE-21.000 SE-21.001 SE-19.004		15 minute 15 minute 1	-				2.705	-0.107	0.000	0.25		4.748		263.1	C

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	10 vear Re	turn Period Summary of Crit	ical	Result	s by Max	imum Le	evel (I	Rank 1)	for Pro	posed St	orm	
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				Water &	Surcharged	Flooded				Maximum	Pipe	
	US/MH		US/CL	Level	Depth	Volume	Flow /	Overflow	Maximum	Velocity	Flow	
PN	Name	Event	(m)	(m)	(m)	(m³)	Cap.	(l/s)	Vol (m³)	(m/s)	(l/s)	Status
GR 10 00C			4 500	0 500	0 010	0 000	0.52			0 0	264.8	0
SE-19.006	MH(SE)-55	15 minute 10 year Winter I+25%		2.529 3.284	-0.019	0.000	0.52		27.655	0.8		0:
SE-22.000	MH(SE)-56	15 minute 10 year Winter I+25%		3.284 3.105	-0.066	0.000	0.93		0.260 1.204		55.0	
SE-22.001	MH(SE)-57	15 minute 10 year Winter I+25%			-0.120					0.9	51.9	0
SE-22.002	MH(SE)-58	15 minute 10 year Winter I+25%		3.078	-0.046	0.000	0.34		3.393	0.6	41.7	0
SE-23.000	MH(SE)-59-5	15 minute 10 year Winter I+25%		3.420	0.070	0.000	0.69		0.498	1.0		SURCHARGE
SE-23.001	MH(SE)-59-4	15 minute 10 year Winter I+25%		3.349	0.169	0.000	0.98		6.100	1.0	102.6	SURCHARGE
SE-23.002	MH(SE)-59-3	15 minute 10 year Winter I+25%	4.550	3.214	0.174	0.000	1.29		5.199			SURCHARGE
SE-22.003	MH(SE)-59-2	15 minute 10 year Winter I+25%	4.550	3.061	0.134	0.000	1.50		13.735	1.2	191.7	SURCHARGE
SE-22.004	MH(SE)-59-1	15 minute 10 year Winter I+25%	4.565	2.886	0.039	0.000	1.06		6.729	0.9	197.3	SURCHARGE
SE-22.005	MH(SE)-59	15 minute 10 year Winter I+25%	4.580	2.801	0.030	0.000	1.11		8.306	1.0	215.6	SURCHARGE
SE-22.006	MH(SE)-60	15 minute 10 year Winter I+25%	4.580	2.647	-0.006	0.000	0.82		12.223	0.9	222.3	0
SE-24.000	MH(SE)-61-1	15 minute 10 year Winter I+25%	4.550	3.462	0.112	0.000	0.99		0.376	1.0	34.3	SURCHARGE
SE-24.001	MH(SE)-61	15 minute 10 year Winter I+25%	4.550	3.289	0.115	0.000	1.21		1.754	1.1	76.7	SURCHARGE
SE-24.002	MH(SE)-62	15 minute 10 year Winter I+25%	4.700	2.868	-0.096	0.000	0.88		1.554	0.9	74.0	C
SE-25.000	MH(SE)-LC-WEST	15 minute 10 year Winter I+25%	4.400	3.666	0.266	0.000	1.73		0.635	1.6	111.0	SURCHARGE
SE-22.007	MH(SE)-63	15 minute 10 year Winter I+25%	4.580	2.551	0.016	0.000	1.07		17.257	1.0	341.3	SURCHARGE
SE-19.007	MH(SE)-64	15 minute 10 year Winter I+25%		2.495	0.031	0.000	1.35		21.467			SURCHARGE
SE-11.008	1	1440 minute 10 year Winter I+25%		2.375	0.395	0.000	0.30		2039.409	0.4		SURCHARGE
SE-26.000	MH(SE)-EX-66	30 minute 10 year Winter I+25%		4.864		164.227	2.19		165.918	2.1	85.1	FLOO
SE-6.007		1440 minute 10 year Winter I+25%		2.138	0.142	0.000	0.29		5.430	0.7		SURCHARGE
SE-6.008		1440 minute 10 year Winter I+25%		2.130	0.203	0.000	0.29		7.434	0.7		SURCHARGE
SE-6.008 SE-6.009		1440 minute 10 year Winter I+25% 1440 minute 10 year Winter I+25%		2.123	0.203	0.000	0.29		16.045	0.7		SURCHARGE
		-		2.102	0.322	0.000	0.34		4.573	0.8		SURCHARGE
SE-6.010		1440 minute 10 year Winter I+25%										
SE-1.006		1440 minute 10 year Winter I+25%		2.076	0.377	0.000	0.12		8.357	0.4		SURCHARGE
	MH(SE) = 7/1	1440 minute 10 year Winter I+25%	4.830	2.069	0.472	0.000	0.11		34.872	0.5	84.7	SURCHARGE
SE-1.007		-			e	· · · ·					100 0	
SE-1.007 SE-27.000	MH(SE)-72-2	15 minute 10 year Winter I+25%		4.224	0.594	0.000	1.68		1.006			SURCHARGE
SE-1.007	MH(SE)-72-2 MH(SE)-72-1	-	4.830	4.224 3.553 2.062	0.594 0.151 0.962	0.000 0.000 0.000	1.68 1.77 0.29		1.006 3.474 1806.885		122.6	SURCHARGE SURCHARGE SURCHARGE

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nnovyze	osed SouthEa	st - Surcharged +	1.9m V2			by Tom Wa 2020.1.3	tson						J
					CWOIN 2	1020.1.5							
	20 year Ret	turn Period Summa	ry of Cr	itical	. Result	ts by Max	imum Le	vel (Ra	ank 1)	for Pro	posed St	torm	
	Areal Redu	action Factor 1.000	Manhole H	<u>Si</u> Ieadloss	mulation Coeff (C	<u>Criteria</u> Global) 0.5	00	MADD Fac	tor * 1	0m³/ha Sto	prage 2.0(	00	
	Hot	Start (mins) 0	Foul Se	wage pe	r hectare	e (l/s) 0.0 al Flow 0.0	00	per Perso		t Coeffied ay (l/per/			
	1	Number of Input Hydrog Number of Online Con								-			
		Rainfall M			FSR MS	nfall Detai 5-60 (mm) 1 Patio P	7.000 Cv						
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		Dr	Analy	SIS TIME	step fi	ne DVD Sta	cus OFF	Summ	er and V	linter			
			) (mins) (years)	15, 30,	60, 120,	180, 240,	360, 480	, 600, 7 1, 1		1440 20, 30			
PN	US/MH Name	Event		US/CI (m)	Water Level (m)	Surcharged Depth (m)		Flow / C		<sup>7</sup> Maximum Vol (m <sup>3</sup> )	-	Flow	Status
SE-1.000	MH(SE)-1	15 minute 20 year W		5% 4.740	3.835	0.295	0.000	1.62	/	0.667	1.2	84.2	SURCHARG
SE-1.001 SE-1.002		15 minute 20 year W 15 minute 20 year W				0.137 -0.103	0.000	1.55 0.44		2.955 2.857			SURCHARG
SE-2.000	MH(SE)-4	15 minute 20 year W	inter I+2	5% 4.830	3.815	0.185	0.000	1.06		0.543	1.2	76.3	SURCHARO
SE-2.001 SE-1.003	<u>MH(SE)−5</u> MH(SE)−6	15 minute 20 year W 15 minute 20 year W				0.128 0.011	0.000 0.000	1.22 0.92		4.194 23.235			SURCHARCE SURCHARCE
SE-3.000 SE-3.001	MH(SE)-7 MH(SE)-8	15 minute 20 year W 15 minute 20 year W				-0.060 -0.113	0.000	0.96 0.85		0.265 1.351	1.0	56.6 111.3	
SE-3.001	MH(SE)-0 MH(SE)-9	15 minute 20 year W				-0.113	0.000	0.85		5.999		178.2	
SE-1.004 SE-4.000	MH(SE)-10 MH(SE)-11	15 minute 20 year W 15 minute 20 year W				0.020 -0.056	0.000 0.000	0.94 0.97		19.850 0.270	0.9 1.0	385.2 57.0	SURCHARG
SE-4.001	MH(SE)-12	15 minute 20 year W				-0.113	0.000	0.85		1.328		111.2	
SE-4.002 SE-4.003	MH(SE)-13 MH(SE)-14	15 minute 20 year W 15 minute 20 year W				-0.146 -0.117	0.000 0.000	0.81 0.69		5.195 8.562		157.3 153.6	
SE-5.000	MH(SE)-LC-EAST	15 minute 20 year W	inter I+2	5% 4.400	3.408	0.008	0.000	1.07		0.343	0.9	63.3	SURCHARG
SE-5.001 SE-4.004	MH(SE)-16 MH(SE)-14-1	15 minute 20 year W 15 minute 20 year W				0.000 -0.085	0.000	1.03 0.84		1.285 4.387	0.9 1.3	60.6 208.3	
SE-1.005	MH(SE)-15	15 minute 20 year W	inter I+2	5% 5.000	3.092	0.022	0.000	1.36		14.036	1.3	591.5	SURCHARG
SE-6.000 SE-7.000	MH(SE)-16 MH(SE)-17	15 minute 20 year W 15 minute 20 year W				0.124 0.080	0.000 0.000	0.86 0.69		0.390 0.339	0.8		SURCHARG
SE-6.001	MH(SE)-18	15 minute 20 year W				0.174	0.000	1.36		3.057	1.2		SURCHARG
SE-8.000 SE-9.000	MH(SE)-19 MH(SE)-20	15 minute 20 year W 15 minute 20 year W				0.153 -0.013	0.000	1.21 0.70		0.422	1.0 1.0	37.0 25.6	SURCHARG
SE-6.002	MH(SE)-21	15 minute 20 year W	inter I+2	5% 4.820	3.542	0.077	0.000	1.43		3.450		104.7	SURCHARG
SE-6.003 SE-6.004	MH(SE)-23 MH(SE)-23-1	240 minute 20 year W 15 minute 20 year W				-0.164 -0.249	0.000 0.000	0.06 0.05		100.698 0.706	0.4 0.4	4.8 3.7	
E-10.000	MH(SE)-22	15 minute 20 year W				0.112	0.000	1.49		0.375	1.2		SURCHARG
SE-6.005 SE-6.006	MH(SE)-24 MH(SE)-25	15 minute 20 year W 15 minute 20 year W				-0.177 -0.189	0.000 0.000	0.51 0.49		1.619 2.199	0.8 0.8	42.4 41.2	
E-11.000 E-11.001	MH(SE)-26 MH(SE)-27	15 minute 20 year W 15 minute 20 year W				0.526 0.402	0.000	1.39 1.33		1.013			SURCHARG
E-12.000	MH(SE)-27 MH(SE)-28	15 minute 20 year W				0.402	0.000 0.000	1.33		7.834 0.888	1.3		SURCHARG
E-12.001 E-11.002	MH(SE)-29 MH(SE)-30	15 minute 20 year W 15 minute 20 year W				0.397 0.329	0.000 0.000	1.41 1.27		3.876 13.729			SURCHARG
E-13.000	MH(SE)-31-1	15 minute 20 year W				0.444	0.000	1.13		0.920			SURCHARG
E-13.001 E-13.002	MH(SE)-31 MH(SE)-32	15 minute 20 year W 15 minute 20 year W				0.408 0.295	0.000 0.000	1.69 1.17		8.009 3.009			SURCHARG
E-14.000	MH(SE)-33	15 minute 20 year W	inter I+2	5% 4.580	4.130	0.750	0.000	1.91		1.097	1.5	58.2	SURCHARG
E-14.001 E-11.003	MH(SE)-34 MH(SE)-35	15 minute 20 year W 15 minute 20 year W				0.271 0.256	0.000 0.000	1.80 1.78		2.327 18.885	1.4 1.7		SURCHARC
E-15.000	MH(SE)-36	15 minute 20 year W	inter I+2	5% 4.580	4.121	0.741	0.000	1.89		1.087	1.5	57.8	SURCHARC
E-15.001 E-16.000	MH(SE)-37 MH(SE)-39	15 minute 20 year W 15 minute 20 year W				0.271 0.284	0.000 0.000	1.84 1.65		2.327 0.654	1.4 1.3		SURCHARC
5-11.004	MH(SE)-40	15 minute 20 year W	inter I+2	5% 4.580	2.848	0.104	0.000	1.90		14.063	1.4	759.4	SURCHARC
2-11.005 2-11.006	MH(SE)-41 MH(SE)-42	15 minute 20 year W 15 minute 20 year W				0.050 0.033	0.000 0.000	$1.15 \\ 1.11$		10.491 45.618			SURCHARC
2-17.000	MH(SE)-43-1	15 minute 20 year W	inter I+2	5% 4.580	3.124	0.299	0.000	1.16		0.587	1.1	41.1	SURCHARC
E-18.000 E-17.001	MH(SE)-43-2 MH(SE)-43-3	15 minute 20 year W 15 minute 20 year W				-0.068 0.142	0.000	0.81 2.10		0.172 2.319	0.9 1.6	24.8	SURCHARG
S = 17.001 S = 11.007		1440 minute 20 year W	inter I+2	5% 4.650	2.503	0.089	0.000	0.09		33.087	0.5	47.4	SURCHARG
E-19.000 E-19.001	MH(SE)-44-1 MH(SE)-44	15 minute 20 year W 15 minute 20 year W				0.797 0.844	0.000 0.000	0.80 0.94		1.150 2.206	0.7 1.0		SURCHARG SURCHARG
E-19.001 E-19.002	MH(SE) - 44 $MH(SE) - 45$	15 minute 20 year W 15 minute 20 year W				0.844	0.000	0.94 1.75		4.299	1.0		SURCHARG
E = 20.000	MH(SE) - 46 MH(SE) - 47	15 minute 20 year W				0.345	0.000	0.07		0.640	0.3		SURCHARG
E-20.001 E-19.003	MH(SE)-47 MH(SE)-48	15 minute 20 year W 15 minute 20 year W				0.497 0.586	0.000 0.000	1.00 1.98		1.952 6.543	1.0 2.2		SURCHARG SURCHARG
E-21.000	MH(SE)-51	15 minute 20 year W	inter I+2	5% 4.550	2.950	-0.320	0.000	0.28		0.286	0.9	66.0	
g 01 001	MH(SE)-52	15 minute 20 year W	inter I+2			-0.292	0.000	0.29		2.405 7.773		118.5	SURCHARG
E-21.001 E-19.004	MH(SE)-53	15 minute 20 year W	inter T+?	5% 4.580	2.821	0.009	0.000	1.05		1 1 1 2		207 7	DURUNARI

Jacobs Engineering Limited		Page 16
	Immingham Eastern	
	Ro-Ro Terminal	
	Southern Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Proposed SouthEast - Surcharged +1.9m v2	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

20 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Proposed Storm

										Surcharged		<b>7</b> ]	0	<b>N</b> i	Maximum	-	
PN	US/MH Name			Eve	nt			US/CL (m)	Level (m)	Depth (m)	(m <sup>3</sup> )	Cap.	(1/s)	Vol (m <sup>3</sup> )	Velocity (m/s)	(1/s)	Status
SE-19.006	MH(SE)-55		minute	-					2.594	0.046	0.000	0.60		29.512			SURCHARGED
SE-22.000	MH(SE)-56		minute	-					3.366	0.016	0.000	1.07		0.351			SURCHARGED
SE-22.001	MH(SE)-57		minute	-					3.315	0.090	0.000	0.56		2.987	0.9		SURCHARGED
SE-22.002	MH(SE)-58		minute	-					3.287	0.163	0.000	0.40		4.468			SURCHARGED
SE-23.000	MH(SE)-59-5		minute	-					3.658	0.308	0.000	0.75		0.767	1.0		SURCHARGED
SE-23.001	MH(SE)-59-4		minute						3.572	0.392	0.000	1.11		6.377			SURCHARGED
SE-23.002	MH(SE)-59-3		minute	-					3.426	0.386	0.000	1.49		5.439			SURCHARGED
SE-22.003	MH(SE)-59-2		minute						3.268	0.341	0.000	1.69		14.391			SURCHARGED
SE-22.004	MH(SE)-59-1		minute						3.048	0.201	0.000	1.21		7.221			SURCHARGED
SE-22.005	MH(SE)-59		minute						2.944	0.173	0.000	1.27		8.905			SURCHARGED
SE-22.006	MH(SE)-60		minute	-					2.747	0.094	0.000	0.94		13.393			SURCHARGED
SE-24.000	MH(SE)-61-1	15	minute	20 ye	ear Wi	inter	I+25%	4.550	3.630	0.280	0.000	1.16		0.565	1.0	39.9	SURCHARGED
SE-24.001	MH(SE)-61	15	minute	20 ye	ear Wi	inter	I+25%	4.550	3.407	0.233	0.000	1.39		1.952			SURCHARGED
SE-24.002	MH(SE)-62	15	minute	20 ye	ear Wi	inter	I+25%	4.700	2.907	-0.057	0.000	0.98		2.084	0.9	82.3	OK
SE-25.000	MH(SE)-LC-WEST	15	minute	20 ye	ear Wi	inter	I+25%	4.400	3.801	0.401	0.000	1.99		0.787	1.8	127.8	SURCHARGED
SE-22.007	MH(SE)-63	15	minute	20 ye	ear Wi	inter	I+25%	4.580	2.636	0.101	0.000	1.28		19.687	1.1	406.7	SURCHARGED
SE-19.007	MH(SE)-64	15	minute	20 ye	ear Wi	inter	I+25%	4.750	2.554	0.090	0.000	1.58		22.314	1.6	710.0	SURCHARGED
SE-11.008	MH(SE)-65	1440	minute	20 ye	ear Wi	inter	I+25%	4.615	2.501	0.521	0.000	0.35		2340.053	0.4	43.0	SURCHARGED
SE-26.000	MH(SE)-EX-66	30	minute	20 ye	ear W	inter	I+25%	4.700	4.914	1.489	213.716	2.22		215.407	2.2	86.2	FLOOD
SE-6.007	MH(SE)-67	1440	minute	20 ye	ear W	inter	I+25%	4.580	2.218	0.222	0.000	0.30		5.545	0.7	59.8	SURCHARGED
SE-6.008	MH(SE)-68	1440	minute	20 ye	ear Wi	inter	I+25%	4.830	2.200	0.280	0.000	0.30		7.545	0.7	58.9	SURCHARGED
SE-6.009	MH(SE)-69	1440	minute	20 ye	ear Wi	inter	I+25%	4.830	2.176	0.396	0.000	0.36		16.151	0.6	58.2	SURCHARGED
SE-6.010	MH(SE)-69-1	1440	minute	20 ye	ear Wi	inter	I+25%	4.830	2.161	0.421	0.000	0.30		4.676	0.7	58.2	SURCHARGED
SE-1.006	MH(SE)-70	1440	minute	20 ye	ear Wi	inter	I+25%	4.830	2.145	0.446	0.000	0.12		8.532	0.4	90.4	SURCHARGED
SE-1.007	MH(SE)-71	1440	minute	20 ye	ear Wi	inter	I+25%	4.830	2.136	0.539	0.000	0.12		35.043	0.5	90.0	SURCHARGED
SE-27.000	MH(SE)-72-2	15	minute	20 ye	ear Wi	inter	I+25%	4.830	4.486	0.856	0.000	1.91		1.301	2.0	139.9	SURCHARGED
SE-27.001	MH(SE)-72-1	15	minute	20 ye	ear Wi	inter	I+25%	4.830	3.622	0.220	0.000	2.01		3.714	2.0	139.1	SURCHARGED
SE-1.008	MH(SE)-72	1440	minute	20 ye	ear Wi	inter	I+25%	4.740	2.128	1.028	0.000	0.35		1885.251	0.4	86.5	SURCHARGED
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ate 05/0	-, -	<del>,</del> )		-	by Helen		r-Smit	h			Dra	inage		
nnovyze	OSEC SOUCHEA	st - Surcharged	+1.9111 V	2			by Tom Wa	LSOII						
	30 year Ret	turn Period Summ	nary of	Criti	lcal	Result	ts by Max	imum Le	vel (R	ank 1)	for Pro	posed St	Corm	
	Areal Redu	action Factor 1.000	Manhole	e Head	<u>Sim</u> loss (	ulation Coeff (G	<u>Criteria</u> Global) 0.5	00	MADD Fa	ctor * 1	0m³/ha Sto	prage 2.00	0	
	Hot	Start (mins) 0	Foul	Sewag	e per	hectare	e (l/s) 0.0 al Flow 0.0	00	per Pers		t Coeffied ay (l/per/			
	:	Number of Input Hyd Number of Online									-			
		Rainfall		_	-	FSR M5	n <u>fall Detai</u> 5-60 (mm) 1 Ratio R	7.000 Cv		,				
		Margin for	Flood Ris	k Warr	ning (	mm) 300	.0 DTS Stat	us ON 1			DFF			
				-	Times	step Fi	ne DVD Stat	cus OFF	G	in and t	linton			
Profile(s)         Summer and Winter           Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440           Return Period(s) (years)         1, 5, 10, 20, 30           Climate Change (%)         25, 25, 25, 25, 25														
PN	US/MH Name	Event		τ	IS/CL (m)	Water Level (m)	Surcharged Depth (m)		Flow / Cap.		/ Maximum Vol (m³)	_	Flow	Status
SE-1.000		15 minute 30 year			.740		0.383	0.000	1.76		0.767	1.3	91.8	SURCHARG
SE-1.001 SE-1.002		15 minute 30 year 15 minute 30 year					0.183 -0.046	0.000 0.000	<mark>1.68</mark> 0.47		3.006 3.532			SURCHAR
E-2.000	MH(SE)-4	15 minute 30 year	Winter I	+25% 4	.830	3.943	0.313	0.000	1.13		0.688	1.2	81.7	SURCHAR
E-2.001 E-1.003	MH(SE)-5 MH(SE)-6	15 minute 30 year 15 minute 30 year				3.553 3.267	0.206	0.000 0.000	1.30 0.99		4.673 24.354			SURCHAR(
E-3.000	MH (SE) - 7	15 minute 30 year				3.636	0.006	0.000	1.02		0.341	1.0		SURCHAR
E-3.001 E-3.002	MH(SE)-8 MH(SE)-9	15 minute 30 year 15 minute 30 year				3.413 3.317	-0.094 -0.079	0.000 0.000	0.91 0.98		1.555 6.900		119.3 189.9	
E-1.004	MH(SE)-10	15 minute 30 year				3.185	0.065	0.000	1.02		21.613			SURCHAR
E-4.000 E-4.001	MH(SE)-11 MH(SE)-12	15 minute 30 year 15 minute 30 year				3.638 3.416	0.008 -0.095	0.000 0.000	1.04 0.91		0.343 1.527	0.9	61.1 119.7	SURCHAR
E-4.002	MH(SE)-13	15 minute 30 year				3.286	-0.118	0.000	0.87		5.864		168.9	
E-4.003	MH(SE)-14 MH(SE)-LC-EAST	15 minute 30 year 15 minute 30 year				3.225 3.439	-0.072 0.039	0.000 0.000	0.74 1.18		9.669 0.378	1.0 1.0	164.8	SURCHAR
E-5.001	MH(SE)-16	15 minute 30 year				3.347	0.010	0.000	1.18		1.317	1.0		SURCHAR
E-4.004	MH(SE)-14-1	15 minute 30 year				3.184	-0.041	0.000	0.90		5.008		221.5	
E-1.005 E-6.000	MH(SE)-15 MH(SE)-16	15 minute 30 year 15 minute 30 year				3.132 3.946	0.062	0.000 0.000	1.46 0.90		14.671 0.493	1.4		SURCHAR
E-7.000	MH(SE)-17	15 minute 30 year				3.893	0.163	0.000	0.73		0.433	0.9		SURCHAR
E-6.001 E-8.000	MH(SE)-18 MH(SE)-19	15 minute 30 year 15 minute 30 year				3.819 3.845	0.243	0.000 0.000	1.48 1.31		3.146 0.504	1.3		SURCHAR
E-9.000	MH(SE)-20	15 minute 30 year				3.651	0.031	0.000	0.74		0.284	1.0		SURCHAR
E-6.002 E-6.003	MH(SE)-21 MH(SE)-23	15 minute 30 year 240 minute 30 year				3.574 3.238	0.109 -0.141	0.000 0.000	1.56 0.06		<b>3.746</b> 111.633	1.6 0.4	114.6 4.9	SURCHAR
E-6.003	MH(SE)-23-1	15 minute 30 year				3.079	-0.239	0.000	0.05		0.810	0.4	3.8	
-10.000	MH(SE)-22	15 minute 30 year				3.921	0.151	0.000	1.62		0.420	1.3		SURCHAR
E-6.005 E-6.006	MH(SE)-24 MH(SE)-25	15 minute 30 year 15 minute 30 year				3.084 2.938	-0.167 -0.179	0.000 0.000	0.55 0.54		1.739 2.386	0.8	46.0 44.7	
-11.000	MH(SE)-26	15 minute 30 year	Winter I	+25% 4	.450	3.985	0.735	0.000	1.47		1.250			SURCHAR
-11.001 -12.000	MH(SE)-27 MH(SE)-28	15 minute 30 year 15 minute 30 year				3.697 3.939	0.607 0.689	0.000 0.000	1.41 1.39		8.066 1.112	1.4		SURCHAR
-12.001	MH(SE)-29	15 minute 30 year				3.680	0.597	0.000	1.48		4.103			SURCHAR
-11.002	MH(SE)-30	15 minute 30 year				3.452	0.500	0.000	1.37		13.973			SURCHAR
-13.000 -13.001	MH(SE)-31-1 MH(SE)-31	15 minute 30 year 15 minute 30 year				4.004 3.661	0.654 0.611	0.000 0.000	1.19 1.78		1.158 8.239			SURCHAR
-13.002	MH(SE)-32	15 minute 30 year	Winter I	+25% 4	.580	3.454	0.474	0.000	1.26		3.212	1.4	213.2	SURCHAR
-14.000 -14.001	MH(SE)-33 MH(SE)-34	15 minute 30 year 15 minute 30 year				4.296 3.549	0.916	0.000	2.03 1.93		1.285 2.401	1.6 1.5		FLOOD R
-11.003	MH(SE)-35	15 minute 30 year	Winter I	+25% 4	.580	3.211	0.400	0.000	1.91		19.894	1.8	643.9	SURCHAR
-15.000 -15.001	MH(SE)-36 MH(SE)-37	15 minute 30 year 15 minute 30 year				4.286 3.547	0.906	0.000	2.05 1.96		1.273 2.398	1.6		FLOOD R
-16.000	MH(SE)-37 MH(SE)-39	15 minute 30 year				3.547 3.611	0.334	0.000	1.98		2.398	1.5		SURCHAR
-11.004	MH(SE) - 40	15 minute 30 year				2.970	0.226	0.000	2.02		16.510			SURCHAR
-11.005 -11.006	MH(SE)-41 MH(SE)-42	15 minute 30 year 15 minute 30 year				2.841 2.613	0.133 0.080	0.000 0.000	1.22 1.20		10.940 47.256			SURCHAR
-17.000	MH(SE)-43-1	15 minute 30 year	Winter I	+25% 4	.580	3.238	0.413	0.000	1.25		0.715	1.2	44.4	SURCHAR
-18.000	MH(SE)-43-2 MH(SE)-43-3	15 minute 30 year 15 minute 30 year				3.322 2.672	-0.058	0.000	0.89 2.27		0.184	0.9 1.7	27.0	קווסמשאסי
-17.001 -11.007		1440 minute 30 year				2.672	0.175 0.177	0.000 0.000	0.10		2.585 33.668	1.7		SURCHAR(
2-19.000	MH(SE)-44-1	15 minute 30 year	Winter I	+25% 4	.580	4.391	1.011	0.000	0.85		1.393	0.8	25.1	FLOOD R
-19.001 -19.002	MH(SE)-44 MH(SE)-45	15 minute 30 year 15 minute 30 year				4.342 4.166	1.055 1.046	0.000 0.000	1.01 1.87		2.445 4.514	1.0 1.4		FLOOD R
-19.002 -20.000	MH(SE)-45 MH(SE)-46	15 minute 30 year				3.884	0.504	0.000	0.09		0.819	0.2		SURCHAR
-20.001	MH(SE) - 47	15 minute 30 year				3.893	0.656	0.000	1.07		2.133	1.0		SURCHAR
E-19.003	MH(SE)-48 MH(SE)-51	15 minute 30 year 15 minute 30 year				3.728 2.967	0.723	0.000 0.000	2.12 0.31		6.698 0.310	2.3	161.4 71.6	SURCHARC
E-21.000 E-21.001 E-19.004	MH(SE)-52 MH(SE)-53	15 minute 30 year 15 minute 30 year	Winter I			2.894 2.854	-0.267 0.042	0.000	0.30 1.15		2.853 8.429		123.3	SURCHAR

Jacobs Engineering Limited		Page 18
	Immingham Eastern	
	Ro-Ro Terminal	
	Southern Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Proposed SouthEast - Surcharged +1.9m v2	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Proposed Storm

	US/MH						US/CL	Water Level	Surcharged Depth		Flow /	Overflow	Maximum	Maximum Velocity	-	
PN	Name			Event			(m)	(m)	(m)	(m <sup>3</sup> )	Cap.	(l/s)	Vol (m³)	(m/s)	(l/s)	Status
SE-19.006	MH(SE)-55	15 n	minute 3	0 year	Winter	I+25%	4.580	2.647	0.099	0.000	0.68		30.148	0.8	343.6	SURCHARGED
SE-22.000	MH(SE)-56	15 n	minute 3	0 year	Winter	I+25%	4.550	3.555	0.205	0.000	1.16		0.565	1.0	68.7	SURCHARGED
SE-22.001	MH(SE)-57	15 n	minute 3	0 year	Winter	I+25%	4.550	3.502	0.277	0.000	0.57		3.299	0.9	54.7	SURCHARGED
SE-22.002	MH(SE)-58	15 n	minute 3	0 year	Winter	I+25%	4.550	3.471	0.347	0.000	0.42		4.677	0.6	51.9	SURCHARGED
SE-23.000	MH(SE)-59-5	15 n	minute 3	0 year	Winter	I+25%	4.550	3.865	0.515	0.000	0.80		1.001	1.0	84.9	SURCHARGED
SE-23.001	MH(SE)-59-4	15 n	minute 3	0 year	Winter	I+25%	4.550	3.786	0.606	0.000	1.17		6.619	1.2	123.2	SURCHARGED
SE-23.002	MH(SE)-59-3	15 n	minute 3	0 year	Winter	I+25%	4.550	3.628	0.588	0.000	1.59		5.667	1.4	209.5	SURCHARGED
SE-22.003	MH(SE)-59-2	15 n	minute 3	0 year	Winter	I+25%	4.550	3.451	0.524	0.000	1.82		14.599	1.5	233.1	SURCHARGED
SE-22.004	MH(SE)-59-1	15 n	minute 3	0 year	Winter	I+25%	4.565	3.198	0.351	0.000	1.31		7.435	1.1	243.4	SURCHARGED
SE-22.005	MH(SE)-59	15 n	minute 3	0 year	Winter	I+25%	4.580	3.070	0.299	0.000	1.39		9.086	1.3	271.2	SURCHARGED
SE-22.006	MH(SE)-60	15 n	minute 3	0 year	Winter	I+25%	4.580	2.838	0.185	0.000	1.03		13.625	1.0	282.0	SURCHARGED
SE-24.000	MH(SE)-61-1	15 n	minute 3	0 year	Winter	I+25%	4.550	3.749	0.399	0.000	1.26		0.700	1.1	43.4	SURCHARGED
SE-24.001	MH(SE)-61	15 n	minute 3	0 year	Winter	I+25%	4.550	3.484	0.310	0.000	1.50		2.039	1.4	95.0	SURCHARGED
SE-24.002	MH(SE)-62	15 n	minute 3	0 year	Winter	I+25%	4.700	2.964	0.000	0.000	1.01		2.988	0.9	84.5	OK
SE-25.000	MH(SE)-LC-WEST	15 n	minute 3	0 year	Winter	I+25%	4.400	3.898	0.498	0.000	2.16		0.897	2.0	138.6	SURCHARGED
SE-22.007	MH(SE)-63	15 n	minute 3	0 year	Winter	I+25%	4.580	2.704	0.169	0.000	1.42		21.566	1.3	450.6	SURCHARGED
SE-19.007	MH(SE)-64	15 n	minute 3	0 year	Winter	I+25%	4.750	2.604	0.140	0.000	1.76		22.701	1.8	790.5	SURCHARGED
SE-11.008	MH(SE)-65	1440 m	minute 3	0 year	Winter	I+25%	4.615	2.590	0.610	0.000	0.37		2550.901	0.4	45.2	SURCHARGED
SE-26.000	MH(SE)-EX-66	60 n	minute 3	0 year	Winter	I+25%	4.700	4.947	1.522	247.421	2.24		249.112	2.2	87.0	FLOOD
SE-6.007	MH(SE)-67	1440 m	minute 3	0 year	Winter	I+25%	4.580	2.275	0.279	0.000	0.32		5.627	0.7	63.9	SURCHARGED
SE-6.008	MH(SE)-68	1440 m	minute 3	0 year	Winter	I+25%	4.830	2.255	0.335	0.000	0.32		7.624	0.7	63.9	SURCHARGED
SE-6.009	MH(SE)-69	1440 m	minute 3	0 year	Winter	I+25%	4.830	2.228	0.448	0.000	0.40		16.226	0.6	63.9	SURCHARGED
SE-6.010	MH(SE)-69-1	1440 m	minute 3	0 year	Winter	I+25%	4.830	2.212	0.472	0.000	0.33		4.748	0.7	64.0	SURCHARGED
SE-1.006	MH(SE)-70	1440 m	minute 3	0 year	Winter	I+25%	4.830	2.194	0.495	0.000	0.13		8.657	0.4	95.9	SURCHARGED
SE-1.007	MH(SE)-71	1440 n	minute 3	0 year	Winter	I+25%	4.830	2.185	0.588	0.000	0.13		35.166	0.5	95.9	SURCHARGED
SE-27.000	MH(SE)-72-2	15 n	minute 3	0 year	Winter	I+25%	4.830	4.670	1.040	0.000	2.05		1.510	2.1	150.3	FLOOD RISK
SE-27.001	MH(SE)-72-1	15 n	minute 3	0 year	Winter	I+25%	4.830	3.673	0.271	0.000	2.16		3.774	2.1	149.5	SURCHARGED
SE-1.008	MH(SE)-72	1440 m	minute 3	0 year	Winter	I+25%	4.740	2.175	1.075	0.000	0.38		1941.805	0.5	95.1	SURCHARGED

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Jacobs Engineering Limited		Page 1
	Immingham Eastern	
	Ro-Ro Terminal	
	Western Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smi	<sup>.th</sup> Drainag
File Proposed Case.MDX	Checked by Tom Watson	Diamac
Innovyze	Network 2020.1.3	L
	IGN by the Modified Rational Metho	<u>od</u>
	zes STANDARD Manhole Sizes ECC	
Return Period (yea M5-60 Rat: Maximum Rainfall (mm, Maximum Time of Concentration (mm)	(mm)17.000Add Flow / Climate (io R0.400Minimum Backdrop H/hr)50Maximum Backdrop Hins)30 Min Design Depth for Optimis/ha)0.000Min Vel for Auto Design (	Height (m) 0.20 Height (m) 1.50 sation (m) 1.20 only (m/s) 0.8
De	signed with Level Soffits	
Simul	ation Criteria for Storm	
Areal Reduction Fact Hot Start (min Hot Start Level (r Manhole Headloss Coeff (Globa Foul Sewage per hectare (1, Number of Input Hyd Number of Online	ns) 0 Inlet Coeffie mm) 0 Flow per Person per Day (1/per al) 0.500 Run Time	torage 2.000 ecient 0.800 r/day) 0.000 (mins) 60 (mins) 1 s 2 s 0
Synt	thetic Rainfall Details	
Rainfall Model Return Period (years) Region E M5-60 (mm) Ratio R	FSR Profile Type 30 Cv (Summer) England and Wales Cv (Winter) 17.000 Storm Duration (mins) 0.400	0.750 0.840

Jacobs H	Engine	eering Li	mited				P	age 2		
				Ir	mmingham East	cern				
				R	o-Ro Terminal					
				Ŵé	estern Yard:	Proposed	N	licco		
Date 05,	/08/20	)22		De	esigned by He	elen Heather	-Smith	Aicro		
		d Case.MD	X		hecked by Ton			)rainagi		
Innovyze	-				etwork 2020.1					
	<u> </u>				202011	• • •				
<u>l year</u>	Retur	<u>n Period</u>	Summa	-	<u>ritical Resul</u>	lts by Maxim	um Level	(Rank 1)		
				<u> </u>	<u>for Storm</u>					
				Simul	ation Criteria					
	A			ctor 1.0	00 Additiona	l Flow - % of				
		Hot S Hot Start			0 MADD		ha Storage effiecient			
Manh	nole He				00 Flow per Pe:					
		age per he								
	1	Number of	Input Hy	/drograph	ns 0 Number of	Storage Struct	tures 2			
		Number o	f Online	e Control	ls 1 Number of	Time/Area Dia	grams O			
		Number of	Offline	e Control	ls 0 Number of	Real Time Cont	trols 0			
			<u>,</u>	Synthetic	c Rainfall Deta	ils				
		Rainf	all Mode			Ratio R 0.4				
					nd and Wales Cv					
		M.	5-60 (mn	n)	17.000 CV	(Winter) 0.8	40			
		Margin for	Flood	Risk War	ning (mm) 300.0	) DVD Stat	us OFF			
				-	Timestep Fine		us OFF			
				-	Timestep Fine TS Status OI		us OFF			
				ם ב	-	J				
			Profile(	D	TS Status OI	N Summer	and Winte			
		E Duration(	Profile(	D	-	N Summer 180, 240, 360	and Winte , 480, 600	,		
		Duration(	Profile( (s) (min	s) s) 15	TS Status OI	Summer 180, 240, 360 , 2160, 2880,	and Winte , 480, 600 4320, 5760 8640, 1008	, , 0		
	Retur	Duration( m Period(s	Profile( (s) (min s) (year	s) s) 15 s)	TS Status OI	Summer 180, 240, 360 , 2160, 2880,	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10	, , 0 0		
	Retur	Duration(	Profile( (s) (min s) (year	s) s) 15 s)	TS Status OI	Summer 180, 240, 360 , 2160, 2880,	and Winte , 480, 600 4320, 5760 8640, 1008	, , 0 0		
		Duration( m Period(s	Profile( (s) (min s) (year Change (	s) s) 15 s) %)	TS Status OI 5, 30, 60, 120, 720, 960, 1440	Summer 180, 240, 360 , 2160, 2880, 7200,	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2	, 0 0 5		
PN	Retur US/MH Name	Duration( m Period(s	Profile( (s) (min s) (year Change ( <b>Return</b>	s) s) 15 s)	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X)	Summer 180, 240, 360 , 2160, 2880, 7200,	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10	, 0 0 5		
<b>PN</b> \$1.000	US/MH Name	Duration( n Period(s Climate C Storm	Profile( (s) (min s) (year Change ( Return Period	s) s) 15 s) %) Climate Change	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X)	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
	US/MH Name S1	Duration( n Period(s Climate C	Profile( (s) (min s) (year Change ( Return Period 1	s) s) 15 s) 5 %) Climate Change +25%	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
S1.000 S1.001 S1.002	US/MH Name S1 S2	Duration( n Period(s Climate C <b>Storm</b> 15 Winter	Profile( (s) (min s) (year Change ( Return Period 1 1	<pre>b s) s) 15 s) %) Climate Change +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
S1.000 S1.001 S1.002 S1.003	US/MH Name S1 S2 S3 S4	Duration ( cn Period(s Climate C Storm 15 Winter 15 Winter 30 Winter 30 Winter	Profile( (s) (min s) (year Change ( Return Period 1 1 1 1	<pre>b s) s) 15 s) 15 s) %) Climate Change +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
S1.000 S1.001 S1.002 S1.003 S1.004	<b>US/MH</b> Name S1 S2 S3 S4 S5	Duration ( Climate C Storm 15 Winter 15 Winter 30 Winter 30 Winter 30 Winter	Profile( (s) (min change ( Return Period 1 1 1 1 1	<pre>climate Climate Change +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
S1.000 S1.001 S1.002 S1.003 S1.004 S1.005	<b>US/MH</b> Name S1 S2 S3 S4 S5 S6	Duration ( Climate C Storm 15 Winter 15 Winter 30 Winter 30 Winter 30 Winter 30 Winter	Profile( (s) (min change ( Return Period 1 1 1 1 1 1 1	<pre>D s) s) 15 s) 15 s) Climate Change +25% +25% +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter 30/30 Winter	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
S1.000 S1.001 S1.002 S1.003 S1.004 S1.005 S1.006	<b>US/MH</b> Name S1 S2 S3 S4 S5 S6 S7	Duration ( cn Period(s Climate C Storm 15 Winter 15 Winter 30 Winter 30 Winter 30 Winter 30 Winter 30 Winter	Profile( (s) (min change ( Return Period 1 1 1 1 1 1 1 1	<pre>D s) s) 15 s) 15 s) Climate Change +25% +25% +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter 30/30 Winter 30/30 Winter	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
S1.000 S1.001 S1.002 S1.003 S1.004 S1.005	<b>US/MH</b> Name S1 S2 S3 S4 S5 S6 S7 S8	Duration ( Climate C Storm 15 Winter 15 Winter 30 Winter 30 Winter 30 Winter 30 Winter	Profile( (s) (min change ( Return Period 1 1 1 1 1 1 1	<pre>D s) s) 15 s) 15 s) Climate Change +25% +25% +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter 30/30 Winter	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
S1.000 S1.001 S1.002 S1.003 S1.004 S1.005 S1.006 S1.007	<b>US/MH</b> Name S1 S2 S3 S4 S5 S6 S7 S8 S9	Duration ( n Period (s Climate C Storm 15 Winter 15 Winter 30 Winter 30 Winter 30 Winter 30 Winter 30 Winter 30 Winter	Profile( (s) (min change ( Return Period 1 1 1 1 1 1 1 1 1 1 1	<pre>D s) s) 15 s) 15 s) Climate Change +25% +25% +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter 30/30 Winter 30/30 Summer	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
S1.000 S1.001 S1.002 S1.003 S1.004 S1.005 S1.006 S1.007 S1.008	US/MH Name S1 S2 S3 S4 S5 S6 S7 S8 S9 S10	Duration ( n Period (s Climate C Storm 15 Winter 15 Winter 30 Winter 30 Winter 30 Winter 30 Winter 30 Winter 30 Winter 30 Winter 30 Winter	Profile( (s) (min change ( Return Period 1 1 1 1 1 1 1 1 1 1 1	<pre>D s) s) 15 s) 15 s) Climate Change +25% +25% +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter 30/30 Winter 30/30 Summer 30/15 Summer	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
S1.000 S1.001 S1.002 S1.003 S1.004 S1.005 S1.006 S1.007 S1.008 S2.000 S2.001 S1.009	US/MH Name S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S10	Duration ( n Period (s Climate C Storm 15 Winter 15 Winter 30 Winter	Profile( (s) (min change ( Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>climate (change) +25% +25% +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter 30/30 Winter 30/30 Winter 30/30 Summer 30/15 Summer 30/15 Summer 100/15 Summer 30/15 Summer	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
\$1.000 \$1.001 \$1.002 \$1.003 \$1.004 \$1.005 \$1.006 \$1.007 \$1.008 \$2.000 \$2.001 \$1.009 \$3.000	US/MH Name S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S10 S11	Duration ( n Period (s Climate C Storm 15 Winter 15 Winter 30 Winter 3	Profile( (s) (min change ( Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>climate (change) +25% +25% +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter 30/30 Winter 30/30 Winter 30/30 Summer 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
\$1.000 \$1.001 \$1.002 \$1.003 \$1.004 \$1.005 \$1.006 \$1.007 \$1.008 \$2.000 \$2.001 \$1.009 \$3.000 \$3.001	US/MH Name S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S10 S11 S12	Duration ( n Period (s Climate C Storm 15 Winter 15 Winter 30 Winter 3	Profile( (s) (min change ( Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>climate (change) +25% +25% +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter 30/30 Winter 30/30 Winter 30/30 Summer 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
\$1.000 \$1.001 \$1.002 \$1.003 \$1.004 \$1.005 \$1.006 \$1.007 \$1.008 \$2.000 \$2.001 \$1.009 \$3.000 \$3.001 \$3.002	US/MH Name S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S10 S11 S12 S13	Duration ( n Period (s Climate C Storm 15 Winter 15 Winter 30 Winter 30 Winter 30 Winter 30 Winter 30 Winter 30 Winter 15 Winter	Profile( (s) (min change ( Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>D s) s) 15 s) 15 s) Climate Change +25% +25% +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter 30/30 Winter 30/30 Winter 30/30 Summer 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer 30/15 Summer	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z)	, 0 5 <b>Overflow</b>		
\$1.000 \$1.001 \$1.002 \$1.003 \$1.004 \$1.005 \$1.006 \$1.007 \$1.008 \$2.000 \$2.001 \$1.009 \$3.000 \$3.001	US/MH Name S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S10 S11 S12 S13 S14	Duration ( n Period (s Climate C Storm 15 Winter 15 Winter 30 Winter 3	Profile( (s) (min change ( Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>climate (change) +25% +25% +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter 30/30 Winter 30/30 Winter 30/30 Summer 30/15 Summer 30/15 Summer 100/15 Summer 30/15 Summer	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y)	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z) Overflow	, 0 5 <b>Overflow</b>		
\$1.000 \$1.001 \$1.002 \$1.003 \$1.004 \$1.005 \$1.006 \$1.007 \$1.008 \$2.000 \$2.001 \$1.009 \$3.000 \$3.001 \$3.002 \$4.000	US/MH Name S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S10 S11 S12 S13 S14 S15	Duration ( n Period (s Climate C Storm 15 Winter 15 Winter 30 Winter 30 Winter 30 Winter 30 Winter 30 Winter 30 Winter 15 Winter 15 Winter 15 Winter 15 Summer 15 Summer 15 Summer 15 Summer	Profile( (s) (min change ( Return Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<pre>D s) s) 15 s) 15 s) Climate Change +25% +25% +25% +25% +25% +25% +25% +25%</pre>	TS Status OI 5, 30, 60, 120, 720, 960, 1440 First (X) Surcharge 30/15 Summer 100/15 Summer 100/15 Summer 100/15 Summer 30/30 Winter 30/30 Winter 30/30 Winter 30/30 Summer 30/15 Summer 30/15 Summer 100/15 Summer 30/15 Summer	Summer 180, 240, 360 , 2160, 2880, 7200, First (Y) Flood	and Winte , 480, 600 4320, 5760 8640, 1008 1, 30, 10 25, 25, 2 First (Z) Overflow	, 0 5 <b>Overflow</b>		

Jacobs Engineering Limited		Page 3
•	Immingham Eastern	
	Ro-Ro Terminal	
	Western Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Proposed Case.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)			Overflow	Half Drain Time (mins)	Flow	Status	Level Exceeded
		• •			- <b>-</b> ·		,	( <i>r</i> = <i>r</i>		
S1.000	S1	3.409	-0.161	0.000	0.59			63.8	OK	
S1.001	S2	3.127	-0.249	0.000	0.40		10	56.1	OK	
S1.002	S3	2.950	-0.302	0.000	0.35			72.9	OK	
S1.003	S4	2.841	-0.287	0.000	0.42			87.9	OK	
S1.004	S5	2.655	-0.335	0.000	0.37			105.3	OK	
S1.005	S6	2.526	-0.313	0.000	0.43			118.6	OK	
S1.006	S7	2.401	-0.307	0.000	0.48			131.4	OK	
S1.007	S8	2.249	-0.324	0.000	0.35			139.1	OK	
S1.008	S9	2.222	-0.215	0.000	0.34			136.5	OK	
S2.000	S10	3.415	-0.145	0.000	0.47			33.0	OK	
S2.001	S11	2.963	-0.158	0.000	0.45			32.6	OK	
S1.009	S10	2.211	-0.044	0.000	0.31			159.3	OK	
S3.000	S11	3.155	-0.375	0.000	0.00			0.0	OK	
S3.001	S12	2.938	-0.244	0.000	0.54			113.6	OK	
S3.002	S13	2.698	-0.344	0.000	0.37			149.1	OK	
S4.000	S14	3.725	-0.375	0.000	0.00			0.0	OK	
S4.001	S15	3.610	-0.163	0.000	0.61			67.2	OK	1
S4.002	S16	3.494	-0.179	0.000	0.65			119.0	OK	

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acobs	Engin	ee	ring L	imited							1	Page 4
						Imm	ingh	am Eas	stern		ſ	
						Ro-	RO T	ermina	al			
						Wes	tern	Yard:	Prop	osed		Micco
ate Or	5/08/2	02	2							Heather-		Micro
			- Case.M	ν			-	by To			01112 011	Drainac
		a	case.M	DA						.5011		
nnovyz	ze					Net	work	2020.	1.3			
year	Retu	rn	Perio	d Summa	ary of				ults k	oy Maximu	m Level	. (Rank 1
						<u>101</u>	<u>s Sto</u>	<u>orm</u>				
DN	US/MH		7.4	Return						st (Y)	-	Z) Overflo
PN	Name	2	Storm	Period	Change		Surch	arge	ł	lood	Overflo	w Act.
4.003	S17	15	Winter	1	+25	8 100	)/15	Summer				
3.003	S18	15	Winter	1	+25	8 3(	)/15	Summer	100/14	40 Winter		
35.000	S19	15	Winter	1			)/15	Summer				
35.001			Winter					Summer				
5.002			Winter			830		Summer				
5.003			Winter		+25 +25	5 10(	)/15	Summer		(15 0		
36.000			Winter						100/	15 Summer		
36.001 36.002			Winter Winter					Summer Summer				
6.002			Winter			० २० २ २०		Winter				
3.004			Winter						100/14	40 Winter		
3.005			Winter		+25			Summer	100/1-	ITO WINCE		
3.006			Winter		+25	8 3(		Summer				
3.007			Winter		+25	8 3(		Summer				
57.000	S31	15	Winter	1	+25		)/15	Summer	100/	15 Summer		
57.001	S32	15	Winter	1	+25	8 30	)/15	Summer				
37.002	S31	15	Winter	1	+25		)/15	Summer				
57.003	S32	15	Winter		+25		)/15	Summer				
37.004			Winter		+25			Summer				
37.005			Winter		+25 +25	8 3(		Summer				
57.006			Winter					Summer				
51.010			Winter		+25			Summer				
31.011	537	60	Winter	1	+25	ō .	1/15	Summer				
				Surchar	-					Half Drain	-	
	US/M		Level	Depth				/ Over		Time	Flow	<u>.</u>
PN	Name	9	(m)	(m)	(n	13)	Cap	. (1	/s)	(mins)	(l/s)	Status
S4.00	)3 S1	7	2.955	-0.3	396 0	.000	0.	25			153.7	OK
S3.00	)3 S1	8	2.473	-0.3	818 0	.000	0.	52			287.6	OK
S5.00			3.532	-0.1		.000	0.				73.9	OK
S5.00			3.294	-0.1		.000	0.				95.2	OK
S5.00			3.189	-0.1		.000	0.				113.5	OK
S5.00			2.817	-0.3		.000	0.				132.4	OK
S6.00			3.500	-0.0		.000	0.				44.9	OK
S6.00			3.263	-0.1		.000	0.				69.9	OK
S6.00 S6.00			3.049 2.680	-0.1 -0.4		.000	0. 0.:				93.8 114.6	OK OK
S6.00 S3.00			2.680	-0.2		.000	0.				526.7	OK OK
S3.00			2.394	-0.2		.000	0.				510.4	OK
s3.00			2.205	-0.2		.000	0.				454.8	OK
s3.00			2.195	-0.1		.000	0.				337.0	OK
			3.368	-0.1		.000	0.1				17.6	OK
S7.00	)0 S3	-										
S7.00 S7.00			3.286	-0.1	L77 0	.000	0.1	27			17.3	OK
	)1 S3	2	3.286 3.250	-0.1 -0.1		.000	0.: 0.				17.3 44.1 91.1	OK OK

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Jacobs Engineering Limited		Page 5
•	Immingham Eastern	
	Ro-Ro Terminal	
	Western Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith Checked by Tom Watson	
File Proposed Case.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S7.004	S33	2.721	-0.207	0.000	0.55			88.7	OK
S7.005	S34	2.543	-0.227	0.000	0.48			86.3	OK
S7.006	S35	2.363	-0.199	0.000	0.59			105.7	OK
S1.010	S36	2.190	0.136	0.000	0.51			551.5	SURCHARGED
S1.011	S37	2.183	0.941	0.000	0.89		50	119.5	SURCHARGED

	US/MH	Level
PN	Name	Exceeded
s4.003	S17	
s3.003		
s5.000		
s5.001	S20	
s5.001		
s5.002		
S5.005		4
S6.001		г.
S6.001		
S6.002		
s3.003		
S3.004		
S3.005	528 S29	
S3.007		2
S7.000	S31	3
S7.001		
S7.002		
S7.003		
S7.004	S33	
S7.005	S34	
S7.006	S35	
S1.010	S36	
S1.011	S37	

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Jacobs Engineering Limite	d				Page	6
·		Immingham 1	Eastern		1 4 9 0	<u> </u>
		Ro-Ro Term				
•		Western Ya:		A		
• Date 05/08/2022						
		Designed by	-		<sup>n</sup> Drair	nage
File Proposed Case.MDX		Checked by		1		<u> </u>
Innovyze		Network 20	20.1.3			
<u>30 year Return Period Sum</u>	mary of	Critical H for Storm	esults by	<u>Maximum L</u>	evel (Ra	<u>nk 1)</u>
Hot Start Leve Manhole Headloss Coeff (G Foul Sewage per hectare Number of Input Number of Onl	Factor 1 (mins) el (mm) Elobal) 0 e (l/s) 0 Hydrogra ine Contr	0 Mi 0 .500 Flow pe: .000 phs 0 Number ols 1 Number	onal Flow - DD Factor * In: Person per of Storage of Time/Are	10m³/ha St et Coeffie Day (l/per Structures a Diagrams	orage 2.00 cient 0.80 /day) 0.00 2 0	00
Number of Offl	ine Contr	ols 0 Number	of Real Tim	e Controls	0	
Rainfall M	-	ic Rainfall		R 0.400		
		FS. and and Wale.				
M5-60			O Cv (Winter			
					_	
Margin for Floc		is Timestep DTS Status	Fine Inertia			
Profil	Le(s)		:	Summer and	Winter	
Duration(s) (n	nins)	15, 30, 60, 1 720, 960, 1	20, 180, 24 440, 2160, 3			
Return Period(s) (ye Climate Change					10080 0, 100 25, 25	
WARNING: Half Drain Time	has not	been calcula	ted as the s	tructure is	too full	
•	n Climate d Change			First (Z) Overflow	Overflow Act.	Water Level (m)
	- change	Surcharge	11000	C.GLITOW		()
S1.000 S1 15 Winter 3						3.782
		: 100/15 Summ : 100/15 Summ				3.345
\$1.002 \$3 30 Winter 3 \$1.003 \$4 30 Winter 3		: 100/15 Summ : 100/15 Summ				3.195
	0 +25%					3.00
S1.005 S6 60 Winter 3						2.922
S1.006 S7 120 Winter 3						2.84
S1.007 S8 120 Winter 3						2.83
\$1.008\$9120Winter3\$2.000\$1015Winter3						2.82
S2.000 S10 15 Winter 3		: 100/15 Summ				3.11
	0 +25%					2.81
		100/15 Summ				3.411
\$3.001 \$12 15 Winter 3						3.412
S3.002 S13 15 Winter 3	0 +25%	30/15 Summ	er			3.275
	@100	2-2020 Inno				

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•	Immingham Eastern	
	Ro-Ro Terminal	
	Western Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith Checked by Tom Watson	
File Proposed Case.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)			Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.212	0.000	1.39			151.4	SURCHARGED	
S1.001	S2	-0.031	0.000	0.99		9	139.1	OK	
S1.002	S3	-0.056	0.000	0.83			173.6	OK	
S1.003	S4	-0.007	0.000	0.98			205.6	OK	
S1.004	S5	0.016	0.000	0.84			236.1	SURCHARGED	
S1.005	S6	0.083	0.000	0.81			222.5	SURCHARGED	
S1.006	S7	0.139	0.000	0.68			187.9	SURCHARGED	
S1.007	S8	0.262	0.000	0.51			204.8	SURCHARGED	
S1.008	S9	0.388	0.000	0.59			238.4	SURCHARGED	
S2.000	S10	0.197	0.000	1.12			79.0	SURCHARGED	
S2.001	S11	-0.006	0.000	1.00			71.9	OK	
S1.009	S10	0.558	0.000	0.59			301.3	SURCHARGED	
S3.000	S11	-0.119	0.000	0.01			1.3	OK	
S3.001	S12	0.230	0.000	1.27			266.1	SURCHARGED	
S3.002	S13	0.233	0.000	0.79			316.6	SURCHARGED	

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Jacobs	Engin	eering	Limited						Page 8
•				Im	mingham	Eastern			
				Ro	-Ro Term	inal			
				We	stern Ya	rd: Prop	osed		Micco
Date 0!	5/08/2	022						Smith	Micro
Date 05/08/2022 Designed by Helen Heather-Smith File Proposed Case.MDX Checked by Tom Watson									Drainag
		u case	. MDX				5011		J
Innovy:	ze			Ne	twork 20	20.1.3			
<u>30 yea</u>	<u>r Retu</u>	<u>irn Per</u>	iod Summa		<u>ritical</u> or Storm		oy Maxim	um Lev	el (Rank 1
	US/MH		Return	Climate	First (X	() Fi	st (Y)	First	(Z) Overflo
PN	Name	Storm	Period	Change	Surcharg	re 1	lood	Overf	low Act.
s4.000	S14	15 Wint	er 30	+25%	30/15 Sum	mor			
S4.000 S4.001	S14 S15	15 Wint 15 Wint			30/15 Sum 30/15 Sum		/15 Winter		
S4.001 S4.002		15 Wint		+25%	30/15 Sum		TO WINCEL		
S4.002	S10	15 Wint			100/15 Sum				
S3.003	S17 S18	15 Wint		+25%		umer 100/14	140 Winter		
s5.000	S10 S19	15 Wint		+25%	30/15 Sum				
s5.001		15 Wint			30/15 Sum				
s5.001	S20	15 Wint			30/15 Sum				
s5.003		15 Wint			100/15 Sum				
s6.000		15 Wint		+25%	30/15 Sum		/15 Summer		
56.001		15 Wint		+25%	30/15 Sum				
S6.002		15 Wint		+25%					
s6.003	S26	15 Wint	er 30	+25%	30/15 Wir	iter			
s3.004	S27	15 Wint	er 30	+25%	30/15 Sum	mer 100/14	40 Winter		
s3.005	S28	15 Wint	er 30	+25%	30/15 Sum	mer			
s3.006	S29	120 Wint	er 30	+25%	30/15 Sum	mer			
s3.007	S30	120 Wint	er 30	+25%	30/15 Sum	mer			
s7.000	S31	15 Wint	er 30	+25%	30/15 Sum	mer 100,	15 Summer		
s7.001	S32	15 Wint	er 30	+25%	30/15 Sum	mer			
s7.002	S31	15 Wint	er 30	+25%	30/15 Sum	mer			
s7.003	S32	15 Wint	er 30	+25%	30/15 Sum	mer			
s7.004	S33	15 Wint	er 30	+25%	30/15 Sum	mer			
S7.005	S34	15 Wint	er 30	+25%	30/15 Sum	mer			
S7.006	S35	120 Wint	er 30	+25%	30/15 Sum				
S1.010		120 Wint		+25%	1/15 Sum				
s1.011	S37	120 Wint	er 30	+25%	1/15 Sum	mer			
		Wator	Surcharge	d Flooded	4	H	alf Drain	Pipe	
	US/MI		-		Flow / C		Time	Flow	
PN	Name		(m)	(m <sup>3</sup> )	Cap.	(1/s)	(mins)	(1/s)	Status
		·/	·/	· /		,_, _,	, <b>-</b> ,	(_, <del>_</del> ,	
S4.00	0 S14	4 4.374	0.2	0.000	0.02			2.1	SURCHARGED
S4.00	1 S15	5 4.380	0.60	0.000	) 1.51			167.0	SURCHARGED
S4.00	2 S1	6 4.185	5 0 <b>.</b> 51	2 0.000	0 1.50			274.7	SURCHARGED
S4.00	3 S1	7 3.279	-0.0	0.000	0.56			346.1	OK
	3 S18	3.177	0.38	36 0.000	1.06			591.8	SURCHARGED
S3.00	0 S19	9 4.578	8 0.92	.3 0.000	1.55			164.9	SURCHARGED
S3.00 S5.00	0 51.		5 0.60	0.000	1.47			218.4	SURCHARGED
		0 4.076			1.89			265.0	SURCHARGED
S5.00	1 S20		2. 0.38						
S5.00 S5.00	1 S20 2 S23	1 3.712	2. 0.38					293.6	OK
S5.00 S5.00 S5.00	1 S20 2 S21 3 S22	1 3.712 2 3.134	0.38 -0.05	59 0.000	0.66				OK FLOOD RISK
S5.00 S5.00 S5.00 S5.00	1 S20 2 S21 3 S22 0 S23	1 3.712 2 3.134 3 4.518 4 3.931	2 0.38 4 -0.09 3 0.92 - 0.54	59     0.000       28     0.000	0 0.66 0 1.65			98.1	
\$5.00 \$5.00 \$5.00 \$5.00 \$6.00	1 S20 2 S22 3 S22 0 S22 1 S24	1 3.712 2 3.134 3 4.518 4 3.931	2 0.38 4 -0.09 3 0.92 - 0.54	59     0.000       28     0.000       47     0.000	0 0.66 0 1.65 0 1.67			98.1 154.2	FLOOD RISK
\$5.00 \$5.00 \$5.00 \$5.00 \$6.00 \$6.00 \$6.00 \$6.00	1 S20 2 S22 3 S22 0 S22 1 S24 2 S25 3 S20	1         3.712           2         3.134           3         4.518           4         3.931           5         3.435           6         3.106	2     0.38       4     -0.09       3     0.92       -     0.54       5     0.20       5     0.01	59       0.000         28       0.000         47       0.000         06       0.000         5       0.000	0 0.66 0 1.65 0 1.67 0 1.47 0 0.44			98.1 154.2 206.7 235.3	FLOOD RISK SURCHARGED SURCHARGED SURCHARGED
\$5.00 \$5.00 \$5.00 \$5.00 \$6.00 \$6.00 \$6.00	1 S20 2 S22 3 S22 0 S22 1 S24 2 S22 3 S20 4 S22	1       3.712         2       3.134         3       4.518         4       3.931         5       3.435         6       3.106         7       3.048	2     0.38       4     -0.09       8     0.92       5     0.20       5     0.03       8     0.40	59       0.000         28       0.000         47       0.000         06       0.000         15       0.000         05       0.000	0       0.66         1.65         1.67         1.47         0       0.44         1.68			98.1 154.2 206.7 235.3 1018.8	FLOOD RISK SURCHARGED SURCHARGED

Jacobs Engineering Limited		Page 9
•	Immingham Eastern	
	Ro-Ro Terminal	
	Western Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	
File Proposed Case.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	1

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m <sup>3</sup> )	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.006	S29	2.817	0.367	0.000	0.62			522.0	SURCHARGED
S3.007	S30	2.810	0.490	0.000	0.94			523.1	SURCHARGED
S7.000	S31	4.345	0.785	0.000	0.61			39.5	SURCHARGED
S7.001	S32	4.306	0.843	0.000	0.68			43.0	SURCHARGED
S7.002	S31	4.271	0.893	0.000	1.37			99.6	SURCHARGED
S7.003	S32	3.836	0.683	0.000	1.83			220.9	SURCHARGED
S7.004	S33	3.139	0.211	0.000	1.28			205.0	SURCHARGED
S7.005	S34	2.919	0.149	0.000	1.08			192.3	SURCHARGED
S7.006	S35	2.809	0.248	0.000	0.63			112.2	SURCHARGED
S1.010	S36	2.803	0.749	0.000	0.86			919.4	SURCHARGED
S1.011	S37	2.797	1.555	0.000	0.89			119.5	SURCHARGED

PN		Level Exceeded
S4.000	S14	
S4.001	S15	1
S4.002	S16	
S4.003	S17	
S3.003	S18	
S5.000	S19	
S5.001	S20	
S5.002	S21	
S5.003	S22	
S6.000	S23	4
S6.001	S24	
S6.002	S25	
S6.003	S26	
S3.004	S27	
S3.005	S28	
S3.006	S29	
S3.007	S30	
S7.000	S31	3
S7.001	S32	
S7.002	S31	
S7.003	S32	
S7.004	S33	
S7.005	S34	
S7.006	S35	
S1.010	S36	
S1.011	S37	
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• • • Date 05/08/2022	Immingham Eastern									
	Ro-Ro Terminal									
	Western Yard: Proposed	Micco								
	Designed by Helen Heather-Smith	Micro								
File Proposed Case.MDX	Drainage									
	-									
Innovyze Network 2020.1.3										
<u>100 year Return Period S</u>	Summary of Critical Results by Maximum I 1) for Storm	<u>Level (Rank</u>								
Hot Start Hot Start Leve Manhole Headloss Coeff (G Foul Sewage per hectare Number of Input Number of Onl	Global) 0.500 Flow per Person per Day (l/per/da e (l/s) 0.000 Hydrographs 0 Number of Storage Structures 2 ine Controls 1 Number of Time/Area Diagrams 0	age 2.000 ent 0.800								
Number of Offi	ine Controls 0 Number of Real Time Controls 0									
	Synthetic Rainfall Details									
Rainfall M										
	gion England and Wales Cv (Summer) 0.750 (mm) 17.000 Cv (Winter) 0.840									
M3 00	(nut) 17.000 CV (Winter) 0.040									
Margin for Floo	od Risk Warning (mm) 300.0 DVD Status OFF									
	Analysis Timestep Fine Inertia Status OFF									
	DTS Status ON									
Profile(s) Summer and Winter										
Profi	le(s) Summer and Win	nter								
Profi Duration(s) (I	mins) 15, 30, 60, 120, 180, 240, 360, 480,	600,								
	nins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5	600, 760,								
Duration(s) (r	nins) 15, 30, 60, 120, 180, 240, 360, 480, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10	600, 760, 0080								
	nins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 8640, 1440, 2160, 2880, 4320, 5 7200, 8640, 16 ears) 1, 30,	600, 760, 0080 100								
Duration(s) (r Return Period(s) (ye	nins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 8640, 1440, 2160, 2880, 4320, 5 7200, 8640, 16 ears) 1, 30,	600, 760, 0080 100								
Duration(s) (r Return Period(s) (ya Climate Changa	nins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 8640, 1440, 2160, 2880, 4320, 5 7200, 8640, 16 ears) 1, 30,	600, 760, 0080 100 , 25								
Duration(s) (r Return Period(s) (ya Climate Changa	mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 8 (%) 1, 30, 8 (%) 25, 25	600, 760, 0080 100 , 25								
Duration(s) (r Return Period(s) (ya Climate Changa	mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 8 (%) 1, 30, 8 (%) 25, 25	600, 760, 0080 100 , 25								
Duration(s) (I Return Period(s) (ye Climate Change WARNING: Half Drain Time	mins)       15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5         7200, 960, 1440, 2160, 2880, 4320, 5         7200, 8640, 10         ears)       1, 30, 25, 25, 25, 25, 25, 25, 25, 25, 25, 25	600, 760, 0080 100 , 25 :00 full. Water								
Duration(s) (I Return Period(s) (ye Climate Change WARNING: Half Drain Time US/MH Retur	mins)       15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5         7200, 960, 1440, 2160, 2880, 4320, 5         7200, 8640, 10         ears)       1, 30, 25, 25, 25, 25, 25, 25, 25, 25, 25, 25	600, 760, 0080 100 , 25 :00 full. Water								
Duration(s) (r Return Period(s) (ye Climate Change WARNING: Half Drain Time US/MH Retur PN Name Storm Perio	nins)       15, 30, 60, 120, 180, 240, 360, 480, 9720, 960, 1440, 2160, 2880, 4320, 577200, 8640, 1077200, 1077000, 1077200,	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m)								
Duration(s) (r Return Period(s) (ye Climate Change WARNING: Half Drain Time US/MH Retur PN Name Storm Perio S1.000 S1 30 Winter 10	<pre>nins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 8 (%) 25, 25 9 has not been calculated as the structure is t n Climate First (X) First (Y) First (Z) Ov d Change Surcharge Flood Overflow 0 +25% 30/15 Summer</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571								
Duration(s) (r Return Period(s) (ye Climate Change WARNING: Half Drain Time US/MH Retur PN Name Storm Perio S1.000 S1 30 Winter 10	<pre>nins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 10 720,</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m)								
Duration(s) (r Return Period(s) (ye Climate Change WARNING: Half Drain Time US/MH Retur PN Name Storm Perio S1.000 S1 30 Winter 10 S1.001 S2 30 Winter 10	<pre>nins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 10 720,</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392								
Duration(s) (r Return Period(s) (ye Climate Change WARNING: Half Drain Time VARNING: Half Drain Time S1.000 S1 30 Winter 10 S1.001 S2 30 Winter 10 S1.002 S3 30 Winter 10 S1.003 S4 30 Winter 10 S1.004 S5 30 Winter 10	<pre>mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 7200, 8640, 10 720, 10 720,</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392 4.222 4.082 3.872								
Duration(s) (r Return Period(s) (ye Climate Change WARNING: Half Drain Time VARNING: Half Drain Time Storm Perio S1.000 S1 30 Winter 10 S1.001 S2 30 Winter 10 S1.002 S3 30 Winter 10 S1.003 S4 30 Winter 10 S1.004 S5 30 Winter 10 S1.005 S6 30 Winter 10	<pre>mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 10 7</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392 4.222 4.082 3.872 3.690								
Duration(s)         (r           Return Period(s)         (ye           Climate Change           WARNING:         Half Drain Time           US/MH         Return           PN         Name         Storm           S1.000         S1         30 Winter         10           S1.001         S2         30 Winter         10           S1.002         S3         30 Winter         10           S1.003         S4         30 Winter         10           S1.004         S5         30 Winter         10           S1.005         S6         30 Winter         10           S1.006         S7         30 Winter         10	<pre>mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 10 72</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392 4.222 4.082 3.872 3.690 3.479								
Duration(s)         (r           Return Period(s)         (ye           Climate Change         WARNING:         Half Drain Time           WARNING:         Half Drain Time         Priod           S1.000         S1         30 Winter         10           S1.001         S2         30 Winter         10           S1.002         S3         30 Winter         10           S1.003         S4         30 Winter         10           S1.004         S5         30 Winter         10           S1.005         S6         30 Winter         10           S1.006         S7         30 Winter         10           S1.007         S8         180 Winter         10	<pre>mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 10 72</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392 4.222 4.082 3.872 3.690 3.479 3.217								
Duration(s)         (r           Return Period(s)         (ye           Climate Change         WARNING: Half Drain Time           WARNING: Half Drain Time         Return           PN         Name         Storm         Period           \$1.000         \$1         30         Winter         10           \$1.001         \$2         30         Winter         10           \$1.002         \$3         30         Winter         10           \$1.003         \$4         30         Winter         10           \$1.004         \$5         30         Winter         10           \$1.005         \$6         30         Winter         10           \$1.006         \$7         30         Winter         10           \$1.007         \$8         180         Winter         10           \$1.008         \$9         180         Winter         10	<pre>mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 10 7200,</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392 4.222 4.082 3.872 3.690 3.479 3.217 3.210								
Duration(s)         (n           Return Period(s)         (ye           Climate Change         WARNING:         Half Drain Time           WARNING:         Half Drain Time           WARNING:         Half Drain Time           Storm         Perio           S1.000         S1         30 Winter         10           S1.001         S2         30 Winter         10           S1.002         S3         30 Winter         10           S1.003         S4         30 Winter         10           S1.004         S5         30 Winter         10           S1.005         S6         30 Winter         10           S1.006         S7         30 Winter         10           S1.007         S8         180 Winter         10           S1.008         S9         180 Winter         10           S2.000         S10         15 Winter         10	<pre>mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 1000,</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392 4.222 4.082 3.872 3.690 3.479 3.217 3.210 4.157								
Duration(s)         (n           Return Period(s)         (ye           Climate Change         WARNING:         Half Drain Time           WARNING:         Half Drain Time           WARNING:         Half Drain Time           Storm         Perio           S1.000         S1         30 Winter         10           S1.001         S2         30 Winter         10           S1.002         S3         30 Winter         10           S1.003         S4         30 Winter         10           S1.004         S5         30 Winter         10           S1.005         S6         30 Winter         10           S1.006         S7         30 Winter         10           S1.007         S8         180 Winter         10           S1.008         S9         180 Winter         10           S2.000         S10         15 Winter         10	<pre>mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 1000,</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392 4.222 4.082 3.872 3.690 3.479 3.217 3.210								
Duration(s)         (n           Return Period(s)         (ye           Climate Change         WARNING: Half Drain Time           WARNING: Half Drain Time         Return           PN         Name         Storm         Perio           S1.000         S1         30 Winter         10           S1.001         S2         30 Winter         10           S1.002         S3         30 Winter         10           S1.003         S4         30 Winter         10           S1.004         S5         30 Winter         10           S1.005         S6         30 Winter         10           S1.006         S7         30 Winter         10           S1.007         S8         180 Winter         10           S1.008         S9         180 Winter         10           S2.000         S10         15 Winter         10	<pre>mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 960, 1440, 2160, 2880, 4300, 5 7200, 8640, 10 720, 960, 1440, 2160, 2880, 4300, 5 720, 960, 1440, 2160, 2880, 4320, 5 720, 8640, 10 720, 100, 10 720, 10, 10, 10 720, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392 4.222 4.082 3.872 3.690 3.479 3.217 3.210 4.157 3.217								
Duration(s)         (n           Return Period(s)         (ye           Climate Change         WARNING: Half Drain Time           WARNING: Half Drain Time         Return           PN         Name         Storm         Perio           S1.000         S1         30 Winter         10           S1.001         S2         30 Winter         10           S1.002         S3         30 Winter         10           S1.003         S4         30 Winter         10           S1.004         S5         30 Winter         10           S1.005         S6         30 Winter         10           S1.006         S7         30 Winter         10           S1.007         S8         180 Winter         10           S1.008         S9         180 Winter         10           S2.000         S10         15 Winter         10           S2.001         S11         15 Winter         10           S1.009         S10         180 Winter         10	<pre>mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 960, 1440, 2160, 2880, 4300, 5 7200, 8640, 10 720, 960, 1440, 2160, 2880, 4300, 5 7200, 8640, 10 720, 960, 1440, 2160, 2880, 4300, 5 720, 8640, 10 720, 8640, 10 75, 25, 25 70, 25, 25 70, 20, 20, 20, 20, 20, 20, 20, 20, 20, 2</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392 4.222 4.082 3.872 3.690 3.479 3.217 3.210 4.157 3.201								
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Duration(s)         (n           Return Period(s)         (ye           Climate Change           WARNING:         Half Drain Time           WARNING:         Half Drain Time           WARNING:         Half Drain Time           Storm         Period           \$1.000         \$1         30 Winter         10           \$1.001         \$2         30 Winter         10           \$1.002         \$3         30 Winter         10           \$1.002         \$3         30 Winter         10           \$1.003         \$4         30 Winter         10           \$1.004         \$5         30 Winter         10           \$1.005         \$6         30 Winter         10           \$1.006         \$7         30 Winter         10           \$1.007         \$8         180 Winter         10           \$1.008         \$9         180 Winter         10           \$2.000         \$10         15 Winter         10           \$2.001         \$11         15 Winter         10           \$3.000         \$11         30 Winter         10           \$3.000         \$12         30 Winter         10 <td><pre>mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 7200, 8640, 10 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 100, 10 720, 10, 10, 10 720, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1</pre></td> <td>600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392 4.222 4.082 3.872 3.690 3.479 3.217 3.210 4.157 3.217 3.201 4.304 4.307</td>	<pre>mins) 15, 30, 60, 120, 180, 240, 360, 480, 720, 960, 1440, 2160, 2880, 4320, 5 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 7200, 8640, 10 720, 960, 1440, 2160, 2880, 4320, 5 7200, 8640, 10 7200, 8640, 10 720, 100, 10 720, 10, 10, 10 720, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1</pre>	600, 760, 0080 100 , 25 coo full. Water verflow Level Act. (m) 4.571 4.392 4.222 4.082 3.872 3.690 3.479 3.217 3.210 4.157 3.217 3.201 4.304 4.307								

Jacobs Engineering Limited		Page 11
•	Immingham Eastern	
	Ro-Ro Terminal	
	Western Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith Checked by Tom Watson	
File Proposed Case.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank <u>1) for Storm</u>

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (1/s)	Status	Level Exceeded
S1.000	S1	1.001	0.000	1.41			153.5	FLOOD RISK	
S1.001	S2	1.016	0.000	1.32		16	184.3	SURCHARGED	
S1.002	S3	0.970	0.000	1.12			234.1	SURCHARGED	
S1.003	S4	0.954	0.000	1.30			271.6	SURCHARGED	
S1.004	S5	0.882	0.000	1.12			316.1	SURCHARGED	
S1.005	S6	0.851	0.000	1.28			351.1	SURCHARGED	
S1.006	S7	0.771	0.000	1.40			385.9	SURCHARGED	
S1.007	S8	0.645	0.000	0.54			214.8	SURCHARGED	
S1.008	S9	0.773	0.000	0.62			252.7	SURCHARGED	
S2.000	S10	0.597	0.000	1.39			98.0	SURCHARGED	
S2.001	S11	0.096	0.000	1.28			92.1	SURCHARGED	
S1.009	S10	0.946	0.000	0.62			318.2	SURCHARGED	
S3.000	S11	0.774	0.000	0.03			3.4	SURCHARGED	
S3.001	S12	1.125	0.000	1.33			277.5	SURCHARGED	
S3.002	S13	1.086	0.000	0.93			373.1	SURCHARGED	

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acobs	Engine	eering 1	Limited							Pag	e 12
				Imi	mingham						
				Ro	Ro-Ro Terminal						
				We	Western Yard: Proposed						
ate N	5/08/20	122			Designed by Helen Heather-Smith						cio
											ainac
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nnovy	ze			Ne	twork 2	020.1	.3				
<u>100 y</u>	ear Re	<u>turn Pe</u>	riod Sumr	-	<u>Critic</u> for Sto		<u>sults b</u>	<u>y Maxi</u>	<u>.mum L</u> e	evel	(Ranł
PN	US/MH Name	Storm	Return C Period	Climate Change	First ( Surchar		First Floo		First Overf		Overflo Act.
				_	/	-					
4.000		15 Winte			30/15 Su		100/15	na i se t			
4.001 4.002		15 Winte 15 Winte			30/15 Su 30/15 Su		100/15	winter			
4.002		30 Winte			.00/15 St						
3.003		30 Winte			30/15 St		00/1440	Winter			
5.000		15 Winte			30/15 Su						
5.001		15 Winte			30/15 Su						
5.002		15 Winte			30/15 Su						
5.003		30 Winte			.00/15 Su		100/15	0			
6.000 6.001		15 Winte 30 Winte			30/15 Su 30/15 Su		100/15	Summer			
6.002		30 Winte			30/15 St						
6.003		30 Winte			30/15 Wi						
3.004	S27	30 Winte	r 100	+25%	30/15 Su	ummer 1	00/1440	Winter			
3.005		30 Winte			30/15 Su						
3.006		80 Winte 80 Winte			30/15 St						
3.007		15 Winte			30/15 Su 30/15 Su		100/15	Summer			
7.001		15 Winte			30/15 St		100/10	Guillier			
7.002	S31	15 Winte	r 100	+25%	30/15 Su	ummer					
7.003		15 Winte			30/15 Su						
7.004		15 Winte			30/15 Su						
7.005 7.006		15 Winte 80 Winte			30/15 Su 30/15 Su						
1.010		80 Winte		+25%	1/15 St						
1.011		80 Winte		+25%	1/15 Su						
		<b>17</b> - 4	Q				7-16	Duration	Ding		
	US/MH		Surcharged Depth		Flow /	Overf1		Drain ime	Pipe Flow		
PN	Name	(m)	(m)	(m <sup>3</sup> )	Cap.	(1/s)		ins)	(1/s)	St	atus
S4.00	0 S14	5.001	0.901	0.000	0.04				5.0	FLOO	D RISK
S4.00			1.228						191.1		FLOOD
S4.00			1.088								D RISK
S4.00			0.778								HARGED
S3.00		3.977	1.187								HARGED
S5.00 S5.00			1.768 1.228								HARGED HARGED
S5.00			1.228								HARGED
S5.00			0.721								HARGED
S6.00			1.207						95.6		FLOOD
S6.00			1.054								HARGED
S6.00			0.890						230.7		
S6.00			0.779						272.1 1268.9		HARGED
S3.00	4 S27	3.784	1.141								

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Jacobs Engineering Limited		Page 13
•	Immingham Eastern	
	Ro-Ro Terminal	
	Western Yard: Proposed	Micro
Date 05/08/2022	Designed by Helen Heather-Smith	Drainage
File Proposed Case.MDX	Checked by Tom Watson	Diamage
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank <u>1) for Storm</u>

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)		Flow / Cap.	Overflow (1/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S3.006	S29	3.207	0.757	0.000	0.61			508.1	SURCHARGED
S3.007	S30	3.199	0.879	0.000	0.91			507.3	SURCHARGED
S7.000	S31	4.768	1.208	7.766	1.30			83.8	FLOOD
S7.001	S32	4.868	1.405	0.000	1.38			87.8	SURCHARGED
S7.002	S31	4.892	1.514	0.000	1.60			116.2	FLOOD RISK
S7.003	S32	4.597	1.443	0.000	2.17			262.2	SURCHARGED
S7.004	S33	3.671	0.743	0.000	1.54			246.4	SURCHARGED
S7.005	S34	3.328	0.558	0.000	1.30			232.6	SURCHARGED
S7.006	S35	3.200	0.638	0.000	0.57			101.7	SURCHARGED
S1.010	S36	3.194	1.140	0.000	0.86			922.0	SURCHARGED
S1.011	S37	3.188	1.946	0.000	0.89			119.5	SURCHARGED

PN		Level Exceeded		
S4.000	S14			
S4.001		1		
S4.002	S16			
S4.003	S17			
s3.003	S18			
S5.000	S19			
S5.001	S20			
S5.002	S21			
S5.003	S22			
S6.000	S23	4		
S6.001	S24			
S6.002	S25			
S6.003	S26			
S3.004	S27			
S3.005	S28			
S3.006	S29			
S3.007	S30			
S7.000	S31	3		
S7.001	S32			
S7.002	S31			
S7.003	S32			
S7.004	S33			
S7.005	S34			
S7.006	S35			
S1.010	S36			
S1.011	S37			
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## **Appendix C. Documents**

- **C1** Environmental Permit
- C2 Immingham Drainage Channel Plan (Plan Courtesy of North East Lindsey Drainage Board)

WIMS NO / EDRM CASE REFERENCE:

## **PRNTS18163**

#### PERMIT NO / EDRM OTHER REFERENCE:

ADDITIONAL REF:

#### **Consent to Discharge**

ť

Water Resources Act 1991 Section 88, Schedule 10 (as amended by the Environment Act 1995)



## Modification of Consent to Discharge

Consent Modification Number: PRNTS/18163A

**Reference Number:** 

**PRNTS/18484** 

To: Immingham Outflow Ltd ("the Consent Holder") Immingham Dock Immingham North East Lincolnshire **DN20 2NS** 



13 JAN 2006

WHEREAS the Environment Agency ("the Agency") in pursuance of its powers under the Water Resources Act 1991 Schedule 10 (as amended by the Environment Act 1995) GRANTED CONSENT to the making of a discharge of TRADE EFFLUENT consisting of SITE DRAINAGE and/or BIOLOGICALLY TREATED SEWAGE EFFLUENT,

From: Premises at Immingham Dock, Immingham, North East Lincolnshire

To: The River Humber

on 27 May 2005; NOW the Agency in pursuance of its powers under the Water Resources Act 1991 (as amended by the Environment Act 1995) GIVES NOTICE that Consent PRNTS/18163 is hereby modified in accordance with the details specified in the following schedule:

#### **Trade Effluent**

#### PRNTS/18163A 01

Subject to the provisions of Paragraphs 7 and 8 of Schedule 10 of the Water Resources Act 1991 (as amended by the Environment Act 1995), no notice shall be served by the Agency, altering this notice of modification, without the agreement in writing of the Consent Holder, during a period of 4 years from the date this notice is served.

This Modification of Consent is issued on: This Modification of Consent takes effect on: 12 December 2005

12 December 2005.

Signed

Simon Nugent, Team Leader, Regulatory Water Quality

NOTE: The specified conditions are now replaced by the conditions in the schedule attached herewith. Consent PRNTS/18163 is updated accordingly.

Conditions of Consent for trade effluent consisting of site drainage and/or biologically treated sewage effluent

## 01 Conditions of Consent for trade effluent consisting of site drainage and/or biologically treated sewage effluent

#### 1 Conditions to be modified and replaced

Condition 1.3.2 in Consent PRNTS/18163 is hereby modified to read as follows:

1.3.2 An appropriately labelled sample point shall be provided and maintained at National Grid Reference TA 2064 1593, as shown marked 'Sample point ' on the Site Plan attached to this consent, so that a representative sample of the Discharge may be obtained. The Consent Holder shall ensure that all constituents of the Discharge pass through the said sampling point at all times and in any legal proceedings it shall, for the purposes of Section 10 of the Rivers (Prevention of Pollution) Act 1961, be presumed, until the contrary is shown, that any sample of the Discharge taken at the said sampling point is a sample of what was being discharged into controlled waters.

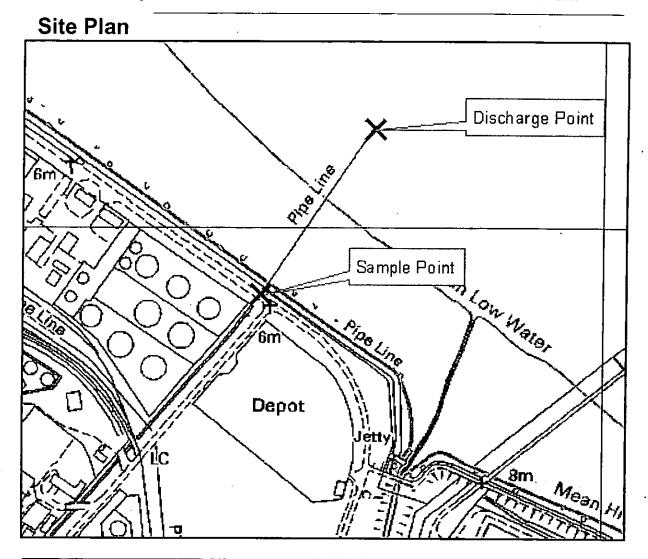
#### Other conditions of the Consent

2

All other conditions of the consent remain in force. Consent **PRNTS/18163** is updated accordingly.

Conditions of Consent for trade effluent consisting of site drainage and/or biologically treated sewage effluent

Schedule Number PRNTS/18163 A 01 Reference Number PRNTS/18484 Date 12 December 2005



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Environment Agency Anglian Region Waterside House, Waterside North, Lincoln, LN2 5HA



## **Consent to Discharge**

Water Resources Act 1991 (as amended by the Environment Act 1995)

Consent Holder(s)



Immingham Outflow Ltd Immingham Dock Immingham North East Lincolnshire DN20 2NS

**Consent to Discharge from** 

Premises at Immingham Dock Immingham North East Lincolnshire

Consent Number

**PRNTS/18163** 

Environment Agency Anglian Region Waterside House, Waterside North, Lincoln, LN2 5HA Tel 08708 506506 Fax: 01522 785878 Consent to Discharge

Water Resources Act 1991 Section 88, Schedule 10 (as amended by the Environment Act 1995)



## Consent to Discharge

## Consent Number PRNTS/18163

To:

Immingham Outflow Ltd ("the Consent Holder") Immingham Dock Immingham North East Lincolnshire DN20 2NS

The Environment Agency ("the Agency") in pursuance of its powers under the Water Resources Act 1991(as amended by the Environment Act 1995) hereby consents to the making of a discharge:

#### Of:

Trade effluent consisting of site drainage and/or biologically treated sewage effluent ("the Discharge")

At:

Premises at Immingham Dock, Immingham, North East Lincolnshire

To:

#### The River Humber

Subject to the conditions set out in this notice of Consent to Discharge.

Subject to the provisions of Paragraphs 7 and 8 of Schedule 10 of the Water Resources Act 1991(as amended by the Environment Act 1995), no notice shall be served by the Agency, altering this consent, without the agreement of the Consent Holder, during a period of 4 years from the date this notice is issued.

This Consent is issued on:	27 May 2005
This Consent takes effect on:	27 May 2005

#### Signed

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Team Leader Water Quality Regulatory

# Conditions of Consent for trade effluent consisting of site drainage and/or biologically treated sewage effluent

#### **1.1** Nature of Discharge

1

- 1.1.1 (a) The Discharge shall not contain any poisonous, noxious, or polluting matter or solid waste matter.
  - (b) Provided that the Discharge hereby consented is made in accordance with the following conditions of this consent, such discharge shall not be taken to be in breach of condition (a) above by reason of containing substances or having properties identified in and controlled by these conditions.
- 1.1.2 The Discharge shall consist solely of trade effluent comprising site drainage, boiler blowdown, cooling tower blowdown, vehicle washing, and container washing as specified in the application, and/or biologically treated sewage effluent from an appropriately sized and designed sewage treatment plant installed, operated and maintained in accordance with the manufacturer's instructions as updated from time to time.

#### 1.2 Place of Discharge

1.3.1

1.2.1 The Discharge shall be made in the manner and at the place specified as:

- a discharging to the River Humber;
- **b** at National Grid Reference TA 2076 1610;
- c shown marked "Discharge Point" on Site Plan attached to this consent.

#### **1.3 Sampling Point Requirements**

A sampling point with facilities enabling fully representative samples of the discharge of **biologically treated sewage effluent** to be readily and safely taken at all times shall be installed by the Consent Holder immediately downstream of the treatment plant. The Consent Holder shall ensure that all constituents of the biologically treated sewage effluent discharge pass through the said sampling point at all times and in any legal proceedings it shall, for the purposes of Section 10 of the Rivers (Prevention of Pollution) Act 1961, be presumed, until the contrary is shown, that any sample of the discharge taken by the Agency at the said sampling point is a sample of what was passing into controlled waters from the said treatment plant.

1.3.2 A sample point shall be provided and maintained at National Grid Reference TA 2027 1544 as shown marked "Sample Point" on the Site Plan attached to this consent, so that a representative sample of the Discharge may be obtained. The Consent Holder shall ensure that all constituents of the Discharge pass through the said sampling point at all times and in any legal proceedings it shall, for the purposes of Section 10 of the Rivers (Prevention of Pollution) Act 1961, be presumed, until the contrary is shown that any sample of the Discharge taken at the said sampling point is a sample of what was discharging into controlled waters.

#### 1.4 Volume

1.4.1 The volume of biologically treated sewage effluent discharged shall not exceed 10 cubic metres per day.

#### 1.5 Composition

- 1.5.1 As far as is reasonably practicable, the discharge shall not contain any matter to such an extent as to cause the receiving waters, or any waters of which the receiving waters are a tributary, to be poisonous or injurious to fish in those waters, or to the spawning grounds, spawn or food of fish in those waters, or otherwise cause damage to the ecology of those waters, or to have any other adverse environmental impact.
- 1.5.2 No biocides or any other chemicals shall be added to the discharge without the prior written agreement of the Agency.
- 1.5.3 No other processes should be carried out on site which generate an effluent other than those specified in the application without the prior written agreement of the Agency.
- 1.5.4 The discharge shall not contain more than 10 milligrammes per litre of total hydrocarbon.
- 1.5.5 The discharge shall not contain more than 300 milligrammes per litre of chemical oxygen demand.
- 1.5.6 The discharge shall not contain more than 200 milligrammes per litre of suspended solids (measured after drying at 105°C).
- 1.5.7 The discharge shall have a pH value of not less than 6.0 nor greater than 8.5.
- 1.5.8 The discharge shall contain no visible oil or grease.

#### 1.6 Flow measurement

- 1.6.1 a At the request of the Agency, the Consent Holder shall install, operate and maintain a means of flow measuring to a specification and at a location required by the Agency, to enable the daily volume and/or instantaneous flow of the discharge to be recorded.
  - **b** The Consent Holder shall calibrate, operate and maintain the flow monitoring and recording system to a standard agreed or specified by the Agency. The flow and maintenance records shall be provided to the Agency as and when requested.

#### 1.7 Maintenance

1.7.1 The discharge pipe, onsite interceptors and pumping equipment shall all be maintained in an efficient and operational condition

#### 1.8 Recording and Reporting

- a The Consent Holder shall establish and operate a documented maintenance programme and record all non-routine actions undertaken that may have adversely affected effluent quality. Copies of the programme shall be made available for inspection by the Agency's officers at all reasonable times.
  - **b** On request the Consent Holder shall supply the Agency with a written report on the maintenance and all non-routine actions that may have adversely affected effluent quality
  - c The Consent Holder shall as soon as reasonably practicable report to the Agency all non-routine actions that may have adversely affected effluent quality.

#### 1.9 Listed substances

1.9.1 The Consent Holder shall notify the Agency forthwith in writing if any change occurs on site that may increase or introduce into the effluent any "dangerous substance" (set out in Annex 1 to this notice as updated from time to time and notified to the Consent Holder in writing), and any other substance considered by the Consent Holder as having or likely to have a significant effect on the receiving waters.

#### 1.10 Dangerous Substance List II Condition

1.10.1

1.8.1

- **a** The quantity of List II Substances (as defined in the Dangerous Substances Directive 76/464/EEC) in the Discharge shall not increase above the levels in the discharge on the date of effect of this Consent where no specific level is authorised; and.
- b notwithstanding a above, the Discharge shall not contain quantities of any List II Substance such as to cause or contribute to the concentration of that substance in the receiving water exceeding the relevant Environmental Quality Standard (EQS).

#### 1.11 Operational Surveillance and Audit

- 1.11.1
- **a** The Consent Holder shall maintain a record of any changes in processes that may result in a change in the Dangerous Substances composition of the effluent discharge.
- **b** The Consent Holder, at a time scale and frequency agreed by the Agency, shall undertake and record an audit to identify any additions or changes to the concentrations and loads of Dangerous Substances in the effluent since the date of issue of the Consent.
- c The audit procedure is to be previously agreed in writing by the Agency.

Consent to Discharge Site Plan

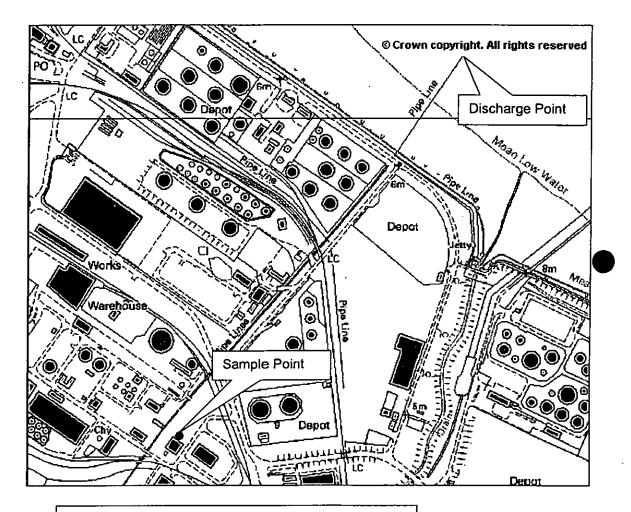
**d** The records kept in accordance with paragraphs a and b above shall be made available to the Agency on request.

#### 1.12 Monitoring

1.12.1 The Consent Holder shall carry out an effluent-monitoring programme as directed in writing by the Agency.

1.12.2 The results of the monitoring programme shall be submitted to the Agency in a format and at a frequency, as directed in writing by the Agency.

## 2 Site plan



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Consent to Discharge

· Annex

#### Annex 1

### **Dangerous substances**

	· · · · · · · · · · · · · · · · · · ·	<b>.</b> .	
1.	Mercury and its compounds	2.	Cadmium and its compounds
3.	Hexachlorocyclohexane	4.	Carbon tetrachloride
_	(lindane and related compounds)		
5.	DDT (the isomers of 1,1,1-trichloro-2,2		nlorophenyl} ethane)
6.	Pentachlorophenol (PCP)	7.	Aldrin
8.	Dieldrin	9.	Endrin
10.	Isodrin	11.	Hexachlorobenzene (HCB)
12.	Hexachlorobutadiene (HCBD)	13.	Chloroform
14.	Polychlorinated biphenyls	15.	Dichlorvos
16.	1,2-Dichloroethane	17.	Trichlorobenzene
18.		19.	Simazine
20. 22.	Tributyltin compounds	21.	Triphenyltin compounds
	Trifluralin	23.	Fenitrothion
24.	Azinphos-methyl	25.	Malathion
26.	Endosulfan	27.	Lead Zinc
28. 30.	Chromium	29. 31.	
30. 32.	Copper Arsenic	31. 33.	Nickel *Iron
32. 34.	*pH if outside the range 5.5 to 9.0	35. 35.	*Boron
3 <del>4</del> . 36.	Vanadium	35. 37.	PCSD'S
38.	Cyfluthrin	39.	Sulcofuron
40.	Flucofuron	41.	Permethrin
42.	4-Chloro-3-methyl-phenol	43.	2-Chlorophenol
44.	2,4-Dichlorophenol	45.	2,4-D (ester)
46.	2,4-D (non ester)	47.	1,1,1-Trichloroethane
48.	1,1,2-Trichloroethane	49.	Bentazone
50.	Benzene	51.	Biphenyl
<b>52</b> .	Chloronitrotoluenes	53.	Demeton
54.	Dimethoate	55.	Linuron
56.	MCPA	57.	Mecoprop
58.	Mevinphos	59.	Napthalene
60.	Omethoate	61.	Toluene
62.	Trizaphos	63	Xylene
64.	Cyanide	65.	Azinphos-ethyl
66.	Fenthion	67.	Parathion
68.	Parathion-methyl	69.	Trichloroethylene
70.	Tetrachloroethylene	71.	Dioxins
72.	PAHs	73.	Nonyl phenol
74.	Nonyl phenyl ethoxylate	75.	Di-ethylhexyl phthalate
76.	Bisphenol-A	77.	Diazinon
78.	Chlorfenvinphos	79.	Chlorotoluron
80. •	Isoproturon	81.	Diuron
82.	Propetamphos	83.	Flumethrin
84.	Amitraz	85.	High-Cis Cypermethrin
86.	Cyromazine	87.	Deltamethrin
88.	Cypermethrin		

This list is applicable as at 1 December 1998 and will be updated as and when changes to the relevant legislative requirements occur.

\*Notification to the Agency by the Consent holder is only required in respect of changes to trade effluents likely to cause significant changes to the pH value, and/or iron or boron concentrations, of the crude sewage.

