

INBO – Dublin 2017
21st September
Floods Directive in Ireland
Case Study Dodder River

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Engineer-in-Charge,
Regional Projects,
Dublin City Council

Floods Directive Legislation

- European Community Floods Directive 2007/60/EC
- Transposed into Republic of Irish Law, EU Assessment and Management of Flood Risks SI122/2010 and SI495/2015.
- Preliminary Flood Risk Assessment 2011
- Flood Maps Production 2014
- Flood Risk Management Plan 2016

Flood Risk Management Plan

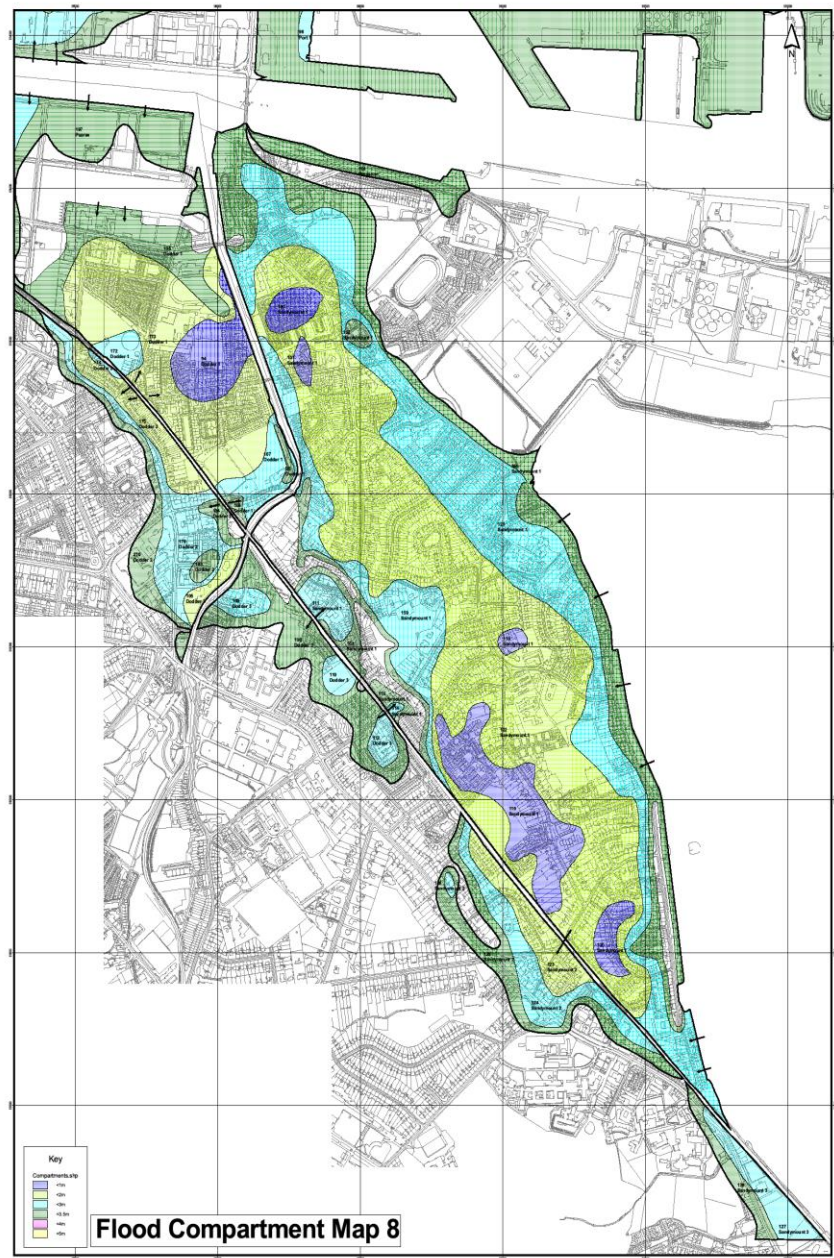
- PFRA identified 300+ areas at significant risk in Ireland, mainly historical flooding.
- Flood Maps estimated flood extents, depths and other relevant factors.
- Flood Risk Management Plans identified possible flood mitigating measures where feasible.
- Pilot Studies on Lee, Dodder, Fingal East Meath, Suir helped develop process.

Dodder Pilot Catchments Flood Risk Assessment & Management Study

- Following the tidal flooding on the Dodder river on 1st February 2002 and many previous large fluvial flood events, flooding tens to hundreds of buildings each time, it was decided that this would be one of the pilot studies for the CFRAMS process.
- The Dodder Pilot CFRAMS was substantially completed in 2014 for the fluvial section the tidal section having being studied as part of the Dublin Coastal Flood Risk Assessment Study (DCFRAS).

Study Outcomes

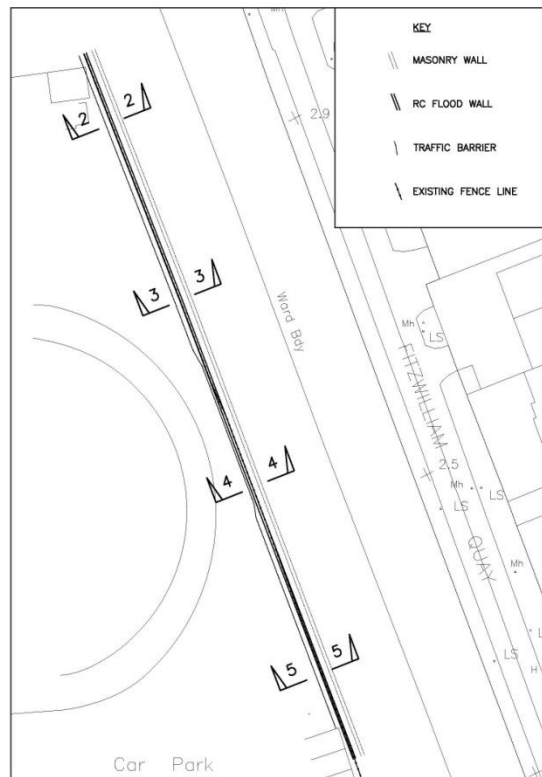
- DCFRAS recommended new flood walls and embankments along the tidal region of the Dodder Estuary. 650mm was added for sea level rise to year 2100, 120mm of which appears to have occurred already in Dublin Bay.
- The Dodder CFRAMS recommended further new walls and embankments and storage to mitigate against higher river flows in the future.
- 100 year river flow with 5 year tide was design for Dodder Estuary fluvial influenced zone.



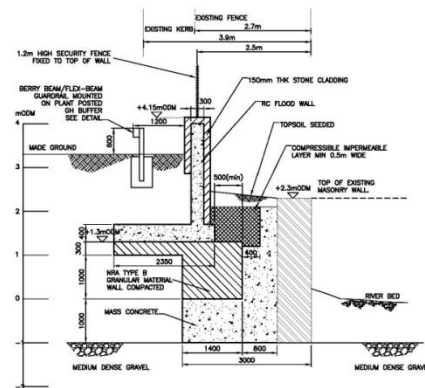
5.2 LOWER DODDER SCHEME - PROPOSED WORK BY SECTIONS



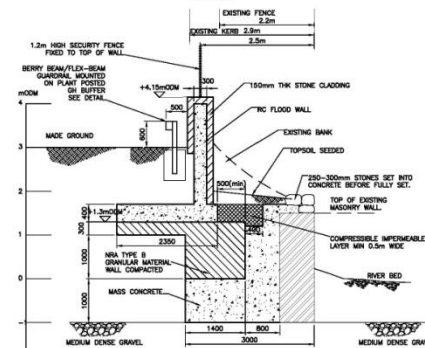
Section 1	Section 2	Section 3
<ol style="list-style-type: none"> 1. Point left bank & right bank Walls 2. Provide permanent stopboards at opening wall 3. Provide secondary defence 	<ol style="list-style-type: none"> 1. Remove trees & other threats. 2. Excavate & Rebuild / Strengthen Existing Lower Wall. 3. Address any water movement through embankment using sheet piling as required 4. Raise Embankment/ provide upper secondary defence wall. 	<ol style="list-style-type: none"> 1. Rebuild existing quay wall and secure primary (lower) defence and riverside walk (no part 8 planning permission required). 2. Provide flood gates or pull-up defences to seal off ends of existing pathways. 3. Address water tightness issues in river wall to "jungle" & reinstate wall. 4. Landscape "jungle" & improve existing secondary defence wall to required height. 5. Requirements of Left bank subject to the pending outcomes of the Dodder catchment study :



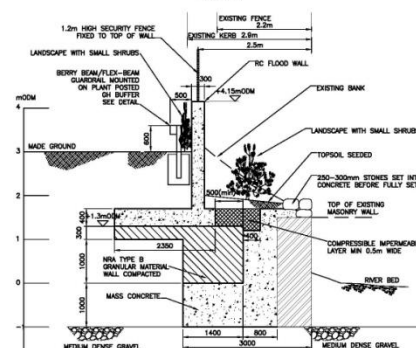
SITE PLAN
SCALE 1:2000



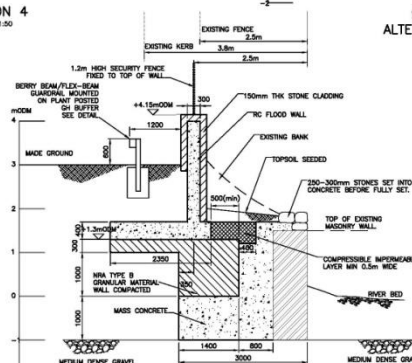
SECTION 2
SCALE 1:50



SECTION 3
SCALE 1:50



SECTION 4
SCALE 1:50



SECTION 5
SCALE 1:50

SECTION 4
ALTERNATIVE FINISH
SCALE 1:50

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ALL LEVELS IN METRES TO ORDNANCE DATUM UNLESS OTHERWISE STATED.

REV	DATE	DESCRIPTION	BY	CHK	APP
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REVISIONS
DUBLIN CITY COUNCIL



RIVER DODDER
FLOOD ALLEVIATION WORKS

TITLE
DOG TRACK SECTION
LOCATION PLAN
& SECTIONS

HASKONING UK Ltd.					
<input type="checkbox"/> FOLLOWER PROJECT SHEET <input type="checkbox"/> DESIGN SHEET <input type="checkbox"/> CALCULATION SHEET <input type="checkbox"/> BILL OF MATERIALS <input type="checkbox"/> SPECIFICATION SHEET <input type="checkbox"/> DRAWING SHEET					
ROYAL HASKONING DRAWN: TDL CHECKED: BJB PASSED: CM'M DATE: 13.09.07 CLIENT'S REF: SCALE: AS SHOWN AUTODRAW REF: FILENAME DRAWING No. 9S9229_1100					





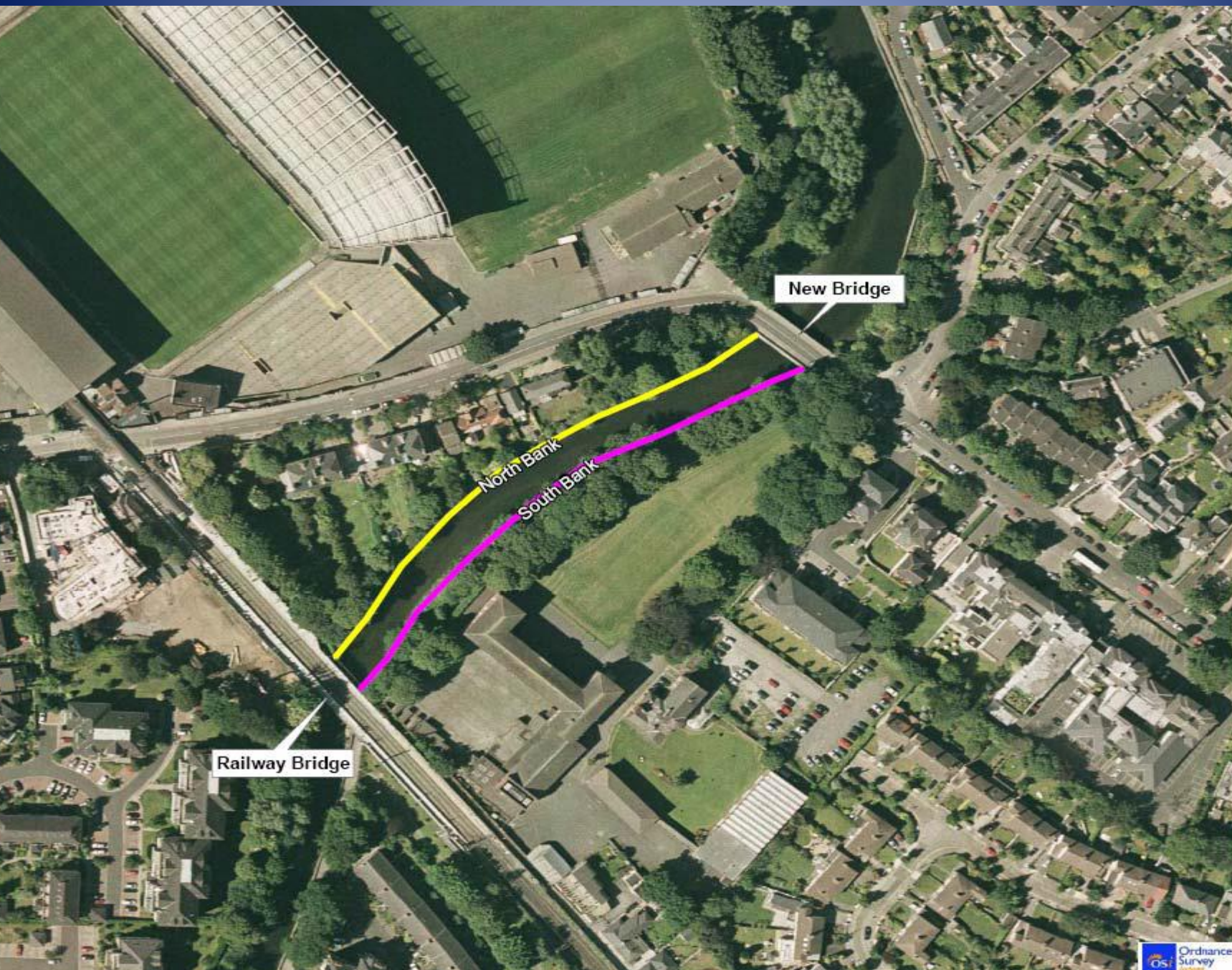













Client

 Dublin City Council
 Corporate Communications

Project
**River Dodder Flood
 Works - Phase 2b**

Title
**Phase 2b
 Proposed Works**

Figure 5.1



Issue Details		
Drawn by:	E.L.	Proj
Checked by:	C.C.	File
Approved by:	J.H.	M
Scale:	1:2,000 @ A4	Draw
Date:	05/02/2010	Mod

Notes

1. This drawing is the property of RPS and should not be used for any other purpose without the written consent of RPS.
2. All levels are referred to O.D.
3. Ordnance Survey Ireland © Copyright Government of Ireland





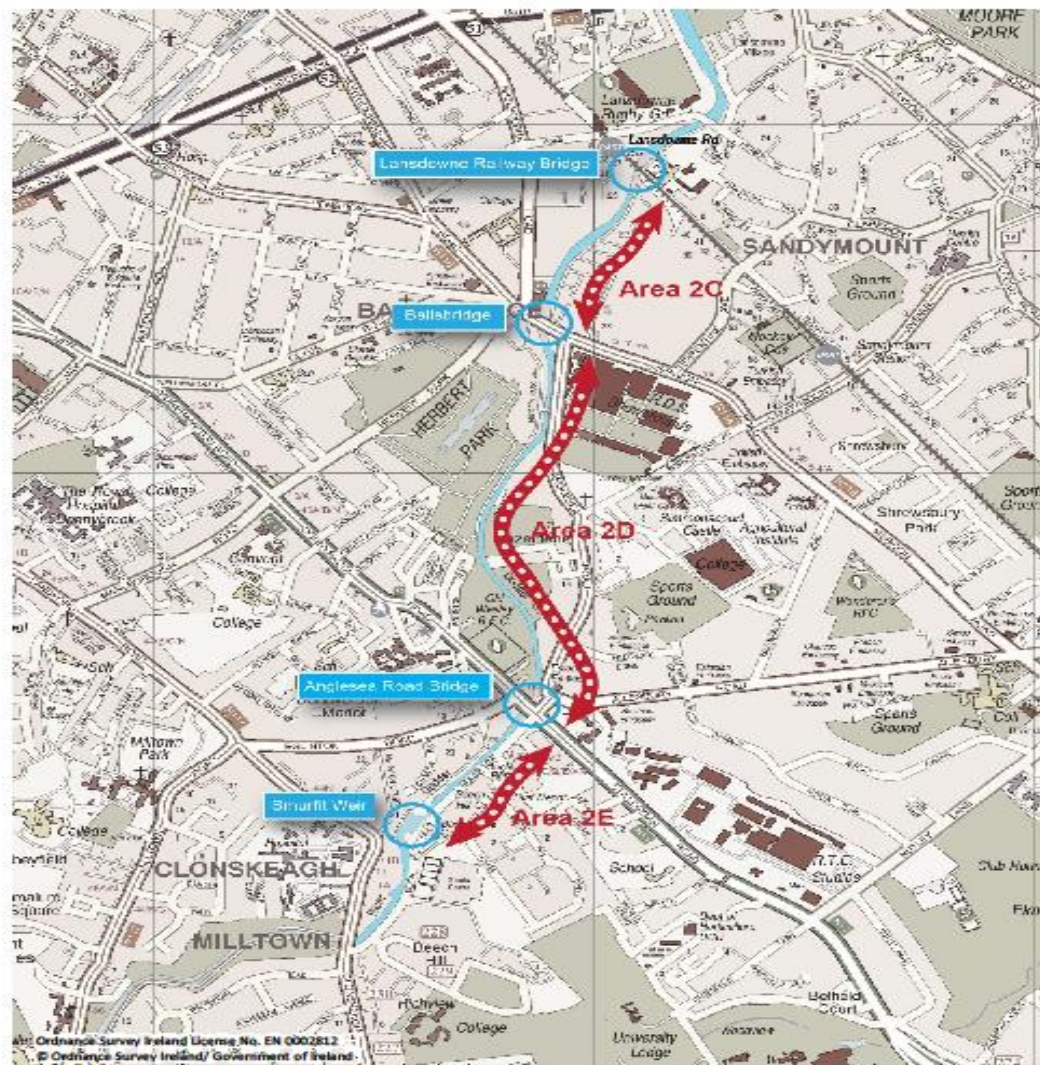




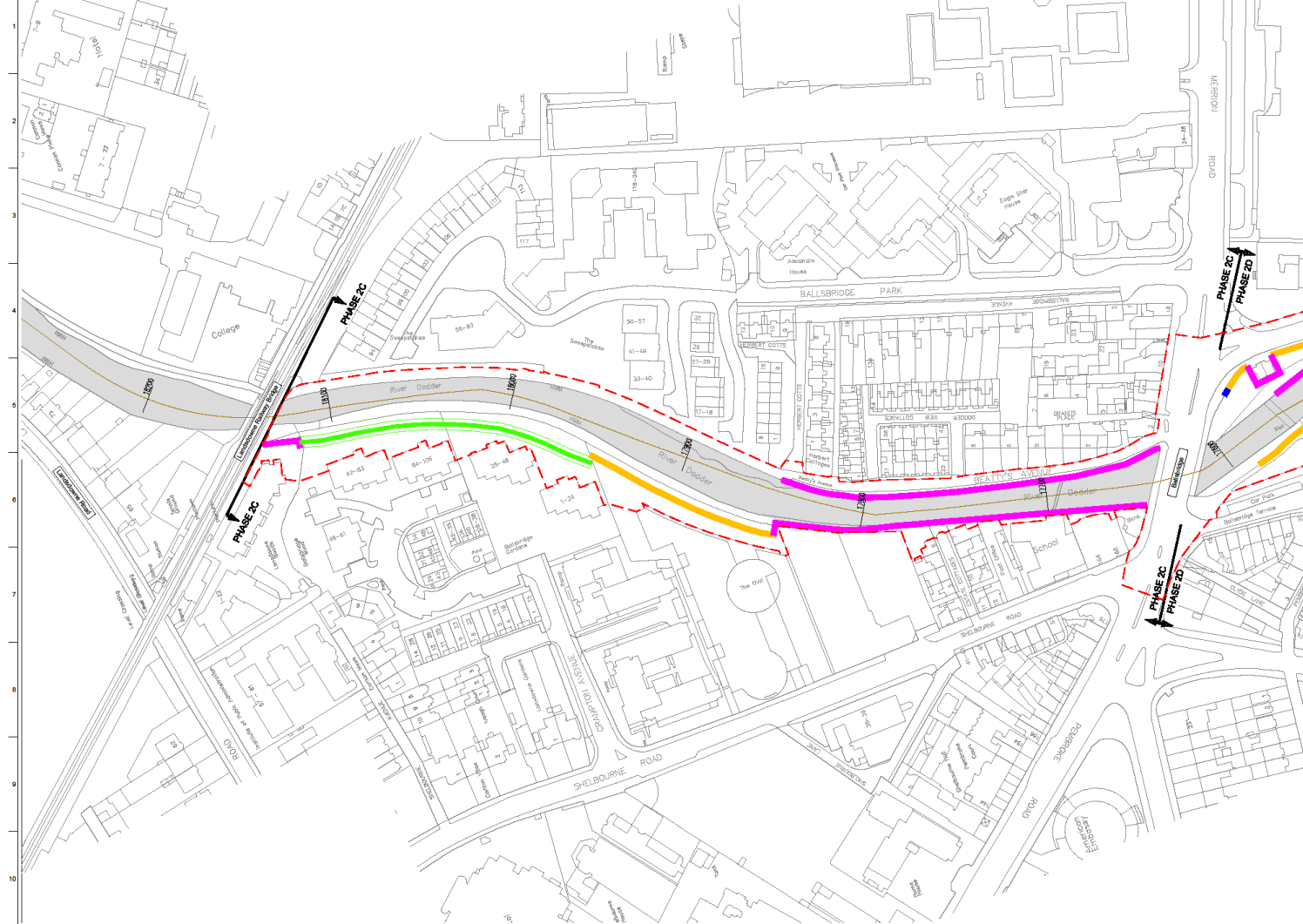




Dodder Flood Alleviation Works Phases 2C, 2D and 2E



Site Location Map
1:14,000



FOR INFORMATION

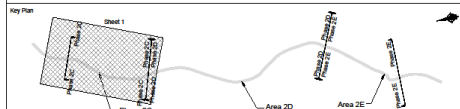
Legend:

- Site Boundary
- Raising Existing Wall
- New Wall
- New Embankment
- Flood Gate

All existing walls and embankments along the length of the scheme may be subject to localized minor remedial and stabilisation works. All outfalls will be fitted with flap valves.

Notes:

1. All coping stones to be Portuguese granite.
2. Wall on left bank chainage 18115 - 18130 to be finished with limestone cladding.
3. Wall on left bank chainage 17940 - 17950 to be finished with random rubble granite cladding.
4. Wall on right bank chainage 17940 - 17950 to be finished with random rubble granite cladding.
5. Wall on right bank chainage 17330 - 17615 to be finished with limestone cladding.



POI	10/04/2013	SR	JR	JMS
Issue	Date	By	Check	Appr

Clients

Dublin City
 Baile Átha Cliath

DUBLIN CITY COUNCIL
 ENVIRONMENT AND ENGINEERING DEPARTMENT
 As from Contracted agent involvement

Contractor

OPW
 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

Project Title
 Dodder Flood Alleviation Project

Scale A1
 1:1000
Date June 2012

Consultant
ARUP

ARUP, 50 Ringland Road
 Dublin 4
 Tel +353(0)1 233 4455 Fax +353(0)1 668 3169
 www.arup.ie

Drawing Title
 Part 8
 Location Map
 Sheet 01 of 04

Drawing Status
 For Information

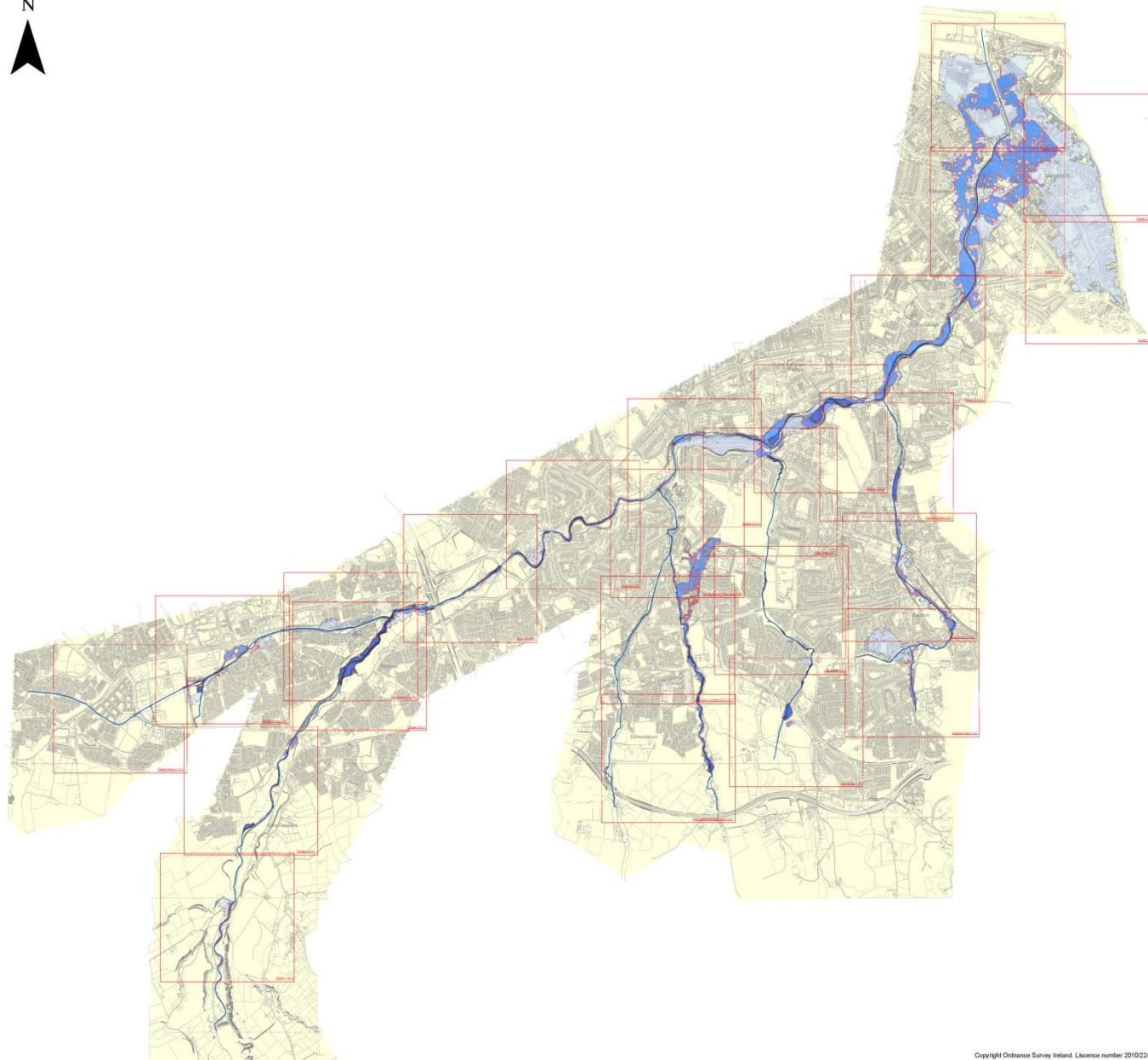
Project No: 219346 Drawing No: D-CA-A-0001 Issue: P01

The Environment

- SEA and AA
- Environmental Reports of each section to EIS/EIA standard.
- Two Otter holts
- Kingfisher roosts
- Missing cladding for nesting.
- Embankments where possible
- Tree and bat surveys.
- Water samples. Silt samples.
- Flap valves on all outlets.
- Sewage seepages repaired.
- Removal of contaminated ground.
- New fisheries pools, rock arrangements.







Legend

- River Centerline
- 10% AEP Flood Extent
- 1% AEP Flood Extent
- 0.1% AEP Flood Extent
- < 0.1% AEP Flood Extent

USER NOTE:

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

CLIENT



PROJECT

Dodder Catchment Flood Risk Management Study

TITLE

Flood Extent Scenario Overview Map

RPS Consulting Engineers

ELMWOOD HOUSE
74 BLOCHER ROAD
BELFAST BT12 6RZ

TEL: 028 9066 7914
FAX: 028 9066 8236
www.rpsgroup.com/ireland

Drawing No.: Page 1 of 1

IBEO064_001

Checked By: A.G.

Approved By: B.E.

Date: 17/06/10

SCALE: 1:15,000

Further Phases

- Phase 3, Clonskeagh to Classon's Bridge
- Phase 4, Whitechurch.
- Phase 5, Orwell Gardens.
- Phase 1e, Newbridge, ongoing.
- Phase 1f, Port View House
- Phase 1g, Graving Yards, d/s Ringsend Bridge,
Left bank.

Design Standards

- Tidal Zone: 1 on 200 year event (0.5% AEP) or 5year tide plus 100 year fluvial event.
- Fluvial Zone, 100 year flood event 1% AEP.
- Global warming to 2100. 650mm in tidal zone. 200 year fluvial event, +20% extra flow.
- Freeboard 300mm flood walls, 500mm embankments.
- All structures designed for 100 years.

Flood Gates

- Various types
- Swing gates quickest to close, can seal even without locking.
- Designed to take full flood wall height plus 100mm overtopping.
- Installed following flood warning.
- Currently takes about half a day to mobilise staff and close 12 flood gates on Dodder.

Flood Warning

- O'Connell-Coe formula. 3-4 days warning.
- Triton flood forecast. 24-36 hours warning.
- Rain watch. 24-48 hours warning, very difficult to predict accurately.
- Fluvial Flood can occur on lower Dodder 6-12 hours after heavy rainfall in mountains due to its very steep nature.
- Flow monitors Bohernabreena, Orwell.
- Rain gauges; Kippure and throughout catchment.

Thanks to.

- Acting City Engineer, John Flanagan.
- OPW for supplying a large portion of funding, direct labour and a lot of technical advice.
- Dave Weston, SRE. Ronan Corcoran, GE. Don McEntee, SE.
- ARUP, RPS, Royal Haskoning (Owen McManus, Director), ROD, URS and many others.
- Residents associations, Councillors, TD's who without their political pressure a lot of this would not have happened.