

FLOOD RISK ASSESSMENT

Nursing Home Extension

Sally Park Nursing Home,
Sally Park Close,
Brimmohouse, Dublin 24.

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Site Name		Sally Park Nursing Home,			
Site Location		Sally Park Nursing Home, Sally Park Close, Firhouse, Dublin 24.			
Site Description		0.393 acre site positioned on the R114 (Firhouse Road) and accessed by the Ballycullen road			
Proposed Development		Oaklands Nursing Homes Ltd. are applying for permission for demolition of modern single storey structures attached to the west and North of the existing building, and for construction of a) a Single storey (53.1 m ²) extension attached to the East of the existing building, & b) a two storey (161.0 m ²) extension attached to the west of the existing building, & c) a three storey (189.2 m ²) extension attached to the north of the existing building. The existing structure is a protected structure (SDCC RPS no. 285). Construction to include all associated site works and enabling works			
Land use Vulnerability Class		Less Vulnerable (Commercial)			
Flood Zones		Based on the Dodder CFRAM flood maps this site is not affected by tidal flooding			
Justification test for Development Management		Required			
Flood risk	Receptor	Source	Pathway	Likelihood	Consequences
Flood Zone C	Property	Fluvial	Blockage/over bank	Low	High
Conclusion		Development demonstrated to be justified under the Planning system and Flood Risk Management Guidelines for Planning Authorities.			

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1. Introduction

CEA has been requested by South Dublin` County Council to prepare a Flood Risk Assessment (FRA) report for the proposed extension to Sally Park Nursing Home at, Sally Park Close, Firhouse, Dublin 24 as part of a preplanning consultation.

The purpose of this flood risk assessment is to provide a quantitative appraisal of any potential flood risk to the proposed site. It is our objective to describe the existing site, catchments, proposed development, existing flood risks, proposed mitigation measures and residual risk to local receptors.

This report outlines the suitability of the proposed development when considering potential flood events. This report takes into account the site conditions, local drainage and historic flood events.

CEA Ltd are of the opinion this report is a commensurate assessment of the risks of flooding and appropriately shows that the proposed development will not adversely impact or impede a watercourse, floodplain or flood protection and management facilities.

1.1 Site Location

The proposed development is located in Tallaght on the R606 regional road. The site is not bounded by any river though the River Dodder passes through the valley to the north of the site. The site is surrounded by residential developments Sally Park Close and Monalee Wood to the West, South and East. The site has the R114 (Firhouse Road) to the north and is accessed via the Ballycullen Road through Sally Park Close to the East.

1.2 Flood Risk Assessment; Aims and Objectives

The examination of flood risk considers pluvial, fluvial and tidal flooding. This FRA uses techniques of analyses that are proportionate to the risk and appropriate to the scale, nature and location of the development considering the following:

- Flood probability,
- Flood depth,
- Flood velocity,
- Rate of onset of flooding and having regard to the consequences to receptors such as people, properties and the environment.

1.3 Terms of Reference

All advice offered by this practice is provided subject to the standard terms of engagement for the appointment of consulting engineers for report and advisory works

as published by the Institution of Engineers of Ireland and the Association of Consulting Engineers of Ireland (ACEI) – Agreement RA 9101. Your use of this report indicates your agreement to these conditions. You may view a copy of this document at our offices or purchase a copy from the referred institutions.

1.4 Report Structure

CEA reviewed the site layout maps, and conducted a search of relevant databases maintained by the Office of Public Works (OPW), Local Authority, Geological Survey of Ireland (GSI) and Ordnance Survey of Ireland (OSI).

The Flood Risk Assessment is based on the guidance in “the Planning System and Flood Risk Management” published by the Minister for the Environment, Heritage and Local Government in November 2009.

- Avoid development in areas at risk of flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify appropriate development;
- Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and then mitigation of flood risk; and
- Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

The sequential approach in flood risk management requires the following three steps to be taken to identify the necessity for the justification test for a development.

- Step No.1· Identification of the Flood Zone at the proposed development Site.
- Step No.2 - Identification of the vulnerability type of the proposed development
- Step No.3·using the matrix of vulnerability versus Flood Zone contained in Table 3.2 of the F.R.M Guidelines: identify the necessity for the justification test for the development.

Flood Zones are defined by the FRM Guidelines within graphical areas which the likelihood of flooding is in a particular range. There are three zones.-

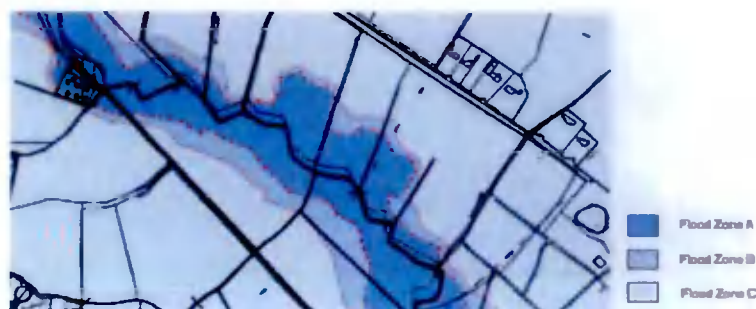


Figure 1 Indicative Flood Zones

Zone	Description
Zone A High Probability of Flooding	This zone defines areas with the highest risk of flooding from rivers (ie. More than 1% probability or more than 1 in 100) and the coast (ie. More than 0.5% probability or more than 1 in 200).
Zone B Moderate probability of flooding	This zone defines areas with a moderate risk of flooding from rivers (ie. 0.1% to 1% probability or between 1 in 100 and 1 in 1000) and the coast (ie. 0.1% to 0.5% probability or between 1 in 200 and 1 in 1000).
Zone C Low probability of flooding	This zone defines areas with a low risk of flooding from rivers and the coast (ie. Less than 0.1% probability or less than 1 in 1000).

Table 1: Definition of the Flood Zones

It is important to note that Flood Zone C covers all areas which are not identified as being in Flood Zones A or B. Flood Zones A, B and C are based on the current assessment of the 10%, 1%, 0.5% and the 0.1% AEP fluvial and tidal events.

Table 3.1 of the FRM Guidelines shows the classification of the vulnerability of flooding of different types of development. The table identifies a housing development as a highly vulnerable development (including essential infrastructure).

Table 3.2 of the FRM Guidelines identifies the type of development that would be appropriate for each Flood Zone and those that would be required to meet the requirements of the Justification Test.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 2: Table 3.2 of the FRM Guidelines

1.5 Stages of Flood Risk Assessment

A three-staged approach to undertaking an FRA is recommended by the Planning Guidelines. In summary, the three stages are:

- **Flood Risk Identification (Stage 1)**

Identification of any issues relating to the site that will require further investigation through a Flood Risk Assessment. This stage makes use of existing and historical information.

- **Initial Flood Risk Assessment (Stage 2)**

Involves establishment of the sources of flooding, the extent of the flood risk, potential impacts of the development and possible mitigation measures.

- **Detailed Flood Risk Assessment (Stage 3)**

Assess flood risk issues in sufficient detail to provide quantitative appraisal of potential flood risk of the development, impacts of the flooding elsewhere and the effectiveness of any proposed mitigation measures.

The Guidelines recognise that “all stages may not be needed to complete a flood risk assessment”. The required level of detail “will depend on the level of risk and the potential conflict with proposed development and the scale of mitigation measures being proposed”.

1.6 Flood Risk Identification

To begin the process, an assessment of the potential for and scale of flood risk at the site is conducted using existing and historical information. This identifies sources of potential flood risk to the site and, if any, highlights the need for further investigation through an Initial Flood Risk Assessment. The findings from the flood risk identification stage of the assessment are provided in Section 4 of this report.

1.7 Flood Risk Assessment

An FRA provides an appropriately detailed assessment of the flood risk at the site. The Guidelines highlight a number of key items to be covered for a site specific FRA:

- Examination of all sources of flooding that may affect the plan area;
- Appraisal of the availability and adequacy of existing information;
- Identification of Flood Zones;
- Determine what technical studies are appropriate;
- Describe what residual risks will be assessed;
- Potential impacts of development on flooding elsewhere;
- Scope of possible mitigation measures.

The findings from this stage of the report can be found in Section 5. This FRA report is considered appropriate and sufficient to allow an informed decision with respect to the proposed development on the grounds of flood risk without the need to carry out the third stage of detailed FRA.

1.8 Technical Concepts

Flood Frequency can be defined in terms of a return period, which is the average time between years with at least one larger flood. Return periods are used because they are the generally accepted convention among hydrologists and engineers and are used in the Flood Studies Report (FSR).

Flood Frequency can alternatively be expressed in terms of an annual exceedance probability (AEP), which is the inverse of the return period as shown in the table.

This can be helpful when presenting results to members of the public who may associate the concept of return period with a regular occurrence rather than an average recurrence interval and is the terminology which will be used throughout the report.

Return Period (years)	Annual Exceedance Probability (%)
2	50
10	10
25	4
75	1.33
100	1
200	0.5
1000	0.1

Table 3 Conversion between return periods and annual exceedance probabilities.
een return periods and annual exceedance probabilities.

2. Flood Risk Identification

As discussed in Section 1, the planning guidelines require that a proposed development identifies the potential nature and scale of any flood risk. This section includes a collection and review of historic flooding and concludes with an identification of the sources and scale of flood risk issues.

2.1 Flood History

This section will collate and review existing sources of flood history that are relevant to the proposed site.

This section will collate and review existing sources of flood history that are relevant to the proposed site.

Floodmaps.ie

The OPW hosts a National Flood Hazard Mapping website which highlights areas at risk of flooding through the collection of recorded data and observed flood events. A review of the maps that there are records of flooding in the vicinity of the site and along the river within 2km of the site.

There is a history of flooding in Midleton town downstream. There have been 13 recorded flood events in the Midleton area. 3 flood events occurred in the vicinity of the proposed development:

Mount Carmel Park Firhouse Nov 2000

Date: 05/11/2000
Location: Junction of Main Street and Distillery Walk, Midleton, Co. Cork.
Source: Pluvial
Rainfall varied across the County from the 76mm recorded at Baldonnell to 137mm recorded at Boharnabreena for the period 9.00a.m. Sunday to 9.00a.m. Monday

Flooding at Homeville, Knocklyon, Dublin 16 24th October 2011

Location: Homeville, Knocklyon, Dublin 16.
Co-Ordinates: 311475, 227465
Source: Pluvial.
The source of the flood waters was the overtopping of the Ballycullen Stream, which is in the Dodder Catchment. Water level rose at culvert inlet under wall/shed. Residents reported that the trash screen was significantly blinded. (Trash screen witnessed by report writer to be over 50% blinded with old debris on 7/12/2011) Water entered the Homeville Estate through a railing fence and flooded 2 properties. River is open channel through the garden of 2 and 3 Homeville. Water rose in the garden of no 2 at culvert inlet and contributed to flooding in 2 and 3 Homeville and 4, 5 and 6 Taoibh na Coille.

Other Sources of Flood History

All reports available on Floodmaps.ie for the River Dodder (for 2km Up and Down Stream) are attached in Appendix B

2.2 Flood Forecasting

Dodder Catchment Flood Risk Assessment and Management Study (CFRAMS) and OPW Preliminary Flood Risk Assessment (PFRA)

The Preliminary Flood Risk Assessment (PFRA) is a requirement of the EU “Floods” Directive (2007/60/EC). One of the PFRA deliverables is flood probability mapping for pluvial, groundwater, fluvial and tidal sources and output from the area. The Dodder CFRAMS produced for the OPW in 2012 included flood mapping for fluvial and tidally influenced areas for both Current and Mid-Range Future scenarios. The River Dodder Fluvial Mid-Range Future Scenario is shown in Figure 3.

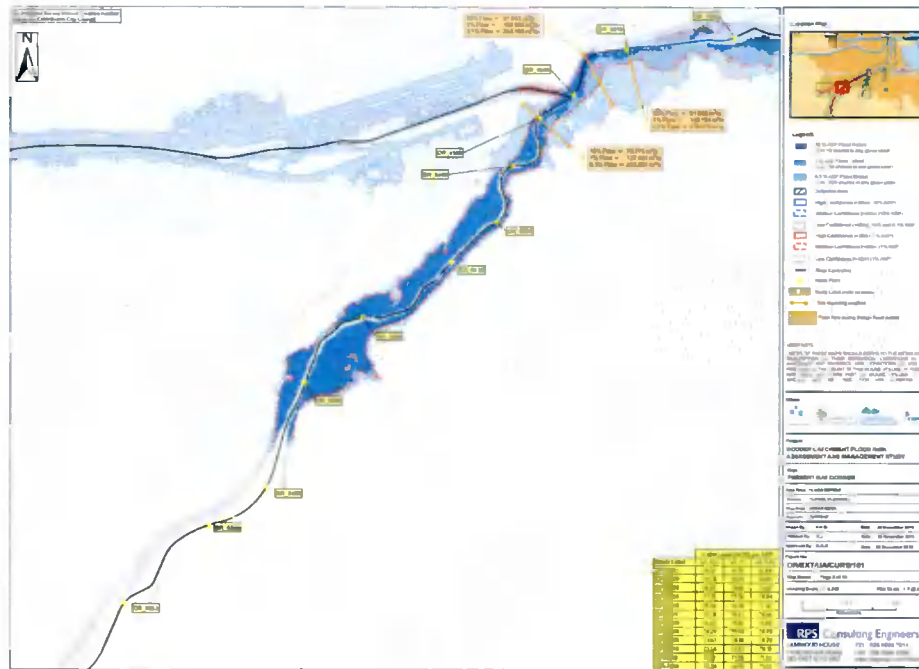


Figure 2 CFRAMS Dodder River mapping (Fluvial)

2.3 Sources of Flooding

The initial stage of a Flood Risk Assessment requires the identification and consideration of probable sources of flooding. Following the data collection phase of this FRA it is possible to summarise the level of potential risk posed by each source of flooding and these are included below.

Coastal

The OPW Dodder CFRAM mapping in Figure 4 indicates that the development site is not situated within a potential flooding zone and is located outside tidally influenced flooding. The site is identified as not susceptible to any flood events.

Pluvial

Pluvial flooding is the result of rainfall-generated overland flows, which arise before runoff can enter any watercourse. It is usually associated with high intensity rainfall.

Flood risk from pluvial sources exists in all areas, however the OPW Dodder CFRAMS mapping does not suggest that there are any areas of high probability of pluvial flooding on the site.

Fluvial

Fluvial flooding is not considered a contributor to flooding at this site. The OPW Dodder CFRAM mapping in Figure 3 suggests that the development site is not situated within a potential flooding zone.

*please see the attached map excerpts in Appendix A

3. Flood Risk Assessment

The initial stage of a Flood Risk Assessment requires the identification and consideration of probable sources of flooding. Following the data collection phase of this flood study it is possible to summarise the level of potential risk posed by each source of flooding and these are included below.

3.1 Identification of the Flood Zone at the site

Identification of the Flood Zone at the site.

The Midleton Local Area Plan (LAP) prepared by the Cork County Council contains a Zoning map for the Midleton Area which identifies the Flood Zones in the Midleton Area. The LAP Zoning Map for Midleton shows the proposed development site to be located in Flood Zone A.

Section 1.8.10 of the Midleton LAP acknowledges that some anomalies will occur and states that *"there is some evidence of possible anomalies in the flood risk mapping resulting in the possibility of inaccuracy at the local level"*.

The Dodder CFRAMS Current and Mid-Range Future Scenario was produced based on detailed surveys and site specific flood modelling of the area and are therefore considered a more robust and holistic assessment of flood risk than the LAP Flood Maps.

3.2 Identification of the Vulnerability of the type of proposed development

Vulnerability Class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children’s homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

The proposed development i.e. nursing Home, is classified as “Highly vulnerable development (including essential infrastructure)”.

3.3 Identification of the Flood Risk

The Dodder CFRAMS fluvial and tidal flood extents maps indicated the subject site was predicted to be subject to fluvial influenced flooding. However, the development site is located in close proximity to the location where tidal and fluvial influenced flooding alternates and therefore it is considered prudent to consider both. The maps indicate the expected future water level at nodes along the river’s length.

At Node DR_6819 for a fluvial influenced flood event in the Mid-Range Future Scenario, the water level for a 10% AEP Flood Extent is 71.52mOD, and the water level for a 0.1% AEP Flood Event is 71.63mOD.

At Node DR_7050 for a tidally influenced flood event in the Mid-Range Future Scenario, the water level for a 10% AEP Flood Extent is 70.24mOD, and the water level for a 0.1% AEP Flood Event is 71.02mOD.

The worst case scenario for a 10% AEP flood event is deemed to be 71.52m. There is a possibility of this water level increasing to 71.55mOD in the 1in 100 year floor event and 71.63mOD in the case of a 1 in 1000 year flood event. Both water levels will be considered as part of the flood risk assessment and mitigation measures, however, 71.63mOD will used as the minimum design water level

The floor level of the proposed structure is set to match existing, this value is above 76.15m which is above the 0.1% AEP Mid-Range Future Scenario.

3.4 Identification of Justification Test requirement

The proposed development is located in Flood Zone C and is classified as a less vulnerable development.

SUDS measures will be adopted to manage surface run-off and potential flooding whereby discharge to the Public infrastructure will be controlled at a level equal to a green-field run-off rate.

The FRM Guidelines stipulate that a justification test is required before it is deemed an appropriate development.

4. Justification Test

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 4: Table 3.2 of the FRM Guidelines

The site is located in Flood Zone C and is classified as a highly vulnerable development (including essential infrastructure) and therefore in accordance with table 3.2 of the FRM guidelines does not require a Justification test.

5. Assessment & Summary Conclusion

A Flood Risk Assessment for the proposed extension development at Sally Park, Firhouse, Co. Dublin, has been undertaken in accordance with the methodology recommended in the FRM Guidelines.

The proposed site is bounded on its northern boundary by the R114 the other side of which Dodder River 312m displaced from the site. The findings of the flood risk assessment can be summarised as follows:

The proposed development is classified as “Highly vulnerable development (including essential infrastructure)” in an area identified as being situated in Flood Zone C (Low Risk). The Zoning map from the Midleton LAP shows that the development site is zoned Objective RES.



The Dodder CFRAMS fluvial and tidal flood extents maps indicated the subject site was predicted to be subject to fluvial influenced flooding. The floor levels of all houses are set to match existing, which is above 71.63m, the 0.1% AEP Mid-Range Future Scenario.

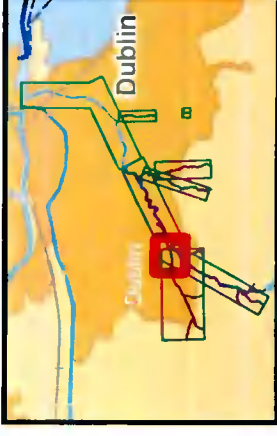
Appendix A

A3 FLUVIAL MAP EXERPTS





Location Plan:



Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Defended Area
- High Confidence (<20m) (10% AEP)
- Medium Confidence (<40m) (10% AEP)
- Low Confidence (>40m) (10% and 0 1% AEP)
- High Confidence (<20m) (1% AEP)
- Medium Confidence (<40m) (1% AEP)
- Low Confidence (>40m) (1% AEP)
- River Centreline
- Node Point
- Node Label (refer to table)
- Flow reporting location
- Peak flow during design flood extent

USER NOTE

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Client:



Project:

DODDER CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map:

PRESENT DAY TALLAGHT STREAM

Map Type: FLOOD EXTENT

Source: FLUVIAL FLOODING

Map Area: URBAN AREA

Scenario: CURRENT

Drawn By: A.A.B Date: 26 November 2010

Checked By: A.J. Date: 26 November 2010

Approved By: A.G.B Date: 26 November 2010

Figure No.: TS/EXT/JA/CURS/102

Map Series: Page 2 of 3

Drawing Scale: 1:5,000 Plot Scale: 1:1 @ A3



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10% Flow = 14.67 m³/s
 1% Flow = 24.17 m³/s
 0.1% Flow = 48.095 m³/s

TS1_4548

TS1_4532

TS1_4350

TS1_4170

TS1_3980

TS1_3800

TS1_3570

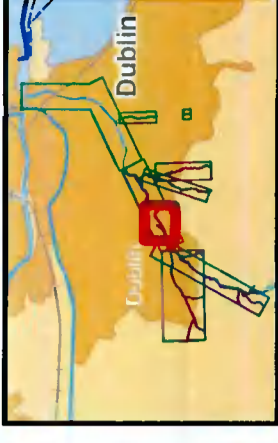
SITE

Node Label	Water Level (mOD) per AEP		
	WL 10%	WL 1%	WL 0.1%
TS1-3570	85.37	85.75	86.17
TS1-3800	83.46	83.84	84.15
TS1-3980	81.73	82.05	82.31
TS1-4170	78.41	78.75	79.05
TS1-4350	76.73	77.11	77.46
TS1-4532	75.35	75.81	76.33
TS1-4548	74.96	75.30	75.67





Location Plan:



Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Defended Area
- High Confidence (<20m) (10% AEP)
- Medium Confidence (<40m) (10% AEP)
- Low Confidence (>40m) (10% and 0.1% AEP)
- High Confidence (<20m) (1% AEP)
- Medium Confidence (<40m) (1% AEP)
- Low Confidence (>40m) (1% AEP)
- River Centreline
- Node Point
- Node Label (refer to table)
- Flow reporting location
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Client:



Project:

DODDER CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map:

PRESENT DAY DODDER

Map Type: FLOOD EXTENT

Source: FLUVIAL FLOODING

Map Area: URBAN AREA

Scenario: CURRENT

Drawn By: A.A.B Date: 26 November 2010

Checked By: A.J. Date: 26 November 2010

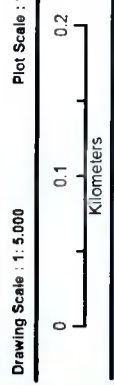
Approved By: A.G.B Date: 26 November 2010

Figure No.:

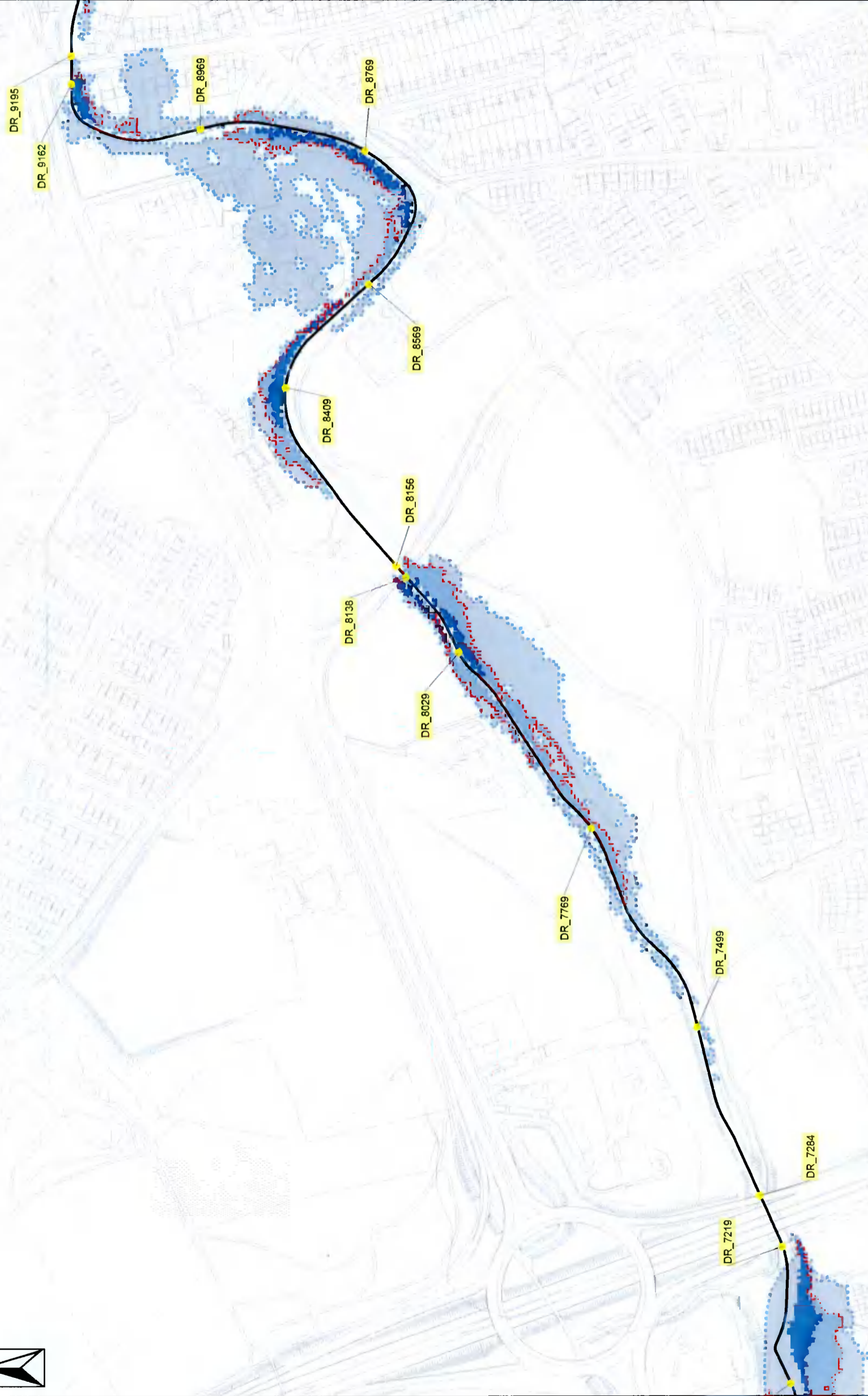
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Map Series: Page 4 of 12

Drawing Scale: 1:5,000 Plot Scale: 1:1 @ A3



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Node Label	Water Level [mOD] per AEP		
	WL 10%	WL 1%	WL 0.1%
DR_7219	63.58	64.54	65.43
DR_7284	63.31	64.28	65.17
DR_7499	62.39	63.26	64.23
DR_7769	60.77	61.59	62.33
DR_8029	59.02	59.76	60.63
DR_8138	58.43	59.21	59.95
DR_8156	58.32	59.15	59.85
DR_8409	56.74	57.33	58.16
DR_8569	55.81	56.59	57.48
DR_8769	54.60	55.33	56.24
DR_8969	53.06	53.74	54.62
DR_9195	51.57	52.20	52.93
DR_9162	52.09	52.60	53.38



