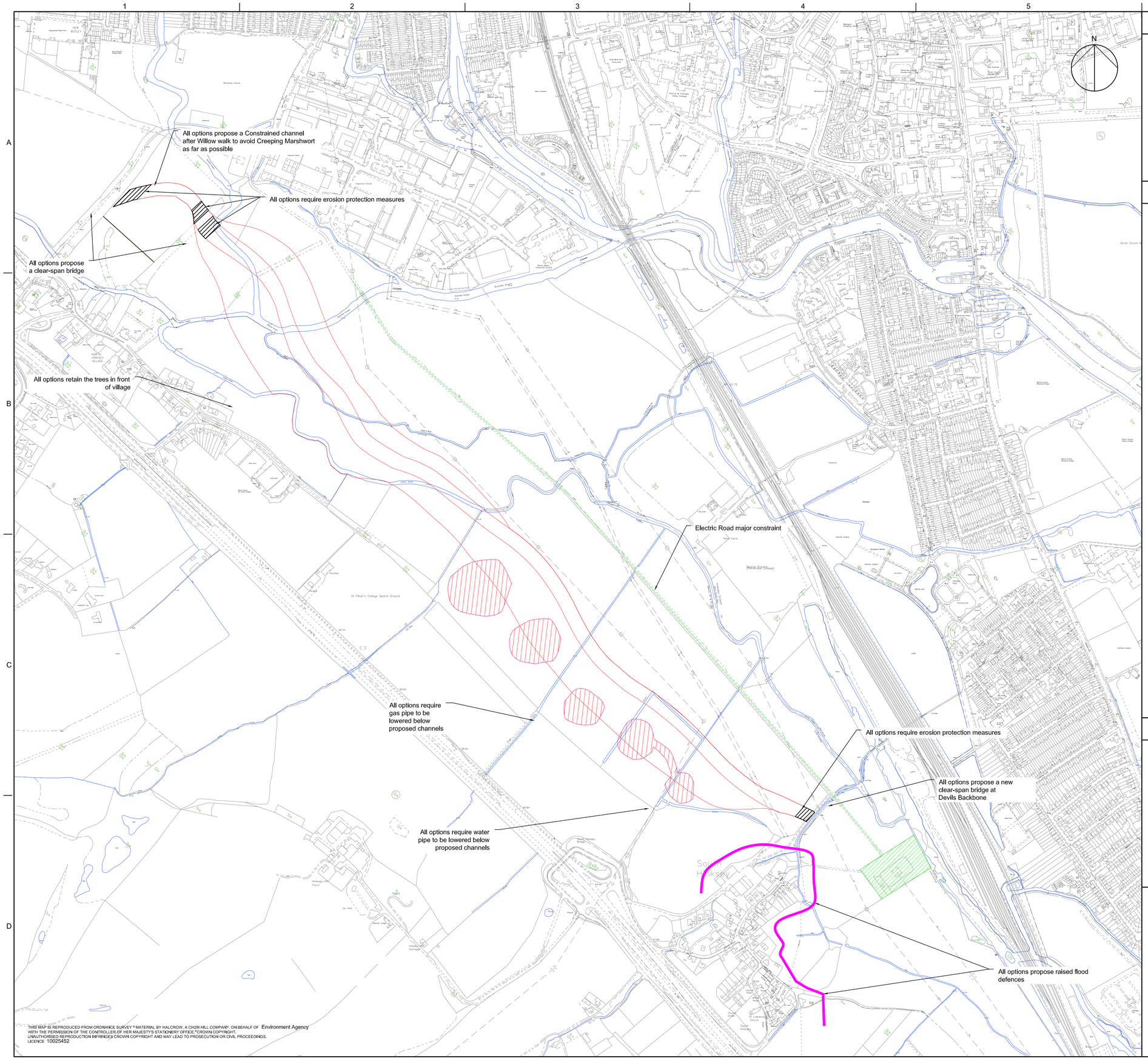


GENERAL NOTES

1. DO NOT SCALE FROM THE DRAWING.

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE TECHNICAL REPORT ENTITLED "OXFORD FLOOD ALLEVIATION SCHEME MULTI-CRITERIA OPTIONS APPRAISAL PHASE 1 OF 2"

NOTES

3A: NEW 2-STAGE CHANNEL.

3B: NEW 2-STAGE CHANNEL WITH AN OFFLINE LAKE.

3C: NEW 2-STAGE CHANNEL WITH AN ONLINE LAKE.

3D: NEW 2-STAGE CHANNEL WITH A SERIES OF SMALL OFFLINE PONDS.

LEGEND

OPTION 3D

EXISTING WATERCOURSES

DRAFT
OFFICIAL:SENSITIVE

0 50 100 150 200 250
METERS

DSGN	REV	STATUS	DATE	DR	CHK	APVD
0	DRAFT	ISSUED AS DRAFT	29/02/2016	ZO	VHJ	ZO

REVISION	BY	APVD
	ZO	PM

DRG STATUS: DRAFT
DRG REV: 0

CH2MHILL®
Burderop Park
Swindon, Wiltshire, SN4 0QD
TEL: +44 1793 812 479

Environment Agency
Enviroment Agency

OXFORD FLOOD ALLEVIATION SCHEME OBC

AREA 3 ROUTE CORRIDOR CONCEPTUAL DRAWING FOR OPTION 3D

NOT TO SCALE

DATE	29/02/2016
PROJ	661656
DWG	OPTION 3D
SHEET	1 of 1

All options propose raised flood defences

All options propose access Bridges incorporating electricity cable diversions

OPTION 4A
Proposed 2-stage channel to convey water to Coldharbour Bridge and new Network Rail culvert

All options propose a ford for agricultural vehicles

Cold Harbour Bridge
(existing crossing for Hinksey Stream)

OPTION 4A - Proposed constrained channel to follow route
of existing channel through lagoons vegetation to cleared through lagoons

All options utilise new culvert under railway to be constructed by Network Rail

OPTION 4A
Proposed semi constrained channel to convey water under Old Abingdon Road

OPTION 4A - Proposed improved conveyance through upper Mayweed Bridge area with new culvert

Pylon

Strouds bridge

OPTION 4A - proposed Increase channel capacity

OPTION 4A - Proposed improved conveyance under A423 southern bypass road

Public Access

OPTION 4A - proposed environmental/ecological enhancement area

OPTION 4A - Proposed new culvert below Old Abingdon Road
(Numerous services to be diverted)

OPTION 4A - Proposed meander in channel to avoid pylon

Pylon constraint

Mundays bridge

All options propose power cable diversion

GENERAL NOTES

1. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
2. CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS OF EXISTING CONSTRUCTION BEFORE PROCEEDING WITH HIS/HER WORK

NOTES

1. DO NOT SCALE FROM THE DRAWING.

options

4A: NEW SINGLE 2-STAGE CHANNEL.

4B: NEW TWO 2-STAGE CHANNELS

4C: NEW TWO 2-STAGE CHANNELS AND NEW CONSTRAINED CHANNEL

LEGEND

OPTION 4A

EXISTING WATERCOURSES

DRAFT
OFFICIAL:SENSITIVE

0 50 100 150 200
METERS

REV	STATUS	DATE	DSGN	DR	CHK	REVISION
1	DRAFT	06/11/2015	TP	EG	PM	FOR INTERNAL REVIEW

	DRG STATUS	DRG REV
TP	DRAFT	1
BY	APVD	PM
PM	APVD	PM

Burderop Park
Swindon, Wiltshire, SN4 0QD
TEL: +44 1793 812 479

CH2MHILL®

Environment Agency
Enviroment Agency

OXFORD FLOOD ALLEVIATION SCHEME OBC

AREA 4 REDBRIDGE
OPTION 4A

NOT TO SCALE

DATE	06/11/2015
PROJ	661656
DWG	0401
SHEET	1 of 1

All options propose raised flood defences

All options propose access Bridges incorporating electricity cable diversions

OPTION 4B
Proposed 2-stage channel to convey water to Coldharbour Bridge and new Network Rail culvert

All options propose a ford for agricultural vehicles

Cold Harbour Bridge
(existing crossing for Hinksey Stream)

OPTION 4B - Proposed constrained channel to follow route
of existing channel through lagoons vegetation to cleared through lagoons

All options utilise new culvert under railway to be constructed by Network Rail

OPTION 4B - Proposed 2-stage channel

OPTION 4B - Proposed improved conveyance through upper Mayweed Bridge area with new culvert

Pylon

Public Access

Strouds bridge

OPTION 4B - proposed environmental/ecological enhancement area

OPTION 4B - proposed Increase channel capacity

OPTION 4B - Proposed improved conveyance under A423 southern bypass road

OPTION 4B - Proposed new culvert below Old Abingdon Road
(Numerous services to be diverted)

OPTION 4B - Proposed meander in channel to avoid pylon

Pylon constraint

Mundays bridge

All options propose power cable diversion

GENERAL NOTES

1. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
2. CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS OF EXISTING CONSTRUCTION BEFORE PROCEEDING WITH HIS/HER WORK

NOTES

1. DO NOT SCALE FROM THE DRAWING.

options

4A: NEW SINGLE 2-STAGE CHANNEL.

4B: NEW TWO 2-STAGE CHANNELS

4C: NEW TWO 2-STAGE CHANNELS AND NEW CONSTRAINED CHANNEL

LEGEND

OPTION 4B

EXISTING WATERCOURSES

DRAFT
OFFICIAL:SENSITIVE

0 50 100 150 200
METERS

REV	STATUS	DATE	DSGN	DR	CHK	APVD	PM
1	DRAFT	06/11/2015	TP		EG	PM	

REVISION: FOR INTERNAL REVIEW

DRG STATUS	DRG REV
DRAFT	1

TP BY APVD PM

Burderop Park
Swindon, Wiltshire, SN4 0QD
TEL: +44 1793 812 479

CH2MHILL®

Environment Agency
Enviroment Agency

OXFORD FLOOD ALLEVIATION SCHEME OBC

AREA 4 REDBRIDGE
OPTION 4B

NOT TO SCALE

DATE	06/11/2015
PROJ	661656
DWG	0401
SHEET	1 of 1

All options propose raised flood defences

All options propose access Bridges incorporating electricity cable diversions

OPTION 4C
Proposed 2-stage channel to convey water to Coldharbour Bridge and new Network Rail culvert

All options propose a ford for agricultural vehicles

Cold Harbour Bridge
(existing crossing for Hinksey Stream)

OPTION 4C - Proposed constrained channel to follow route
of existing channel through lagoons vegetation to cleared through lagoons

All options utilise new culvert under railway to be constructed by Network Rail

OPTION 4C
Proposed semi constrained channel to convey water under Old Abingdon Road

OPTION 4C - Proposed 2-stage channel

OPTION 4C - Proposed improved conveyance through upper Mayweed Bridge area with new culvert

Pylon

Public Access

Strouds bridge

OPTION 4A - proposed environmental/ecological enhancement area

OPTION 4C - proposed Increase channel capacity

OPTION 4C - Proposed improved conveyance under A423 southern bypass road

OPTION 4C - Proposed new culvert below Old Abingdon Road
(Numerous services to be diverted)

OPTION 4C - Proposed 2-stage channel

OPTION 4C - Proposed meander in channel to avoid pylon

Pylon constraint

Mundays bridge

All options propose power cable diversion

GENERAL NOTES

1. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
2. CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS OF EXISTING CONSTRUCTION BEFORE PROCEEDING WITH HIS/HER WORK

NOTES

1. DO NOT SCALE FROM THE DRAWING.

options

4A: NEW SINGLE 2-STAGE CHANNEL.

4B: NEW TWO 2-STAGE CHANNELS

4C: NEW TWO 2-STAGE CHANNELS AND NEW CONSTRAINED CHANNEL

LEGEND

OPTION 4C

EXISTING WATERCOURSES

DRAFT
OFFICIAL:SENSITIVE

0 50 100 150 200
METERS

REV	STATUS	DATE	DSGN	DR	CHK	APVD	BY	APVD	DRG STATUS	DRG REV
1	DRAFT	06/11/2015	TP	EG	PM	PM	TP	PM	DRAFT	1

REVISION: FOR INTERNAL REVIEW

CH2MHILL®
Burderop Park
Swindon, Wiltshire, SN4 0QD
TEL: +44 1793 812 479

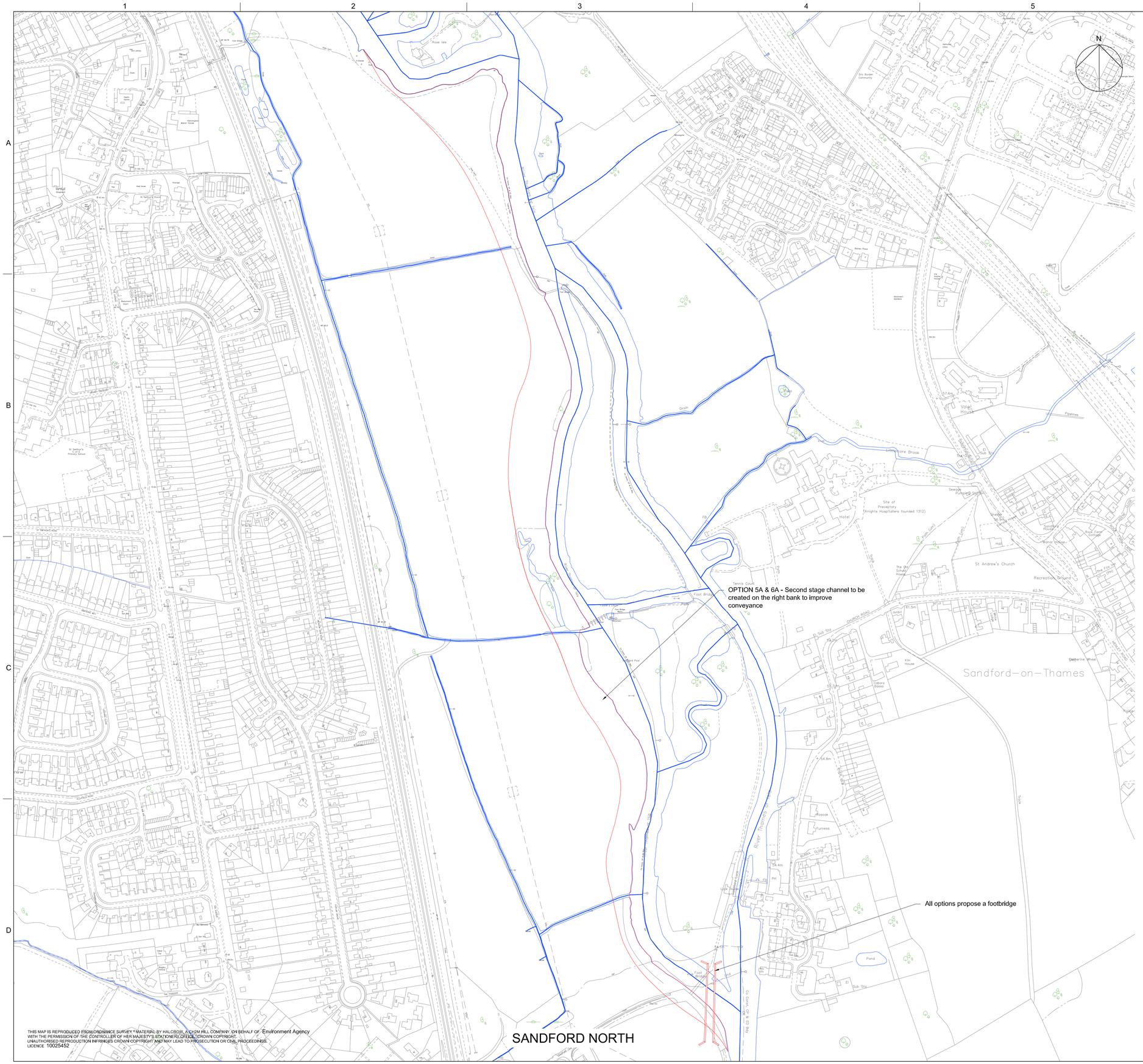
OXFORD FLOOD ALLEVIATION SCHEME OBC

AREA 4 REDBRIDGE
OPTION 4C

Environment Agency
Enviroment Agency

NOT TO SCALE

DATE	06/11/2015
PROJ	661656
DWG	0401
SHEET	1 of 1



GENERAL NOTES

1. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
2. CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS OF EXISTING CONSTRUCTION BEFORE PROCEEDING WITH HIS/HER WORK

NOTES

1. DO NOT SCALE FROM THE DRAWING.

OPTIONS

5A & 6A: PROPOSED SECOND-STAGE CHANNEL ON RIGHT BANK OF RIVER THAMES

5B & 6B:PROPOSED 2-STAGE CHANNEL

6C: AS OPTION '5A & 6A' BUT RETURNING TO THE RIVER THAMES AT UPSTREAM OF SANDFORD LANE

LEGEND

OPTION 5A & 6A

EXISTING WATERCOURSES

DRAFT
OFFICIAL:SENSITIVE

0 50 100 150 200
METERS

REV	STATUS	DATE	DR	CHK	APVD	DRG STATUS	DRG REV
1	DRAFT	06/11/2015	TP	EG	PM	DRAFT	1

REVISION

1 DRAFT 06/11/2015 FOR INTERNAL REVIEW TP EG PM

DSGN BY APVD PM

Burderop Park
Swindon, Wiltshire, SN4 0QD
TEL: +44 1793 812 479

Environment Agency

Enviroment Agency

CH2MHILL®

OXFORD FLOOD ALLEVIATION SCHEME OBC

AREA 5 SANDFORD NORTH
OPTION 5A & 6A

NOT TO SCALE

DATE	06/11/2015
PROJ	661656
DWG	0501
SHEET	1 of 1

OPTION 5B & 6B - Proposed footbridge over new channel

OPTION 5B & 6B - Potential erosion protection works

OPTION 5B & 6B - Proposed constrained channel

OPTION 5B & 6B- New channel to run between existing river and overhead power lines

OPTION 5B - Existing land drainage to be diverted at crossover

OPTION 5B & 6B - Proposed footbridges over new channel

OPTION 5B & 6B - Potential erosion protection works

SANDFORD NORTH

GENERAL NOTES

1. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
2. CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS OF EXISTING CONSTRUCTION BEFORE PROCEEDING WITH HIS/HER WORK

NOTES

1. DO NOT SCALE FROM THE DRAWING.

OPTIONS

5A & 6A: PROPOSED SECOND-STAGE CHANNEL ON RIGHT BANK OF RIVER THAMES

5B & 6B:PROPOSED COSTRAINED CHANNEL

6C: AS OPTION '5A & 6A' BUT RETURNING TO THE RIVER THAMES AT UPSTREAM OF SANDFORD LANE

LEGEND

OPTION 5B & 6B

EXISTING WATERCOURSES

DRAFT
OFFICIAL:SENSITIVE

0 50 100 150 200
METERS

REV	STATUS	DATE	DR	REVISION	CHK	APVD
1	DRAFT	06/11/2015	TP	FOR INTERNAL REVIEW	EG	PM
DSGN					TP	PM

DRG STATUS: DRAFT
DRG REV: 1

CH2MHILL®
Burderop Park
Swindon, Wiltshire, SN4 0QD
TEL: +44 1793 812 479

Environment Agency
Enviroment Agency

OXFORD FLOOD ALLEVIATION SCHEME OBC

AREA 5 SANDFORD NORTH & SOUTH
OPTION 5B & 6B

NOT TO SCALE

DATE	06/11/2015
PROJ	661656
DWG	0501
SHEET	1 of 1

OPTION 6C - Proposed footbridge over new channel

OPTION 6C - Potential erosion protection works

OPTION 6C - Proposed constrained channel

OPTION 6C- New channel to run between existing river and overhead power lines

OPTION 6C - Existing land drainage to be diverted at crossover

OPTION 6C - Potential erosion protection works

OPTION 6C - Proposed footbridges over new channel

SANDFORD NORTH

GENERAL NOTES

1. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
2. CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS OF EXISTING CONSTRUCTION BEFORE PROCEEDING WITH HIS/HER WORK

NOTES

1. DO NOT SCALE FROM THE DRAWING.

OPTIONS

5A & 6A: PROPOSED SECOND-STAGE CHANNEL ON RIGHT BANK OF RIVER THAMES

6C:PROPOSED COSTRAINED CHANNEL

6C: AS OPTION '5A & 6A' BUT RETURNING TO THE RIVER THAMES AT UPSTREAM OF SANDFORD LANE

LEGEND

OPTION 6C

EXISTING WATERCOURSES

DRAFT
OFFICIAL:SENSITIVE

0 50 100 150 200
METERS

REV	STATUS	DATE	DR	REVISION	CHK	APVD	BY	APVD	DRG STATUS	DRG REV
1	DRAFT	06/11/2015	TP	FOR INTERNAL REVIEW	EG	PM	TP	PM	DRAFT	1
DSGN										

Burderop Park
Swindon, Wiltshire, SN4 0QD
TEL: +44 1793 812 479

Environment Agency
Enviroment Agency

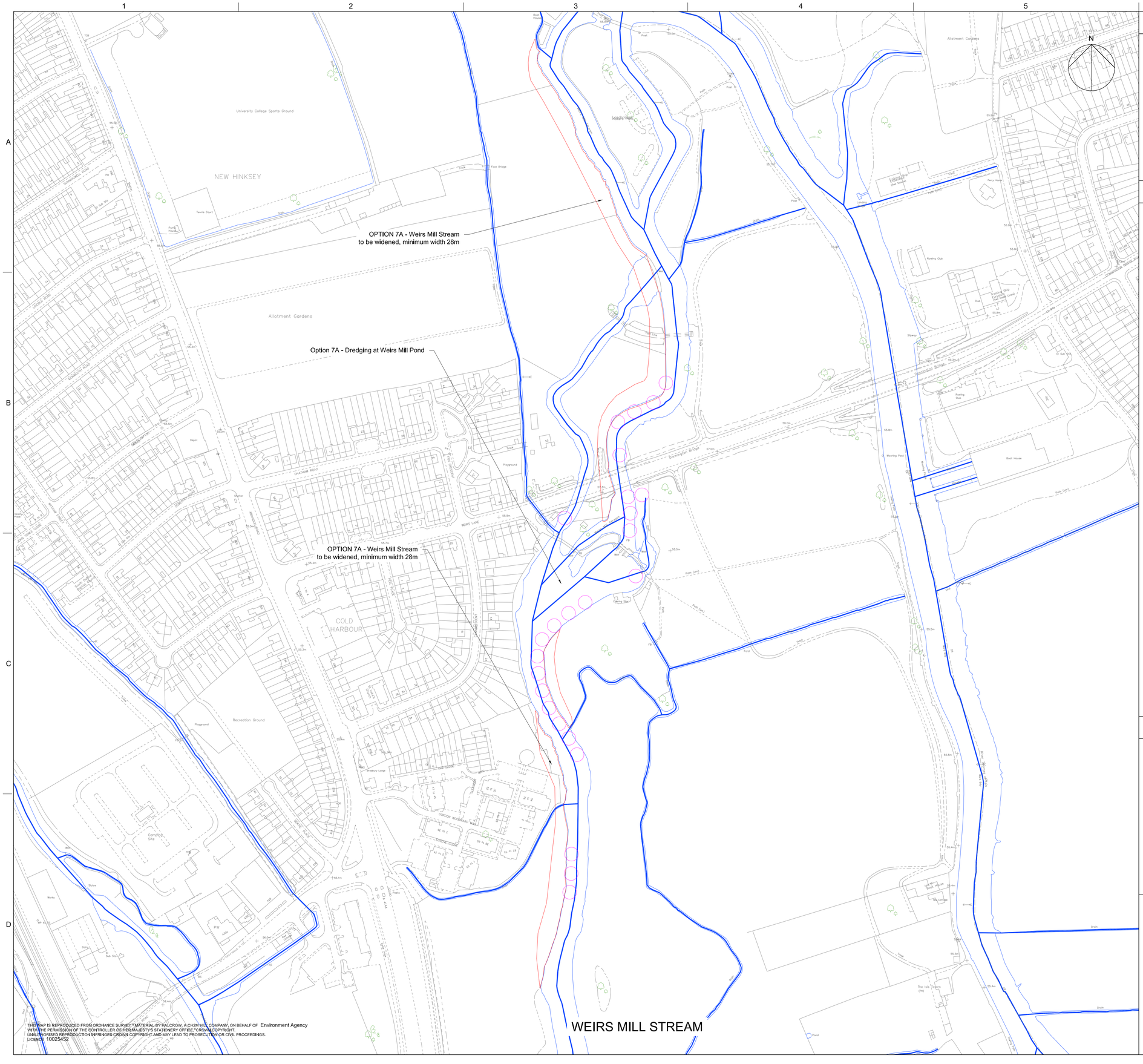
CH2MHILL®

OXFORD FLOOD ALLEVIATION SCHEME OBC

AREA 5 SANDFORD NORTH & SOUTH
OPTION 6C

NOT TO SCALE

DATE	06/11/2015
PROJ	661656
DWG	0501
SHEET	1 of 1



GENERAL NOTES

1. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
2. CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS OF EXISTING CONSTRUCTION BEFORE PROCEEDING WITH HIS/HER WORK

NOTES

1. DO NOT SCALE FROM THE DRAWING.

OPTIONS

7A. WIDENING OF WEIRS MILL STREAM

7B. PROPOSED ADDITIONAL CULVERTS AT DONNINGTON BRIDGE ROAD

7C. PROPOSED CONSTRAIN CHANNEL

LEGEND

OPTION 7A

BOAT MOORINGS

DRAFT
OFFICIAL:SENSITIVE

0 50 100 150 200
METERS

DSGN	REV	STATUS	DATE		REVISION	CHK	APVD	BY	APVD	DRG STATUS	DRG REV
	1	DRAFT	06/11/2015	TP	FOR INTERNAL REVISION	EG	PM	TP	PM	DRAFT	1

Burderop Park
Swindon, Wiltshire, SN4 0QD
TEL: +44 1793 812 479

Environment Agency
Enviroment Agency

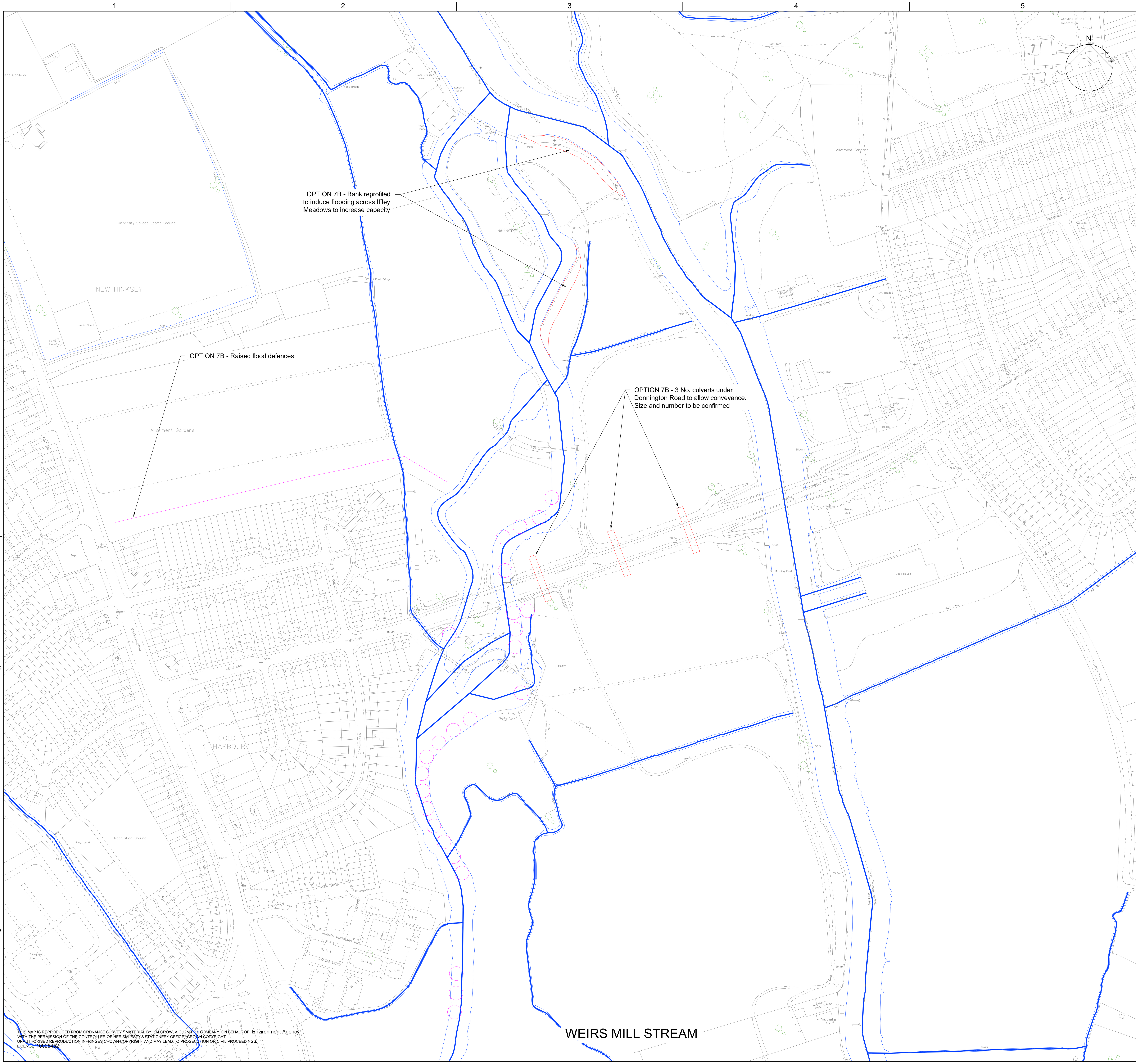
CH2MHILL®

OXFORD FLOOD ALLEVIATION SCHEME OBC

AREA 7 WEIRS MILL STREAM
OPTION 7A

NOT TO SCALE

DATE	06/11/2015
PROJ	661656
DWG	0701
SHEET	1 of 1



GENERAL NOTES

1. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
2. CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS OF EXISTING CONSTRUCTION BEFORE PROCEEDING WITH HIS/HER WORK

NOTES

1. DO NOT SCALE FROM THE DRAWING.

OPTIONS

7A. WIDENING OF WEIRS MILL STREAM

7B. PROPOSED ADDITIONAL CULVERTS AT DONNINGTON BRIDGE ROAD

7C. PROPOSED CONSTRAIN CHANNEL

LEGEND

OPTION 7B

BOAT MOORINGS

DRAFT
OFFICIAL:SENSITIVE

0 50 100 150 200
METERS

REV	STATUS	DATE	REVISION	BY	APVD
1	DRAFT	06/11/2015	FOR INTERNAL REVISION	TP	PM

DSGN TP | DR EG | CHK PM | APVD

DRG STATUS DRAFT | DRG REV 1

CH2MHILL®
Burderop Park
Swindon, Wiltshire, SN4 0QD
TEL: +44 1793 812 479

Environment Agency
Enviroment Agency

OXFORD FLOOD ALLEVIATION SCHEME OBC
AREA 7 WEIRS MILL STREAM
OPTION 7B

NOT TO SCALE

DATE	06/11/2015
PROJ	661656
DWG	0701
SHEET	1 of 1

GENERAL NOTES

1. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
2. CONTRACTOR SHALL VERIFY DIMENSIONS AND CONDITIONS OF EXISTING CONSTRUCTION BEFORE PROCEEDING WITH HIS/HER WORK

NOTES

1. DO NOT SCALE FROM THE DRAWING.

OPTIONS

7A. WIDENING OF WEIRS MILL STREAM

7B. PROPOSED ADDITIONAL CULVERTS AT DONNINGTON BRIDGE ROAD

7C. PROPOSED CONSTRAIN CHANNEL

Option 7C - Proposed access bridges

Option 7C - Proposed control structure

Option 7C - Comms cable diverted over bridge

OPTION 7C - Proposed New semi-constrained channel to follow route of existing ditch

OPTION 7C - Proposed erosion protection measures

WEIRS MILL STREAM

LEGEND

OPTION 7C

BOAT MOORINGS

DRAFT
OFFICIAL:SENSITIVE

0 50 100 150 200
METERS

REV	STATUS	DATE	DR	REVISION	CHK	APVD	BY	APVD	DRG STATUS	DRG REV
1	DRAFT	06/11/2015	TP	FOR INTERNAL REVISION	EG	PM	TP	PM	DRAFT	1

DSGN

Burderop Park
Swindon, Wiltshire, SN4 0QD
TEL: +44 1793 812 479

Environment Agency
Enviroment Agency

CH2MHILL®

OXFORD FLOOD ALLEVIATION SCHEME OBC

AREA 7 WEIRS MILL STREAM
OPTION 7C

NOT TO SCALE

DATE	06/11/2015
PROJ	661656
DWG	0701
SHEET	1 of 1

Appendix B - Evaluation Data for First Phase Appraisal

Appendix B.01 – First-Phase Evaluation Data for Social Objectives

Evaluation of social objectives at Area 2

Evaluating landscape opportunities at Area 2

Impact on views of Oxford

Option 2A retains the existing meadow appearance and views from Willow Walk towards the surrounding hills. Options 2A and 2B retain the trees along the left bank of the Hinksey Stream screening views to Osney Mead Industrial Estate from houses on the right bank of the stream.

Option 2B proposes a new 2-stage channel across farmland and the existing channel is to be modified to form a backwater. The new channel dissects the meadow and splits the area in two and would interrupt views across the meadow.

Options 2C and 2D retain the appearance of the meadow, but trees along the right bank of Hinksey Stream would be removed potentially opening views to and from houses on the west bank of the stream which will require infill planting on the right bank to mitigate against.

Options 2C avoids the existing pylon by starting downstream, however this will require additional engineered bank protection in the existing channel area as this will be a constraint and subject to erosion due to more water passing down this section of the channel than in the other options. The other options start upstream of the pylon and would isolate the pylon on an island in the channel during flood events.

Enhances/adds to areas of classic landscape setting

All of the options will have a significant impact on the setting and appearance of the existing meadow. The proposed shallow scrape for Option 2A would be a subtle difference in the topography of the meadow, however it would impact on a large area of the existing ecologically valuable MG4 grassland. It would also make the lowered section of the field wetter. The retention of the trees along the left bank of the Hinksey Stream retains the character and setting of a natural grassland meadow.

In all options, the alignment of the channel with existing trash screens utilises a break in the treeline along Willow Walk to minimise the removal of additional mature trees, although it is recognised that a number will be lost. Specifically to option 2B, the addition of a new first-stage channel dissects the meadow and splits the area in two altering its character. This would change recreational walking activities and reduce the remaining areas to two small areas which would be difficult to manage effectively through agricultural practice.

In Options 2C and 2D, the character of the meadow would be affected by the removal of the trees along the left bank of the Hinksey Stream. This would potentially need some infill planting on the right bank to maintain the tree screen. These two options are also pushed as sets in the meadow to try and reduce the impact on the MG4 grassland areas. The topography of the meadow itself would be subtly changed.

Evaluating recreational opportunities at Area 2

Opportunities for horse riding activities

Horse riding routes and activities along Willow Walk and around the meadow would be unaffected by the options.

It is not believed that any riding takes place within the meadow but Option 2B would be have the greatest impact due to the first-stage channel cutting through the middle of the area.

Fishing and water based activities

There will be temporary impacts on fishing and water based activities but in the longer term none of the options are considered to have impacts. Options 2C and 2D may create additional fisheries habitat in the Seacourt Stream by removal of the trees on the left bank which currently overshadow the channel.

Future pedestrian and cycleway routes

For Options 2A, 2C and 2D; the meadow remains fully accessible with all routes and access points for pedestrians remaining unchanged although the area available would potentially be smaller depending on water levels in the second stage of the channel. Any small channel in the area could be crossed with a small footbridge.

The introduction of a permanent water course in Option 2B splits the meadow and prevents circular walks around the meadow without the introduction of an additional crossing points and structures.

Scoring on social objectives at Area 2

Refer to Appendix C.2 of the main report for the scoring of all Sub-Objectives at Area 2.

Evaluation of social objectives at Area 3

Evaluating landscape opportunities at Area 3

Impact on views of Oxford

The new 2-stage channel shown in all options would alter the character of the farmland and existing waterways running through the fields. The permanent water flow through the farmland would have an impact on views. The shallow scrape of the second-stage channel banks would have less of an impact blending into the existing levels.

The off-line lakes proposed in Options 3B and 3C would have a significant visual impact with views from the protected view of the 'Oxford View Cones' to the west.

The series of smaller lakes proposed in Option 3D would have less of an impact as they are broken up and will be planted to create additional habitat opportunities with less focus on recreational activities.

Enhances/adds to areas of landscape character and setting

An additional permanently filled channel in this area would alter the landscape significantly in all options. There are numerous streams and ditches in this farmland, these remain largely hidden from view. The shallow scrape would subtly change the topography of the fields but would retain some of the character of the farmland.

The on-line and off-line lakes would further alter the character of the farmland giving a more formal appearance with activities associated with any water based recreation changing the pastoral nature of the area.

The series of lakes proposed in option 3D would fit into the farmland character and be more in keeping with the rural nature of the area with the creation of habitats around the lakes.

Evaluating recreational opportunities at Area 3

Pedestrian and cycleway routes

In all options, the new channel offers the opportunity for a riverside pedestrian and cycleway. East - West movement would be limited with the introduction of a substantial permanent water course without the addition of numerous crossing points.

There may be less proposed access associated with Option 3D if habitat creation around the series of lakes is given a greater priority.

Fishing and water based activities

In all options, the new channel offers a new route for water based activities with connections to existing waterways making vehicle-free access a possibility. Additional fishing locations are feasible in this location.

The off-line lake in Option 3B would make access difficult to undertake water sports on the lakes. Access for specialist activities may be required with vehicles e.g. rowing, this could be achieved by using the existing sports ground at South Hinksey. Additional fishing locations both on the proposed lake and channel is feasible in this location.

The proposed on-line lake in Option 3C would make access easier for water based activities and possibly connect with existing channels such as the Bulstake Stream and then into the River Thames.

The proposed off-line ponds in Option 3D would make access difficult to undertake water sports on the lakes and undesirable if habitat creation is the goal.

Opportunities for horse riding activities

New channels in all options offers the opportunity for a riverside bridle path. East - west movement around the farmland would be limited with the introduction of a substantial permanent water course. The new channel and lakes in all options heavily disrupt existing circular routes used by local horse riders.

Scoring on social objectives at Area 3

Refer to Appendix C.3 of the main report for the scoring of all Sub-Objectives at Area 3.

Evaluation of social objectives at Area 4

Evaluating landscape opportunities at Area 4

Impact on views of Oxford

The proposed new 2-stage channel in option 4A would have a noticeable impact on the farmland in this area. The introduction of a new channel near Old Abingdon Road would be seen from Redbridge and nearby allotments as well as the protected views in the 'Oxford View cones' to the west.

For both options 4B and 4C, the new split flow 2-stage channel would have a significant impact on the farmland in this area. The new channel would be seen from Redbridge and nearby allotments as well as the protected views in the 'Oxford View cones' to the west. Diverting the flow along existing streams and ditches lessens the visual impact in Option 4B.

A proposed new channel south of Old Abingdon Road in Option 4C would have a significant visual impact unless the channel is routed underground.

Enhances/adds to areas of landscape character and setting

The new 2-stage channel in all options would have a significant effect on the character of the farmland in this area. The introduction of a new channel near Old Abingdon Road blends in with the existing waterways and streams but would change the character of the area.

For both Options 4B and 4C, the new split flow 2-stage channel would have a significant effect on the character of the farmland in this area. The introduction of two permanent channels with shallow scrapes would noticeably alter the character of the farmland.

Option 4C proposes a new channel south of Old Abingdon Road, this is a significant feature and would alter the character of the area and nearby nature reserves.

Evaluating recreational opportunities at Area 4

Pedestrian and cycleway routes

Due to difficult site conditions in this area (existing railways and roads); connectivity is difficult for all options. The use of existing waterways and culverts in Option 4A reduces the need for additional bridges and access points for this option.

In Options 4B and 4C, the split flow channels would make the need for additional bridges/crossing points necessary to utilise access to all areas. A possible additional route could be created alongside the new channel south of Old Abingdon Road in Option 4C allowing greater connectivity and access to surrounding areas.

Fishing and water based activities

For all options, the new channel offers new opportunities for water based activities with connections to existing waterways making vehicle-free access possible. Additional fishing locations are feasible in this location.

Opportunities for horse riding activities

Due to difficult site conditions in this area (existing railways and roads); connectivity is difficult for all options. The use of existing waterways and culverts in Option 4A reduces the need for additional bridges and access points for this option.

In options 4B and 4C, the split flow channels would make the need for additional bridges/crossing points necessary to utilise access to all areas. A possible additional route could be created alongside the new channel south of Old Abingdon Road in Option 4C allowing greater connectivity and access to surrounding areas.

Scoring on social objectives at Area 4

Refer to Appendix C.4 of the main report for the scoring of all Sub-Objectives at Area 4.

Evaluation of social objectives at Areas 5&6

Evaluating landscape opportunities at Areas 5&6

Impact on views of Oxford

For Option 5A&6A, the appearance of the grassland meadow would be retained and any changes being aligned nearer the river. The new shallow second-stage on the River Thames would add a subtle change to the topography in the area.

For Options 5B&6B and 6C, the new secondary channel would have a significant visual effect on the grassland meadow. Option 5B&6B would require a vehicle bridge crossing for access via Sandford Lane and this would have a significant impact being a large structure. This would not be required for Option 6C.

Enhances/adds to areas of landscape character and setting

Option 5A&6A offers more opportunity to increase access into the river. The grassland meadow would retain a lot of its character and any changes being aligned nearer the river. The new shallow

second-stage would add a subtle change to the topography in the area. No structures would be needed to cross the channel including at Sandford Lane.

For Options 5B&6B and 6C, the new secondary channel would have a significant impact on the character of the grassland meadow. Due to the water in the channel, the creation for additional crossing points to retain access to all parts of the meadow and rivers edge would be required. Option B would require a vehicle bridge crossing for access via Sandford Lane, this would alter the character near Sandford Lock and the removal of a hedge and mature trees would be required.

Evaluating recreational opportunities at Areas 5&6

Pedestrian and cycleway routes

The Thames footpath would be greatly affected with Option 5A&6A. The footpath would have to be relocated away from the River Thames. Maintaining access to Rose Isle and Sandford Lock would require the addition of a pedestrian/cycle bridge. The Sustrans cycle route wouldn't be affected by this option.

The Thames footpath wouldn't be affected with Option 5B&6B except for the addition of 3 bridges and Option 6C requiring the addition of 2 bridges to retain the towpath connection along the River Thames. Options 5B&6B and 6C significantly affect the connectivity across the grass meadows in this area with a permanent channel dividing the area in two. Additional bridges and access points would be required. The Sustrans cycle route wouldn't be affected by these options.

Fishing and water based activities

For Option 5A&6A, access to the river would be enhanced with the second-stage channel offering a graded approach. Fishing is not permitted along large stretches of the river in this location.

For Options 5B&6B and 6C, connections with the existing waterways offers opportunities for water activities.

Opportunities for horse riding activities

Horse riding opportunities would remain largely unaffected with Option 5A&6A.

The introduction of a new channel in Options 5B&6B and 6C through the grassland meadow would make connecting circular routes in the area problematic. Similar to the activities above, the requirement for additional bridges and connection points would be required.

Scoring on social objectives at Areas 5&6

Refer to Appendix C.5&6 of the main report for the scoring of all Sub-Objectives at Areas 5&6.

Evaluation of social objectives at Area 7

Evaluating landscape opportunities at Area 7

Impact on views of Oxford

Option 7A would have a significant impact on the visual appearance in this area particularly around the orchard and residential moorings. Iffley Meadows SSSI would remain largely unaffected by this option.

In Option 7B, the bank modification works and culverts would have a small impact on the visual appearance in the area. The bank modification works would alter the appearance to a small part of the Thames towpath and a small part of Weirs Mill Stream. Views to and from Iffley Meadows SSSI would remain largely unaffected by this option.

Utilising an existing ditch reduces the visual impact to this area in Option C. Iffley Meadows SSSI would remain largely unaffected by this option. The introduction of a control structure for this option should be incorporated into any crossing required to lessen its visual impact.

Enhances/adds to areas of landscape character and setting

Option 7A would cause disruption to the residential narrow boat moorings in the area. The vegetation on the bank would suffer as a result of this option. This option avoids disruption to the nearby SSSI (Iffley Meadows).

A small section of existing trees and hedgerows along the River Thames would be sacrificed for Option 7B.

Option 7C utilises an existing ditch and would reduce any effects on the SSSI (Iffley Meadows) to a minimum. The character in the area as a whole would remain largely unchanged as a result of Options 7B and 7C.

Evaluating recreational opportunities at Area 7

Pedestrian and cycleway routes

The Thames towpath would remain untouched by Option 7A. Opportunities for additional connections would be reduced due to the nature of the widening of the stream.

Option 7B would require a short section of the Thames towpath to be relocated. Opportunities for additional connections would be reduced due to the nature of this option.

The Thames towpath would require a small amount of work to retain the connection for Option 7C. An opportunity for additional connections is possible for this option to link the River Thames towpath to other footpaths/cycleways in the area.

Fishing and water based activities

All options for Area 7 wouldn't offer any additional opportunities for water based activities. The fishing opportunities in this area would remain unaffected. Fishing on the River Thames is restricted in large areas in this location. Option 7C has a control structure and would make boat access unfeasible.

Opportunities for horse riding activities

All options for area 7 have no impact on the horse riding along Weirs Mill Stream. Horse riding is restricted along Weirs Mill Stream and none of the options offer additional opportunities or connections. Horse riding along this section of the Thames towpath is not permitted.

Scoring on social objectives at Area 7

Refer to Appendix C.7 of the main report for the scoring of all Sub-Objectives at Area 7.

Appendix B.02 – First-Phase Evaluation Data for Technical Objectives

Evaluation of technical objectives at Area 2

Evaluating engineering risks at Area 2

Impacts on the groundwater regime

The proposed channels for Options 2A, 2C and 2D are all in the form of second stages and their excavations are not likely to extend into the water table but will lower an area of the meadow which will be wetter than currently. Option 2B will require excavations into or close to the water table to create the new channel however this is not expected to have a impact on the groundwater regime in the area.

Minimise introduction of engineered elements

Options 2A will require a spillway to be constructed at the start of the proposed channel. The engineered spillway would require erosion protection along the spill, this will likely be of a reinforced grass type construction. The majority of the channel lengths for Option 2C and 2D will be directly linked to left bank of Hinksey Stream which prevents high velocities and therefore they should not require an engineered spillway

Option 2B however, proposes a narrow primary flow channel that would be in constant use. This option will require a control structure for managing flows into the new first stage.

Option 2C will require sheet piling to protect the base of the pylon as more water will be pushed along the Seacourt Stream at this location.

Reduce risk of blockages and frequency of maintenance

All options propose channels that have shallow banks and therefore functionality and capacity of the proposed channels will be very sensitive to any vegetation growth and sedimentation. The proposed shallow bank gradients will permit maintenance vehicles to be driven along the whole channel which will make it easier to mow and manage the vegetation growth. It is anticipated that grazing will still be achievable during drier months of the year on a large proportion of the second stage. This may be restricted closer to the channel where the land will be wetter.

Evaluating disruptions to infrastructure and services at Area 2

There is no significant infrastructure within the footprint of any of the options in this area, other than the National Grid pylon. Hence, it is not likely that any of the options would require the removal/diversion of significant infrastructure during their construction or operation.

Impact on infrastructure and public highways

At the southern end of the channels, all of the options require excavations at both sides of the bridge at Willow Walk. However, Option 2B will require a deeper excavation and therefore has the highest probability of requiring a heavier bridge. In addition, all options also require scour protection to the bridge.

There is a stone bridge in the south of the area on the western end of Willow Walk that is to remain.

Impact on existing services

All four options will involve constructing a channel within close proximity to a pylon at the upstream ends of the channels. Early communications with National Grid suggest that there would be acceptable mitigation solutions for all the proposed options if taken forward.

Evaluating health and safety in buildability and maintenance at Area 2

Buildability

All options would have similar construction risks with the exception of Option 2D which includes a high risk task of driving sheet piles within close proximity to a pylon.

Working at height

All of the options require the construction of a new bridge over Willow Walk, which may require some working from height.

Confined Space

All of the options will include a new clear-span bridge at Willow Walk and therefore none of the options would require confined space working.

Scoring on technical objectives at Area 2

Refer to Appendix C.2 of the main report for the scoring of all Sub-Objectives at Area 2.

Evaluation of technical objectives at Area 3

Evaluating engineering risks at Area 3

Impacts on the groundwater regime

All of the options propose a 2-stage channel that will be situated into or close to the water table and therefore introduces a risk of impacting on the upstream groundwater levels, this may have some beneficial flood risk reduction benefits but need to be carefully assess to minimise environmental impacts.

The risk level on impacting upstream groundwater by the proposed offline and online lakes will be balanced by the implementation of flow control structures. However, if there are no flow control structures introduced, or if they fail, then the risks on impacting upstream groundwater will be higher for the proposed online lake, Option 3C.

Option 3B proposes an offline lake that will most likely be constantly fed by groundwater.

Minimise introduction of engineered elements

All options will feature engineered erosion protection at their northern and southern extents where they are to be crossed by clear-span bridges. This is consistent in form throughout the options. Also, all of the options will require a raised defence around the village of South Hinksey at the far south of Area 3, in the form of an earthen bund. Although this is a significant engineered component, it can be landscaped to minimise visual impact to residents nearby.

Both of the proposed lakes for Option 3B and Option 3C will be of natural construction, with limited hard engineering required. The proposed online lake for Option 3C will require a large weir-type control structure to be constructed at its downstream side to maintain water in the lake.

Option 3D consists of a number of smaller lakes in sequence along the right bank of the channel, there lakes would also be of natural construction with no hard engineered structures required.

Of all the options, Option 3C has the most risk associated with engineered elements due to the requirement of a large flow control structure at the downstream extent of the online lake. The other three options have no discernible difference in terms of engineered elements.

Minimise risk of blockages and frequency of maintenance

Maintenance of all of the options would involve bank clearance (removing vegetation, debris etc, and grass cutting) along the length of the proposed 2-stage channels.

All of the options introduce a risk of blockages due to the inclusion of various flow controls on both existing and proposed channels. This risk could be mitigated by introducing an appropriate maintenance schedule and by appropriately sizing the structures to minimise blockages.

The required large flow control structure on the downstream side of the proposed online lake, as featured in options 3C will also introduce a risk of blockage. Given the wider larger flow area through this lake, which would reduce velocities, paired with the control structure, it is likely that this lake will be prone to accumulate sediment.

The proposed offline lakes in options 3B and 3C, which are likely to be fed from groundwater, are also at risk of sediment build up as a result of fast moving flood water overtopping into them from the banks of the proposed 2-stage channel. Velocity of the flood waters would drop significantly as it overtops into the lake causing sediment to settle.

Additional maintenance will be required at all control structures on a periodic basis, which would likely be determined based on the operations procedures for these controls. Due to this, there would be more maintenance required for Option 3C.

It is anticipated that in the long term the second stage will return to grassland and be able to be grazed during the summer months to reduce the frequency of maintenance mowing.

Evaluating disruptions to infrastructure and services at Area 3

Impact on infrastructure and public highways

All of the options are the same in this regard. Each of them cross a total of three public rights of way within this area. One at the upstream extent, one at the downstream extent and one adjacent to North Hinksey village. At each location, it is proposed that the channel be crossed by a clear-span bridge.

Construction tasks could be phased to minimise the impact that the construction of the channel options would have on these rights of way.

Options 3B and 3C would result in the largest amount of excavated material due to the size of the lakes that they feature. This would result in the largest amount of traffic movements around the site, and thus have the largest impact on the highways network.

Impact on existing services

All of the options have a similar impact on existing services. There are a number of services within the vicinity of the works that will be directly impacted by the works and these services will require to be protected or diverted. Also, there are numerous services that are outside the footprint of the proposed options and these services may also require to be protected to allow construction.

Furthermore, there are a number of electricity pylons directly to the north of the site, which may fall within the construction limits, but are not within the footprint of the design itself. This is in addition to the Electric Road, which features a number of high voltage lines along it. This is also directly to the north of the proposed channel and may have an impact of transport/access in and around the site.

Evaluating health and safety in buildability and maintenance at Area 3

Buildability

All of the options require large scale excavations in areas where the ground water table is known to be high. Also, all of the options will require pumping around the proposed control structures to allow for their constructions, this will be more of an issue during the construction of a large control

structure for Option 3C. The construction of Option 3A will be least affected by the high water table as it will have the smallest amount of excavations.

Working at height

All of the options include a number of clear-span bridges which may include some working from height. In this regards however, there are no differentiating factors between the options at this stage.

Confined spaces

None of the options at this stage are thought to require any confined space working due to the inclusion of clear-span bridges where the channel crosses any existing roads or access tracks. There are no differentiating factors between the options at this stage.

Scoring on technical objectives at Area 3

Refer to Appendix C.3 of the main report for the scoring of all Sub-Objectives at Area 3.

Evaluation of technical objectives at Area 4

Evaluating engineering risks at Area 4

Impacts on the groundwater regime

All of the options propose a 2-stage channel that will be situated into or close to the water table and therefore introduces a risk of impacting on the upstream groundwater levels.

Options 4B and 4C have larger footprints than Option 4A and would require significantly more excavations and therefore it has a higher risk on impacting upstream groundwater levels. This

Minimise introduction of engineered elements

Options 4A and 4B are very similar, both will utilise the same four crossing points on the railway line, and both would require a new culvert under the Old Abingdon Road. However, Options 4B and 4C split the proposed 2-stage channel into two channels and a large control structure would be required at the bifurcation point to ensure the appropriate split in flows between the two channels. This flow control structure would be of a considerable size due to the capacity of the channel in this location.

Option 4C would require a much larger channel to the west of the railway and this channel would be heavily lined/engineered as it passes a historic landfill site. This option will require a much larger culvert under Old Abingdon Road, and two new culvert crossings; under the A423 and Kennington Road.

Minimise risk of blockages and frequency of maintenance

All of the options propose a significant length of new channel that would require additional maintenance activities to maintain the required standard of protection. These works would require vegetation clearance, silt removal and grass cutting in the 2-stage channels. This area is very accessible and it would be the ideal location to design some form of passive debris collection feature.

Maintenance works will be required at all the culvert crossings and where new structures are introduced. There would be a need to hold discussions with Network Rail to determine the existing maintenance schedule and to assess whether there would be a requirement to undertake more frequent maintenance post scheme.

Option 4A would have the least number of culvert crossings and flow control structures and therefore would have the smallest probability for blockages.

The risk of blockage would be slightly higher for Options 4B and 4C due to the proposed large flow control structure at the point of bifurcation of the 2-stage channel.

Option 4C would have a higher risk of blockages than Option 4B due to the additional culverts required to cross the A4232 bypass and Kennington Road.

Evaluating disruptions to infrastructure and services in Area 4

Impact on infrastructure and public highways

All options propose crossings at Old Abingdon Road and this will have a significant impact on the traffic movements.

Options 4B and 4C, which include significant levels of additional excavation, due to their inclusion of a second 2-stage channel for much of their length, would result in higher levels of traffic in and around the site during the removal of this material.

In addition to those from options 4A and 4B, Option 4C would require new culvert crossings under the A423 and Kennington Road, this could have a major impact on the traffic movement during the construction period. The proposed channel for Option 4C would also encroach on the front gardens of some residential properties and its construction would have a considerable impact on the local community.

Impact on existing services

The main area in which there would be a significant impact on existing services is around the Old Abingdon Road and A423 Area. Kennington Road also carries a number of services.

All options would require a new crossing through Old Abingdon Road. This road has a high density of services and these would need to be diverted.

Option 4C also requires a new channel adjacent to Kennington Road and an additional crossing underneath the A423. Both of these roads have a number of services as well. Due to the larger footprint of the options, and the requirement of more culvert crossings, Option 4C would have more of an impact on existing services.

All of the options propose work around the pylons and other national grid assets in the Area, aiming to avoid any interaction with these assets. Meanders have been added to the channels where required in order to avoid pylons.

Evaluating health and safety in buildability and maintenance at Area 4

Buildability

The excavation of materials and the construction of structures within an area of high water table poses difficulties to all of the options. This is less problematic for option 4A as it has a significantly smaller footprint and only incorporates one wholly new structure at the road crossing at Old Abingdon Road.

For Option 4B, there is more of an impact due to the larger footprint, due to the inclusion of the second 2-stage channel and the requirement that brings for a large online control structure.

The problem is most significant for Option 4C, as this option has two additional structures on top of those discussed in Option 4B, at the crossings of the A423 and Kennington Road.

The most significant impact that has been identified, however, is due to an area of historic landfill between the A423 and Old Abingdon Road. Here, Option 4C incorporates a channel through the landfill. This would pose both significant engineering challenges, to isolate the channel from the landfill, and cost implications due to the removal of contaminated material. This material must be either treated on site, at huge cost, or taken to specialist landfill sites.

Working at height

All options include the construction of two bridges. One at the Northern extent, which has been discussed in Area 3, and a further one directly east of South Hinksey. The construction of these may require some working from height. There is no clear difference between options relating to working from height.

Confined space

All of the options include a number of culverted road crossings, and the improvement of a number of railway crossings. Whilst it is not clear at this stage whether or not any of these activities will require confined space working, it may be said that option 4C is more likely to involve these activities.

Scoring on technical objectives at Area 4

Refer to Appendix C.4 of the main report for the scoring of all Sub-Objectives at Area 4.

Evaluation of technical objectives at Areas 5&6

Evaluating engineering risks at Areas 5&6

Impacts on the groundwater regime

The level of the proposed second-stage channel on the River Thames for Option 5B&6B will likely be situated above the water table. Therefore, Option 5B&6B is not likely to affect the groundwater flows and any potential impact on the groundwater will only be localised.

The depth of the proposed channel for Options 5A&6A and 6C will be approximately 2m deep and it is likely that this channel will be situated within or quite close to the water table. This will create a new pathway for groundwater flows and it has the potential of depleting the groundwater especially during extended periods of dry weather.

Minimise introduction of engineered elements

A flow control structure will be required within the proposed channels for Options 5B&6B and 6C to manage groundwater levels.

There are various existing public footpaths along this stretch of the River Thames and all proposed options maintain these footpaths. All the options propose to construct bridges at locations where a proposed channel will intrude onto a footpath.

There are two existing footbridges bridges located at either end of the island which was created by the parting of the River Thames. The first of these footbridges is located to the north of the island and the second is located to the south of the island nearby Sandford Lock. These two existing footbridges will require to be extended to accommodate the proposed channel in Option 5A&6A.

Option 6C will require a new bridge to be constructed to the west of Rose Isle to maintain the Thames Path across the proposed channel. Also, Option 6C will require the extension of the existing footbridge that is located to the south of Sandford Lock. The proposed channel for Option 6C will likely require erosion protection at the either side of the channel by the locations of the proposed bridges.

Option 5B&6B is a continuation of Option 6C and it will also require a new bridge to be constructed to the west of Rose Isle. Additionally, this option will also require a single-lane vehicle bridge to be constructed at Sandford Lane and a new footbridge to be constructed at the location where the proposed channel returns to the River Thames.

Minimise risk of blockages and frequency of maintenance

In this area, all options will require vegetation clearance and mowing, with special focus on the spillway for Options 5B&6B and 6C.

The proposed second stage channel in Option 5A&6A will be intermittently wet as it will only be active during periods of heavy rainfall. This periodic shift of dry and wet conditions will induce more vegetation growth and it will require to be mowed on a regular basis if it is to retain its full functionality.

Evaluating disruptions to infrastructure and services at Areas 5&6

There is a row of electricity pylons carrying high voltage cables runs north-south through the area. Also, there are numerous underground electricity lines that run east-west.

Impact on infrastructure and public highways

All options will obstruct the existing public access to this area and there could be a requirement to maintain public access by constructing an informal/temporary public footpath. The impact of construction activities on existing public assess will be assessed at the detail design stage.

Option 5A&6A and Option 6C will require the vehicle bridge at Sandford Lane to be extended and this may require closure to Sandford Lane and to the car park for some duration of the construction period.

The channel proposed in Option 5B&6B will cross Sandford Lane and the construction of a new vehicle bridge will be required to facilitate this crossing.

Impact on existing services

Option 5A&6A will be situated far away from the pylons and therefore it will not affect the integrity of the pylons.

Option 5B&6B and 6C will be in close proximity to the pylons and the proposed channels will meander to avoid the pylons. There is a significant risk that the excavations for constructing Option 5B&6B and 6C could impact the structural integrity of the pylons and therefore there could be a requirement to protect the pylons during the construction period. Also, the proprietor of the pylons may impose an exclusion distance which will subsequently govern the layout of any proposed channel.

Options 5B&6B will also clash with the existing underground cables and these cables will require to be lowered or diverted in the area to the south of Sandford Lane. Option 6C avoids these but will need to cross the outgoing cable the hydro scheme at Sanford Weir, this should be straight forward to divert.

Evaluating health and safety in buildability and maintenance at Areas 5&6

Buildability

The construction of Option 5B&6B and 6C will involve working in close proximity to the pylons and introduces a remote risk of electrocution. A full Ground Penetration Radar survey will be required to mitigate the risk of accidently contacting a buried electrical cable. The high elevation of the electric cables suspended from the pylons will prevent the cables being contacted by any of the construction equipment.

The construction of Option 5A&6A will require some form of cofferdam on the right bank of the River Thames for the duration of the construction period. The cofferdam may reduce the conveyance capacity of the River Thames and therefore it will require a flood risk assessment.

Working at height

All options will require working at height for the construction of the footbridges. Additionally, the construction the new vehicle bridge for Option 5B&6B will involve more of working at height.

Confined spaces

None of the options at this stage are thought to require any confined space working due to the inclusion of clear-span bridges where the channel crosses any existing roads or access tracks. There are no differentiating factors between the options at this stage.

Scoring on technical objectives at Areas 5&6

Refer to Appendix C.5&6 of the main report for the scoring of all Sub-Objectives at Areas 5&6.

Evaluation of technical objectives at Area 7

Evaluating engineering risks at Areas 7

Impacts on the groundwater regime

None of the options are thought to have a significant impact on groundwater within the area. Option 7A which features some channel widening will have no impact on groundwater levels nor will Option 7B which introduces three new culverts under Weirs Lane. Option 7C may have localised impact, but this will be limited to some infiltration from the underlying groundwater into the new proposed channel during periods of high water table.

Minimise introduction of engineered elements

Option 7A features no new engineered structures. It is likely that at the crossing of Weirs Lane, the bridge may need to be widened to allow the wider channel underneath but this is yet to be confirmed.

Option 7B would require the construction of three new culverts under Weirs Lane to pass floodplain flows and alleviate blockages and restrictions at the bridges. These could likely be constructed without major disruption to the road network or the current river navigation network.

Option 7C would require the introduction of a number of highly engineered elements, not least the new channel. This option would require, in addition to a new channel, a flow bifurcation structure on the River Thames end of the channel, erosion protection at its downstream end, and two separate new access bridges across the new channel. For this reason, Option 7C would have the most significant impact in terms of engineered elements.

Minimise risk of blockages and frequency of maintenance

Option 7A would not require any additional maintenance activities, above those currently undertaken in the area. As this option only requires channel widening, the current level of bank/ vegetation clearance or mowing activities that are undertaken could still be sufficient post scheme.

Option 7B would require some additional maintenance to clear trash screen and check the culverts are clear from blockages and in a good state of repair. This would not be required very often, as the culverts would only be operational during high flow events, when there would be significant flow within the floodplain.

Option 7C would require significant additional maintenance. The new channel would add over 1km of new bank which would require maintenance to an operational standard. The two new bridge crossings would require routine inspections and periodic maintenance. The bifurcation control structure would require significant maintenance to structural, mechanical and electronic components on a routine basis to ensure correct operation during high flow events. This option would increase the risk of blockages within the network due to the addition of the structure, for these reasons, this option has the most risk associated with blockages and maintenance requirements.

Evaluating disruptions to infrastructure and services at Area 7

Impact on infrastructure and public highways

Option 7A proposes widening works on the Weirs Mill Stream at its crossing with Donnington Bridge Road. It is anticipated that this widening works will be undertaken under live traffic but there could be a requirement to introduce a slower speed limit during the duration of the works. The other proposed widening works at downstream of Weirs Mill Pool for Option 7A is in close proximity to the residential flats, these works will require special planning to avoid impacting on the residential flats.

Similarly, it is anticipated that the proposed culverts through Donnington Bridge Donnington Road will be undertaken under live traffic but there could be a requirement to introduce a slower speed limit during the duration of the works.

The works proposed for Option 7C are outside the highway boundary but the works will impact on public footpaths. Option 7C will require slight repositioning of public footpaths to allow the construction of the proposed channel and footbridges.

Impact on existing services

Option 7A will impact some of the numerous services that are currently serving the boat moorings. These services will require to be diverted or protected depending on the exact location of each individual service. Also, the boat moorings could be repositioned following construction of Option 7A and therefore the locations of the services may have to be repositioned to suit the new locations of the boat moorings.

There is a high density of services located on either side of Donnington Bridge road and there are less services at the central part of this road. The westernmost of the three proposed culverts in Option 7B will have the most impact on the services. The westernmost culvert could be positioned away from the services to mitigate the risk of clashes. The other two proposed culverts will have minimal impact on services.

The proposed flow control structure for Option 7C will be situated in close proximity to a high voltage electric cable and a gas service. These two services will either require to be diverted or protected depending on the actual positioning of the proposed control structure. Towards the west (downstream) of the proposed channel there is a communication cable that could require protection works. There is also a gas service to the west (downstream) of the proposed channel which is slaloming across the field and it will cross the proposed channel at three locations. This gas service will require diverting.

Evaluating health and safety in buildability and maintenance at Area 7

Buildability

Option 7A will be the most challenging to build as the works will be situated in close proximity to infrastructure and services.

Unfavourable ground conditions would only be a significant hindrance to Option 7C due to the large scale excavation required for this option. Ground conditions could also impact on the construction the control structure for Option 7C.

Working at height

The need for two new bridge crossings in Option 7C may require working from height during construction and operation of the scheme. There are no differentiating factors between the other options.

Confined Space

Depending on the construction methodology used, only Option 7B risks the need for confined space working during construction or operation of the scheme. There are no differentiating factors between the other options.

Scoring on technical objectives at Area 7

Refer to Appendix C.7 of the main report for the scoring of all Sub-Objectives at Area 7.

Appendix B.03 – First-Phase Evaluation Data for Environmental Objectives

Evaluation of environmental objectives at Area 2

Evaluating ecological opportunities at Area 2

Effect on SSSIs

There is no geographical or hydrological link to Iffley Meadows or Port Meadows, so no opportunities for improvement. However all options have a significant impact on the nationally important MG4 grassland in this location.

Wider environmental habitat created

All options:

Wide, shallow scrape will improve conditions (enhanced connectivity with ground water and surface water) for establishment of species-rich wet grassland sward (focus on improving conditions to increase extent of Creeping Marshwort).

Increased inundation via spillway and new connectivity with existing ditch (Seacourt Stream) present opportunities for creation of more sustainable wetland habitats.

Opportunities to create niche habitats within scrape (e.g. shallow pools, or ditches linked to existing or new water courses).

However, stringent maintenance requirements for the scrape channel in Options 2A, 2C and 2D, plus the second-stage channel in Option 2B is likely to affect establishment of diverse habitat and may reduce ecological potential.

Ecologically sensitive design of new scrapes and channels (planform and profiles) is critical to maximising ecological potential.

In-channel habitat created

Option 2B offers a net gain in channel habitat, as the new channel becomes the flowing channel and Seacourt Stream is retained as backwater habitat. However this also has a significant impact on the MG4 grassland.

Option 2A offers a minor potential benefit to Seacourt Stream, around the connection between the existing stream and the upstream end of the scrape, where re-profiling could provide enhanced habitat. This option has the largest footprint and hence the greatest impact on theMG4 grassland in the area

In both cases, ecologically sensitive design of new channel planform and profile is critical to maximising ecological potential.

Options 2C and 2D offer no net gain in overall channel habitat, although there are opportunities to create bays and backwaters through re-profiling of the banks, which is less possible with Option 2A.

Fisheries improvements

Option 2B provides additional river habitat for fish, with Seacourt Stream retained as backwater which provides valuable nursery habitat for juvenile fish. Maintaining a sweetening flow down Seacourt Stream would improve the ecological potential of this habitat, if this could be achieved without compromising optimum flow in other channels.

Options 2C and 2D offer lesser opportunities to enhance juvenile fish habitat in the Seacourt Stream through creation of bays and backwater habitats through re-profiling of banks as previously noted.

Option 2A provides no opportunities for enhanced fish habitat.

Evaluating WFD assessment at Area 2

Impact on hydrological regime

All options alter the existing hydrological regime by changing the flow split between the main Thames and the Seacourt Stream during the design event. Option 2B has the potential to make further changes during all flows thought the creation of a new channel. Option 2B also has the potential to impact on groundwater level.

Impact on river continuity

All options alter the existing flow split between the main Thames and the Seacourt Stream as well as altering the local flood regime in terms of volume and timing of out of bank flows, and thus have the potential to alter downstream sediment transfer of the Thames and Seacourt stream. However continuity of flow and sediment transfer will be improved in Seacourt Stream with the replacement of culverts at Willow Walk with a clear-span bridge.

Impact on morphological conditions

Options 2B, 2C and 2D have the potential to improve morphological and flow diversity both within the channel and the floodplain of Seacourt Stream through the creation of a new channel/alterations to the existing channel. This could help reduce sedimentation in the channel improving the quality of the substrate, and improving heterogeneity. However it will result in the loss of the existing form and substrate in Option 2B. Option 2A does not cause a deterioration in the morphological diversity of the Seacourt Stream.

Evaluating environmental impact at Area 2

Impacts to Scheduled Monuments and archaeology

There have been some finds of local importance along Willow Walk. Archaeological mitigation is likely to be needed for all options, but there are no localised constraints which will affect option choice.

All the options require similar flow capacity through Willow Walk (and also through Monk's Causeway in Area 3), Option 2B involves deeper excavation in the meadow, so it is slightly less preferred, but there is no major difference between Options 2A, 2B and 2C. Option 2B involves excavation over a larger area than the other options and is therefore least preferred.

Ecological impacts

The meadow is of high ecological value, stated by BBOWT to be of near SSSI quality. It is species-rich and of a relatively rare vegetation type known as MG4. It is second only to Iffley Meadows SSSI in ecological importance within the scheme footprint and BBOWT are keen to see the footprint of the works minimised. They also wish to see new MG4 meadow created to replace that which is lost.

The scheme will need to mitigate the loss of meadow, through attempting to recreate the habitat. One possibility being examined is retaining the seedbank by keeping topsoil taken from the meadow separate. However it is not yet clear if the newly lowered ground will be too wet for the habitat type.

Modelling has not yet been done to determine the width of the lowered areas, so it is not clear which option would have the lowest land take. Option 2C may be preferred for keeping the works as far to the south-west as possible. However this involves loss of the trees along the bank of Seacourt Stream, which may have potential for otter holts or for bats, and are almost certain to be of value to bats as a commuting route.

Option 2B, by creating a new channel, bisects the meadow and will make it harder to manage it as meadow in the future.

Option 2A has more land take than the other options.

The area where Snakes Head Fritillary grows is within the footprint of all options. Therefore, although it is a significant negative impact, this is not factored into the option choice as a differentiator.

Immediately downstream of Area 2 is the horse paddock where Creeping Marshwort grows. Option B carries a risk that, through turning the downstream part of Seacourt Stream into a backwater which might silt up, it might change the drainage of the paddock unfavourably. This would be highly undesirable. Options 2A, 2C and 2D all involve the possibility of minor channel widening along the edge of the paddock. Our current understanding is that the Creeping Marshwort does not grow in the area that would be affected, however there would be additional construction noise.

Overall, Options 2B and 2A appear less favourable.

Scoring on environmental objectives at Area 2

Refer to Appendix C.2 of the main report for the scoring of all Sub-Objectives at Area 2.

Evaluation of environmental objectives at Area 3

Evaluating ecological opportunities at Area 3

Effect on SSSIs

There is no geographical or hydrological link to Iffley Meadows or Port Meadows, so no opportunities for improvement.

Wider environmental habitat created

The wide shallow second-stage channel will improve conditions (enhanced connectivity with ground water and surface water) for establishment of species-rich wet grassland sward. In the northern section, this should focus on improving conditions to increase extent of Creeping Marshwort.

All options offer opportunities to create niche habitats (e.g. shallow pools/scrapes, ditches, bays, backwaters).

Ecologically sensitive design of new channel and associated wetland habitat features (planform and profiles) is critical to maximising ecological potential.

Option 3A offers particularly increased inundation to floodplain via the new primary channel. This presents opportunities for creation of more sustainable wetland habitats. The other options also offer this, but to a lesser extent as more of the enhanced floodplain will be occupied by permanent water.

In Options 3B and 3C, the new lake provides additional wetland and open water habitat. Option 3B also provides ‘off-line’ refuge areas for fish, mammals, birds etc. under normal flow conditions.

The on-line nature of lake in Option 3C is not desirable from an ecological viewpoint (potential for pollution events from river).

The series of small ponds in Option 3D provide significant additional wetland and open water habitat and provides ‘off-line’ refuge areas for fish, mammals, birds etc. If suitably designed this habitat can be of more benefit than a single large lake.

Note that in Option 3B it is not certain that the off-line lake would be constructed; if it were not, the benefits of Option 3B would be similar to those of Option 3A.

In-channel habitat created

A net overall gain in channel habitat is currently anticipated (i.e. gains exceed losses). Ecologically sensitive design of new channel and lake (planform and profiles) is critical to maximising ecological potential and therefore ensuring that the in-channel habitat created is of more benefit than the existing channels which will be lost or converted to backwaters.

The new channel will be partly groundwater fed (as well as taking the flow from Seacourt Stream) which has potential to reduce the demand on other channels during normal and low flow conditions.

Fisheries improvements

The new channel provides additional river habitat for fish, in all options. In Options 3B, 3C and 3D, the additional waterbodies provide additional fish habitat compared to Option 3A.

In Options 3B and in particularly 3D, the lake/ponds are not linked to channel, so fish may become trapped and predated.

In Options 3B and 3C, and to a lesser extent 3D, there is a risk that fish will be introduced to the lake (e.g. by members of the public with good intentions), which could then affect native fish stocks in the main channel and downstream watercourses.

Note that in Option 3B it is not certain that the off-line lake would be constructed; if it were not, the benefits of Option 3B would be similar to those of Option 3A.

Evaluating WFD assessment at Area 3

Impact on hydrological regime

All options will change the flow dynamics in the area by reducing the number of channels and combining the flow in a single channel. All options will also impact on ground water connections. Options 3B and 3D will reduce downstream discharge (and resulting river energy) at design flow events. Option 3C will further impact downstream flow by controlling discharge at all flows. This change may be considered positive from an ecological perspective as it will reduce the likelihood of channels running dry under time of very low flow.

Impact on river continuity

The change in flow patterns created by all options will change sediment transport pathways in the area, impacting the side channels (that have been diverted into one channel) and potentially the main Thames. Flow control structures will further impact sediment transfer and possibly the passage of aquatic species. The addition of on online lake (Option 3B) will have the largest impact on sediment transfer, and is likely to be a focus of deposition on upstream sediments, with potential increased erosion downstream. It will also reduce peak flows (and energy) downstream of the lake within the Hinksey Brook.

Impact on morphological condition

All options involve a reduction in length and number of channels and so will reduce the variety of the bed, and bank form, however the options also have potential for the new low flow channel to have a more varied morphology, leading to more varied flow conditions and substrate. The required erosion protection and confined nature of the channel in some areas will have a negative impact on morphology and the ability of the channel to adjust over time.

Evaluating environmental impact at Area 3

Impacts to Scheduled Monuments and archaeology

All options involve works in the same place at Monk's Causeway. A mitigation plan will be needed to ensure any archaeology disturbed is recorded, but there will be no difference between Options 3A to 3D. There is a minor negative effect if Option 2B is chosen, as the channel would likely need to be slightly larger to accommodate the base flow diverted from Seacourt Stream.

Further south there is an area of crop-marks which may contain archaeology. As with any area of archaeological potential, there is a general preference to avoid unnecessary excavation, therefore Option A, without additional lakes, is preferred, while Option D is also preferable to the other options, if the lakes will be relatively shallow.

Ecological impacts

All options avoid the Creeping Marshwort, although there is concern that it may be harmed if the works cause too much noise for horses to be able to graze. Specific mitigation may be needed here, including potentially arranging alternative grazing, or possibly arranging the timing of works near the paddock to avoid losing a whole summer of grazing. This will require further consideration. It does not affect the choice of options in Area 3 does influence the choice of option for Area 2.

The land further south is of lower current value and in principle there is little to choose between the options. The higher ecological value of the ponds compared to the lakes is taken into account as an ecological opportunity. However, this area is the most likely to be suitable for creating new MG4 meadow as mitigation for that lost in Area 2, especially if the lowered ground cannot be made suitable for MG4. Therefore, Options 3B and 3C may reduce the capacity for mitigation of impacts elsewhere.

Impact on hydrological regime

All options will change the flow dynamics in the area by reducing the number of channels and combining the flow in a single channel. All options will also impact on ground water connections. Options 3B and 3D will reduce downstream discharge (and resulting river energy) at design flow events. Option 3C will further impact downstream flow by controlling discharge at all flows. This change may be considered positive from an ecological perspective as it will reduce the likelihood of channels running dry under time of very low flow.

Impact on river continuity

The change in flow patterns created by all options will change sediment transport pathways in the area, impacting the side channels (that have been diverted into one channel) and potentially the main Thames. Flow control structures will further impact sediment transfer and possibly the passage of aquatic species. The addition of on online lake (Option 3B) will have the largest impact on sediment transfer, and is likely to be a focus of deposition on upstream sediments, with potential increased erosion downstream. It will also reduce peak flows (and energy) downstream of the lake within the Hinksey Brook.

Impact on morphological condition

All options involve a reduction in length and number of channels and so will reduce the variety of the bed, and bank form, however the options also have potential for the new low flow channel to have a more varied morphology, leading to more varied flow conditions and substrate. The required erosion protection and confined nature of the channel in some areas will have a negative impact on morphology and the ability of the channel to adjust over time.

Scoring on environmental objectives at Area 3

Refer to Appendix C.3 of the main report for the scoring of all Sub-Objectives at Area 3.

Evaluation of environmental objectives at Area 4

Evaluating ecological opportunities at Area 4

Effect on SSSIs

There is no geographical or hydrological link to Iffley Meadows or Port Meadows, so no opportunities for improvement.

Wider environmental habitat created

Construction of 2-stage channels will provide the opportunity to create a more species-rich wet grassland sward. In Option 4A, the area will be limited as there would be only one such channel, compared to two in the other options.

Increased inundation to the second stage of the channels provides opportunities to create niche habitats along new channel (e.g. shallow pools/scrapes, bays, backwaters). Again, this is less so for Option 4A.

Ecologically sensitive design of new 2-stage channels and associated wetland habitat features (planform and profiles) is critical to maximising ecological potential.

In-channel habitat created

Construction of two 2-stage channels (or one for Option 4A) and constrained/semi-constrained channels further downstream, provide opportunities for a significant net gain in in-channel habitat.

Ecologically sensitive design of new 2-stage channel and constrained/semi-constrained channels (planform and profiles) critical to maximising ecological potential.

Fisheries improvements

The new channels provide additional river habitat for fish. Again, this is more so for Options 4B and 4C than for Option 4A.

Ecologically sensitive design of new channel planform and profile critical to maximising ecological potential.

Evaluating WFD assessment at Area 4

Impact on hydrological regime

All options will alter the hydrological regime, firstly by conveying additional flow from the upstream channels in Areas 2 and 3, and secondly by altering the flow paths and patterns of the existing channels. The creation of 2 channels as part of Options 4B and 4C have the potential to leave channels dry or with very little flow under low flows. Flows into the lagoons will also be altered by all options.

Impact on river continuity

The changes in flow will alter the sediment transport pathways of the channels through the area. The addition of bridges and culverts to all options may reduce the downstream continuity of sediment transfer, but especially in Option 4C with a longer length of culvert through landfill.

Impact on morphological conditions

All options will involve a loss of the current channel bed and bank form and substrate, however the options have potential for the new low flow channel to have a more varied morphology, leading to more varied flow conditions and substrate. Option 4C, however has reduced potential given the length of proposed culvert. The required bridges and culverts and the confined nature of the channel in some areas will have a negative impact on morphology and the ability of the channel to adjust over time.

Evaluating environmental impact at Area 4

Impacts to Scheduled Monuments and archaeology

All options pass through Old Abingdon Road at the same place, to miss the visible culverts which are the official Scheduled Monument. There is a high risk of encountering valuable archaeology even in the location chosen. The extent of likely damage is highly dependent on the capacity of the new channel; the smaller the channel, the more flexibility there is over its exact route and therefore the more chance that any archaeology encountered can be retained in situ.

Option 4C involves a higher-capacity channel, but also passes through the road at a more perpendicular angle, reducing the amount of excavation. Also, Option 4C involves loss of vegetation at the site boundary of Templeton College, which the local council has expressed concern about. However, this is some distance from the building itself and is unlikely to be judged to have a significant effect on the setting of the Listed Building.

On balance, there is little difference between the three options. All must be considered unfavourable due to the risk of damage to the highly-important causeway.

Ecological impacts

Hinksey Pond was not identified as of particularly high value during the Phase 1 Habitat Survey. Its value was much greater in the past, when it was at one time the last habitat in England for a rare species of snail, whose UK population is now confined to Wales. However the Freshwater Habitats Trust when consulted said they believe the snail to be locally extinct. We are awaiting survey data from FHT to determine if there are other valuable species present: if so, mitigation may be needed so that the pond loses some of its area to the new channel, rather than the whole of the pond becoming part of the channel.

Options 4A and 4B both go through the pond, which option 4C avoids it.

Kendall Copse is a relatively recently planted community woodland on a former landfill site. All three options take land from this site, with Option 4C taking most.

Scoring on environmental objectives at Area 4

Refer to Appendix C.4 of the main report for the scoring of all Sub-Objectives at Area 4.

Evaluation of environmental objectives at Areas 5&6

Evaluating ecological opportunities at Area 5&6

Effect on SSSIs

There is no geographical link to Iffley Meadows or Port Meadows. There is a minor hydrological link (the works are designed to draw water through from upstream) but this is anticipated to be a very minor effect. The magnitude of the effect cannot be judged until hydraulic models have been run, but for the current assessment it is assumed that (a) there is no opportunity for noticeable improvement for the SSSI and (b) any effect which does occur will be the same for all three options.

Wider environmental habitat created

In all options, construction of a second-stage channel will improve conditions (enhanced connectivity with ground water and/or surface water) for establishment of species-rich wet grassland sward.

Increased inundation via improved connectivity to main River Thames (Option 5A&6A) or the new channel (Options 5B&6b and 6C) presents opportunities for creation of more sustainable wetland habitats.

Options B and C may provide opportunities to introduce Creeping Marshwort, where appropriate.

There will be opportunities to create niche habitats (e.g. shallow pools/scrapes, ditches, bays, backwaters) at the interface between the first-stage and second-stage channel, in each option. This is of particular potential value in Option 5A&6A, where bays or backwaters in the main channel of the Thames could be created.

Conversely, in Option 5A&6A there would be less opportunity for new wetland features (e.g. scrapes) to act as ‘off-line’ habitat refuges than in the other options, as the lowered ground would be directly connected to main River Thames. Maintenance requirements to minimise/manage sedimentation in the navigable channel would be likely to affect establishment of diverse habitat

and may reduce ecological potential (although the potential would still be greater than the existing river).

In-channel habitat created

Options 5B&6B and 6C offer a net gain in overall channel habitat. The gain in Option 6C is slightly greater. Option 5A&6A offers no net gain.

Fisheries improvements

Options 5B&6B and 6C offer an increase in fish habitat. The increase in Option 6C is slightly greater.

Option 5A&6A offers opportunities to enhance juvenile fish habitat in the main River Thames through creation of bays and backwater habitats through re-profiling of banks; there would be no benefit to fish simply from constructing the second-stage channel.

Evaluating WFD assessment at Areas 5&6

Impact on hydrological regime

Option 5A&6A will alter the timing (increasing the frequency) and extent of out of bank flows. Options 5B&6B and 6C will lower water levels in the Thames during all flows as flow is directed down the new 2-stage channel. Both will impact of existing discharge and velocity within the channels.

Impact on river continuity

As all options will alter the discharge and velocity of the main channels resulting in changes to sediment transport and pathways. The scale of the changes is currently unknown.

Impact on morphological conditions

Option A will result in a loss of existing bank from along the length of the works, but re-profiling works have the potential to add a greater variety of bank form to the reach, with reduced bank protection measures. Bedform may also become more varied as a result of the works and the likely reduction of energy within the channel.

Options 5B&6B and 6C both have the potential to improve morphological diversity through the addition of the new channel, however this potential is reduced where there are areas of erosion protection.

Evaluating environmental impact at Areas 5&6

Impacts to Scheduled Monuments and archaeology

There are features of local cultural heritage value, including the obelisk near Sandford Pool and Sandford Pool itself. Neither has archaeological potential, but Option 5A&6A by changing the bank layout would have an effect on the cultural heritage value of the site.

For archaeology, there is no evidence that the footprint of any of the options is more or less sensitive than the others. Therefore the option which permits the excavation to be shallowest and narrowest is preferable; on current proposals this would support Option 5A&6A.

Ecological impacts

BBOWT have asked for a detailed survey of the meadow to identify which are the highest-value areas and whether a route for the option could be chosen to minimise loss of the highest-value areas. Option 5A&6A presents less chance to change the detail of the alignment, since it must follow the river throughout.

Option 5A&6A also involves the loss of significantly more trees than the other options, as all trees and hedgerow along the bank would be lost and could not be re-planted. The trees may have value for otters and bats, and will almost certainly have value in reinforcing the line of the river for bats, which follow such geographical features when flying.

BBOWT have noted a risk that Options 5B&6B or 6C could impact on the management of the meadow; if they were to interfere with the landowner's ability to manage the land as meadow, this would be ecologically damaging. However, since OPT are committed to maintaining the meadows, this in practice means a commitment to providing enough suitable crossing points to ensure management can continue.

A further risk with Options 5B&6B or 6C is that, because they have a permanent channel within them, they could lower the level of the River Thames during normal and low-flow conditions, as well as during floods. There is a risk of ecological damage to the river (covered in the section on WFD) but also a risk of damage to Fiddler's Elbow Marsh, which is likely to be sensitive to water levels in the river locally. This risk will only materialise if the river level is negatively affected. It is an established objective of the scheme to avoid this, so the risk is not likely to materialise.

Scoring on environmental objectives at Areas 5&6

Refer to Appendix C.5&6 of the main report for the scoring of all Sub-Objectives at Areas 5&6.

Evaluation of environmental objectives at Area 7

Evaluating ecological opportunities at Area 7

Effect on SSSIs

Modelling has not yet been carried out which would determine the effect of Option 7B on Iffley Meadows SSSI, but there are concerns that it may lead to increased frequency or duration of flooding during normal winters. Parts of the SSSI are currently too wet, including a unit in "Unfavourable (recovering)" condition. Increasing frequency of flooding in these areas is therefore likely to reduce opportunities for improvement in condition, resulting in a dis-benefit.

Option 7A has a minor dis-benefit due to the short stretch of widening works on the left bank. It presents no opportunities for improvements to the SSSI.

Option 7C offers potential for improvements to the SSSI through creation of wider flowing channel through meadows, along the route of an existing ditch or else along a former channel. Ecologically sensitive design of the new channel planform and profile would be critical to maximising ecological potential.

In all cases, there is the possibility of benefitting the SSSI though drainage improvements in the southern part of the meadows. Since this is independent of the option choice, it is not included in this assessment.

Wider environmental habitat created

Option 7A offers opportunities for habitat improvement along banks of river, through appropriate re-grading of banks as opposed to replacing the existing artificial banks like-for-like. However such opportunities are likely to be limited due to requirements for ongoing maintenance and dredging along the widened reach.

Option 7B offers very limited opportunities for wider improvements, as the works are confined to the SSSI. It is possible there could be very minor improvements in bank habitats resulting from re-profiling.

Option 7C offers some opportunities for habitat improvement along banks of river, through appropriate design of new channel. In principle, there could also be opportunities to create niche habitats along new channel (e.g. bays, backwaters, berms), although such changes would be restricted by the need for any additional land-take to be of benefit to the SSSI.

In-channel habitat created

Options 7A and 7B offer no net gain in channel habitat. Option 7B may have some very limited opportunities for improvement of the habitat through bank re-profiling where the banks would be

lowered. Option 7A is unlikely to offer opportunities for improvement, due to likely requirements for ongoing maintenance and dredging along the widened reach.

Option 7C does offer a net gain in channel habitat, if ecologically sensitive design is applied, and also possible opportunities to create niche habitats along new channel (e.g. bays, backwaters, berms), although such opportunities may be restricted by the SSSI designation.

Fisheries improvements

For all three options, the potential for fisheries benefits is the same as the potential for creation of in- channel creation.

Evaluating WFD assessment at Area 7

Impact on hydrological regime

All options will alter the hydrological regime of the Thames. Option 7A may reduce velocity, and reduce channel – floodplain coupling. Option 7B will increase the frequency of out of bank flows and Option 7C changes the flow splits between channels at all flows.

Impact on river continuity

All options will alter sediment transport downstream, with Option 7C likely to have the greatest change (at all flows). Option 7B will increase the frequency of over bank flows into Iffley Meadows, and allow better utilisation of the floodplain.

Impact on morphological conditions

Option 7A involves channel widening and straightening and will reduce result in a large loss of natural bank and bed and damage to substrate as well as reduced form diversity of the channel along the length of works. Option 7B will involve small losses of exiting banks, but will reconnect the channel and the floodplain, as well as improving connectivity of the floodplain downstream of the bridge thought the addition of extra culverts, creating more natural floodplain processes. Option 7C will result in the loss of natural channel, but has the potential to improve morphological diversity through good design, however control structures and erosion protection will limit the adjustment of this channel over time.

Evaluating environmental impact at Area 7

Impacts to Scheduled Monuments and archaeology

The cultural heritage value of Area 7 lies in the meadows themselves. There are no archaeological features or Listed/Scheduled structures which would affect the choice of option.

Potential effects on cultural heritage relate to the minor effect on the orchard (Option 7A) and a potential effect on the use of the meadows for local community events (Option 7B). If the increase in flooding under Option 7B were enough to interfere with the use of the meadows, it would inevitably also have an unacceptable effect on the ecology of the site, sufficient to cause Natural England to object to the scheme. Therefore, this effect is scored under ecology rather than in this section, to avoid double-counting.

Ecological impacts

Iffley Meadows SSSI is the most important ecological site in the scheme area (discounting Port Meadows, which is north of Area 1 and not expected to be affected). It is essential that any effect on the SSSI is net beneficial, or at least neutral. BBOWT have indicated that ideally they would prefer the meadows, especially the southern part, to be drier than they currently are. The population of Snakes Head Fritillary (larger than the population in Area 2) is towards the south of the site.

Option 7A has negative effects due to loss of trees, including some from the orchard. However, since it does not directly affect the SSSI, it is BBOWT's preferred option.

Option 7C involves direct land-take from the SSSI. As currently drawn it would be unlikely to be acceptable, however if it were re-aligned to follow an old ditch channel and were to incorporate drainage improvements in the south of the SSSI to compensate for the past effects of the building of the southern bypass, it may be possible to make this option acceptable.

Option 7B may turn out to be unacceptable, depending on the results of the modelling. The key question is whether it increases the duration of the typical winter flood (specifically, if it causes flooding to last longer into spring). If the river will normally drop below the lowered bank level before the end of the flood season (i.e. the floods remain on the site due to slow drainage at the southern end), it may be possible to make this option viable by including some drainage improvements in the south. However, if modelling shows that flooding will extend later into spring, due to water entering the site later than it currently does, both BBOWT and Natural England will oppose this.

The overall effect of Option 7B is hard to assess until the modelling is available. It has currently been scored on the assumption that there will be a minor increase in spring flooding.

Scoring on environmental objectives at Area 7

Refer to Appendix A.4 for the scoring of all Sub-Objectives at Area 4.

Appendix B.04 – First-Phase Evaluation Data for Institutional Objectives

Evaluation of Institutional objectives at Area 2

Provides Benefits and Minimises Impact on Interested Parties at Area 2

Residents / Landowners / Tenants

There are no residents directly affected by the proposed options in Area 2. Feedback from the residents of North Hinksey is incorporated under the 'Public' Parameter.

The landowner for the meadow section of Area 2 has major reservations regarding the impacts on the meadow from all of the options and has significant concerns over the impact on the setting and condition of the meadow. It was noted that Option 2B could be linked into the section of channel in the area which is currently a wetland section. Concern was raised over public access in this area and they would like to see the footprint of any works made as small as possible. Oxford City Council own the section of Area 2 adjacent to Botley Road and have noted that the impact on the Seacourt Nature Park will be significant for all options other than Option 2C. The landowner also raised the opportunity for improving the visual aspect of Willow Walk with the proposed new clear-span bridge over the existing culverts and headwalls.

The tenant farmer for the meadow in Area 2 currently uses the field for grazing cattle and cutting hay. This is an important part of the management regime used over the years to maintain the meadow in its current state including it ecological value. All of the options will impact on the farming regime in the meadow. The ground water is high in this area and any proposed excavations will create wetter areas which may then create difficulties with cutting hay and have a wider impact on the viability of grazing in the meadow for longer periods of the year than the current situation. Option 2B severs the field in two with the new channel and will create difficulties with cutting hay on the second-stage channel and additional access to each area will be required.

Local Authorities

Oxfordshire County Council also raised the opportunity to improve the visual aspect of Willow Walk and the opportunity for enhancements to Willow Walk to reduce flood risk to this important pedestrian and cycle route to the city centre.

There was also concern if Option 2C or Option 2D were implemented there would be a significant loss of trees along the left bank of the Seacourt Stream. If Option 2B is carried out and the existing Seacourt Stream becomes a backwater there would be impacts on local drainage network which would need to be managed.

Public

Overall feedback from the public was that Option 2B would be the preferred option. Although at the Abingdon public consultation event, Option 2C was the preferred choice. However, at the West Oxford public consultation event, Option 2A was preferred and this was the second most popular option overall across all public events.

Concern was raised over the loss of trees on the left bank of the Seacourt Stream in Options 2C and 2D and possible impacts on the existing stone bridge over the stream on Willow Walk with these options. Overall Option 2D was by far the least preferred option.

Other interested local organisations and businesses

Other organisations consulted as part of this process has similar comments to those highlighted in the previous sections. Particular in relation to the loss of trees, impacts on the status of the meadow and recreational activities along with the visual appearance of the existing culverts at Willow Walk. Other than impacts of trees no specific preferences were put forward at this stage.

Impact of the farming business is covered in the previous sections, no other businesses will be directly affected by the works. No feedback from any of the businesses along Botley Road has been received.

Evaluating potential policy/legislative conflict and planning outcomes at Area 2

Links to River Basin Management Plan

None of the options in this area are in conflict with the overall aims and objectives of the River Basin Management Plan. Specific details of ecological status of channels and other issues covered by the plan are included in the Environmental Objectives of this review.

Impacts on Navigation in the Oxford Area

None of the options in this area will have impacts on river based navigational operations in the Oxford area. Options for creating an easily navigable watercourse in this area is also severely limited.

Links to Existing Planning Policy

There are a number of Oxford City Planning Policies which could affect the scheme. These include Policy CS11 – Flooding and Policy NE11 – Land Drainage and River Engineering Works. The proposed works are in line with these policies although all proposed options will directly impact on the flora and fauna of the meadow in Area 2.

Planning Policy CS4 – Green Belt will require all of the proposed options to justify the need for the scheme to achieve planning consent. Policy NE20 – Wildlife Corridors requires wildlife corridors to be maintained, Options 2C and 2D will impact on the existing wildlife corridor along the Seacourt Stream. All options will help to improve pedestrian and cycle routes under Policy TR5. However Option 2B will restrict pedestrian access routes east – west across the meadow.

Evaluating opportunities for partnering/funding at Area 2

Stakeholder requirements and objectives

In addition to flood risk reduction to residential properties there will also be a benefit to reduced flood risk along Botley Road. This will also benefit the commercial and retail businesses in the area. However all options provide a similar level of fluvial flood risk reduction benefit and there is no direct differentiation between the options in relation to wider stakeholder objectives in this area.

Opportunities for development, both public and private

The proposed works are expected to reduce flood risk to residential and commercial properties along Botley Road and in the Osney area along with a reduction in risk to Botley Road transport route. There may be some small benefit to the Osney Mead Trading Estate. It is understood that options are being investigated by the Oxford University to redevelop this area. However there is no direct differentiation between the options in this area.

Opportunities for public and private sector funding

As noted above all options have similar flood risk benefits in the area, approaches are being made to Oxford University in relation to funding opportunities or partnership working in relation to Osney Mead Trading Estate redevelopment and in relation to longer term education opportunities with the university. Approaches to benefiting businesses along Botley Road may yield some funding. All options provide a similar level of fluvial flood risk reduction benefit. However, Option 2B may help to

reduce groundwater impacts to some of the businesses along Botley Road, and Option 2A will have potentially less benefits otherwise there is no direct differentiation between the options in this area.

Scoring on Institutional objectives at Area 2

Refer to Appendix C.2 of the main report for the scoring of all Sub-Objectives at Area 2.

Evaluation of Institutional objectives at Area 3

Provides Benefits and Minimises Impact on Interested Parties at Area 3

Residents / Landowners / Tenants

There are no residents directly affected by the proposed options in Area 3. Feedback from the residents of South Hinksey is incorporated under the 'Public' Parameter.

The landowner for the paddock section of Area 3 immediately to the south of Willow Walk again has major reservations regarding the impacts on the meadow from all of the proposed options and has significant concerns over the impact on the setting and biodiversity opportunities of the paddocks with all the options. Concern was raised over public access in this area as it is currently used for horse paddock and the public is currently excluded. There would be issues around allowing free public access if the area continues to be used as horse paddocks, this view was reiterated by the tenant at these paddocks.

Other landowners in the area raised concerns about extracting gravels as part of the works, however this is a wider issue and sits outside of this options review process. Refer to the scheme's Material Management Plan for the discussions relating to gravel extraction.

The tenant farmer for the various horse paddocks in the northern section of Area 3 noted that the grazing areas would be significantly reduced as a result of the scheme. To maintain horse grazing the water courses need to be fenced to avoid animals wandering off. This will create difficulties with all options where the second-stage channel needs to be kept clear of obstructions. This tenant also raised concerns over the impacts to his riding school business due to a reduction in grazing available and any restrictions which may impact on his clients hacking around the local area.

The tenant on the meadows to the south of this area currently uses the field for grazing sheep, cattle and cutting hay. It was noted that parts of this area are usually very wet throughout most of the year and the works will make the area around the channel even wetter. All of the options will impact on the farming regime in the meadows through which the channel runs in terms of hay cutting and animal grazing. Parts of the area will be wetter in the future, to make the area viable two cuts of hay per year are required this may be difficult to achieve in some areas of the second stage of the new channel. Dry access for sheep to use across the channel will be required at a location in this area, however this is common to all options.

None of the tenants using the land were in favour of the lake options due to the additional land take for these options.

Local Authorities

Limited specific comments were received for Area 3 from Local Authorities which are not covered elsewhere in the environmental and landscape aspects of this assessment. Therefore all Options are scored neutrally in this section to avoid double counting in the overall assessment process.

Public

Feedback from the public on Options in Area 3 indicated that Option 3A was the preferred, opinion was then relatively evenly split across the remaining options. At three of the five drop in sessions, Option 3A was the preferred option, these were the three drop in meetings closest to Area 3 and therefore indicate the local opinion. Positive responses to other options are also divided by location of events. The Kennington and Abingdon events preferred the lake options generally. As opinion is

relative to the areas of respondents it is difficult to directly assign preferences other than taking the overall scores across all the public drop in events. The least preferred options was 3B although from the comments it is not clear why this is the case.

Other interested local organisations and businesses

Other organisations consulted as part of this process have similar comments to those highlighted in the previous sections. Particular in relation to the loss of trees and hedgerows along with the impacts to existing watercourses. Overall feedback indicated that Option 3D is preferred due to the wider range of environmental opportunities.

Impact of the farming and agricultural businesses, including the riding stables in the area is covered in the previous sections, no other businesses will be directly affected by the works.

Evaluating potential policy/legislative conflict and planning outcomes at Area 3

Links to River Basin Management Plan

All options maintain and maximise the use of the existing floodplain in this area. Option 3C will potentially have an impact on the geomorphology of the new system as the on-line lake will tend to act as a silt trap and will require an additional weir to retain levels, this option is also likely to have the lowest water quality for the new body of water created by the lake. There may be some potential impacts on the status of existing watercourse at the northern end of this area and this will require careful design to ensure they are enhanced wherever possible.

Impacts on Navigation in the Oxford Area

None of the options in this area will have impacts on river based navigational operations in the Oxford area. All options impact on the Bulstake Stream and care will be needed at the junction with this stream to ensure navigation depths in the River Thames are not impacted during low flow periods. Options for creating an easily navigable watercourse in this area is also severely limited.

Links to Existing Planning Policy

There are a number of Oxford City Planning Policies which could affect the scheme. These include Policy CS11 – Flooding and Policy NE11 – Land Drainage and River Engineering Works. The proposed works are in line with these policies. Sections of Area 3 route pass through local wildlife sites for wildlife conservation where Policy C12 – Biodiversity applies, however all options have equal impacts and will require mitigation works.

Planning Policy CS4 – Green Belt will require all of the options to justify the need for the scheme to achieve planning consent. If Options 3B or 3C were to go ahead and a lake implanted for recreational purposed, then any facilities associated with recreation and rowing at the lake could be in contravention of CS11. All options will help to improve pedestrian and cycle routes under Policy TR5.

Evaluating opportunities for partnering/funding at Area 3

Stakeholder requirements and objectives

Option 3D is likely to create a greater range of environmental habitats which could further increase the environmental opportunities in the area which links in with the wider aims and objectives of all the key stakeholder and interested parties. The lake opportunities in Options 3B and 3C will enhance the recreation facilities but generally at the expense of environmental benefits and maintaining the existing type of landscape character of the area. All options provide equal opportunities for meeting other key requirements and objectives.

Opportunities for development, both public and private

The proposed works in this area optimise the use of the existing flood plain and do not reduce flood risk in areas which could be suitable for development under current planning policy. Similar to the

proposals at Area 2, there may be some small benefit to the Osney Mead Trading Estate. However there is no direct differentiation between the options in this area at this stage.

Opportunities for public and private sector funding

As noted above, all options have similar flood risk benefits in the area. There are no direct beneficiaries in this area other than the residents of South Hinksey. As before there may be some flood risk benefit to the Osney Mead Trading Estate which may assist with redevelopment opportunities which could help bring in some funding from this development. However all options create this opportunity. As noted before there are ongoing discussions regarding this area with Oxford University with respect the educational opportunities and Option 3D is likely to create the largest range of habitats which could benefit education programmes with the university.

Whilst there is significant service infrastructure in this area, the operators have indicated their plant is already sufficiently resilient with respect to flood risk. Options 2B and 2C could potentially draw in funding for the creation of the lake of recreational purposes. However, a commercially viable recreational lake is not likely to be compatible with the overall landscape and environmental aims of the project. Also, the facilities required for a recreational lake could create planning issues in the flood plain.

Scoring on Institutional objectives at Area 3

Refer to Appendix C.3 of the main report for the scoring of all Sub-Objectives at Area 3.

Evaluation of Institutional objectives at Area 4

Provides Benefits and Minimises Impact on Interested Parties at Area 4

Residents / Landowners / Tenants

There are no residents to the north of Old Abingdon Road directly affected by the proposed options in Area 4. Feedback from the residents of South Hinksey is incorporated under the 'Public' Parameter. There are a small number of private residential properties at the northern end of Kennington Road which will have gardens affected by all of the options to enhance flows through Munday's Bridge. The residents have all voiced concerns over these works due to the loss of garden and disruption. They have recently suffered disruption in relation to a Thames Water scheme in the same location. Option 4C will have the greatest impact in terms of land take from the gardens.

Option 4C will heavily impact on the frontage of the Said Business School at Egrove Park on Kennington Road and they have expressed concern over the visual impact of the enlarged channel through this area.

No specific comments from the other landowners in this area expressed any preferences for any of the options which are not covered by other aspects of this appraisal.

The tenant farmer for fields to the north of Old Abingdon Road has expressed concern over the impacts of lowering the second stage on the grazing areas which would be wetter for longer periods of the years. Option 4B minimises this and the impact on the areas available for grazing and hay making.

All options will impact on the landowners on the left bank of the Hinksey Stream which is required to enhance the capacity of the channel, however the impacts are neutral in relation to the options selection process.

The options in this area will also potentially impact on the horse riding school business In North Hinksey due to a reduction in access for their clients hacking around the local area. Option 4A would minimise these impacts.

Local Authorities

Limited specific comments were received for Area 4 from Local Authorities which are not covered elsewhere in the environmental and landscape aspects of this assessment. Therefore all options are scored neutrally in this section to avoid double counting in the overall assessment process.

Public

Feedback from the public on options in Area 4 are relatively evenly split across the options. Overall, Option 4B scored higher than the others. Option 4A and 4C were closely rated. However at two of the five drop in sessions, Option 4C was the preferred option, these were the southernmost drop-in sessions but over Option 4C was also the least preferred option.

Other interested local organisations and businesses

Other organisations consulted as part of this process didn't have any significant comments. However the Freshwater Habitats Trust noted that they generally preferred Option 4C as this avoided impacts on the Kennington Pond to the south of the A423 bypass.

Impact of the farming and agricultural businesses, including the riding stables in North Hinksey is covered in the previous sections, no other businesses will be directly affected by the works.

Evaluating potential policy/legislative conflict and planning outcomes at Area 4

Links to River Basin Management Plan

None of the options in this area are in conflict with the overall aims and objectives of the River Basin Management Plan. All options maintain and maximise the use of the existing flood plain. Option 4A will potentially have the biggest change to the existing floodplain as the smaller channel will need to be heavily engineered and artificially increase velocities in this area. There are opportunities to improve the status of some of the existing watercourses in the area.

Impacts on Navigation in the Oxford Area

None of the options in this area will have impacts on river based navigational operations in the Oxford area. Options for creating an easily navigable new watercourse in this area is also severely limited. The proposed works to Hinksey Stream will help to improve the possibility of navigation for small craft and kayaks in this area for all options.

Links to Existing Planning Policy

There are a number of Oxford City Planning Policies which could affect the scheme. These include Policy CS11 – Flooding and Policy NE11 – Land Drainage and River Engineering Works. The proposed works are in line with these policies, although Options 4B and 4C would create a more natural appearing river channel.

Planning Policy CS4 – Green Belt will require all of the options to justify the need for the scheme to achieve planning consent. Parts of the works on the Hinksey Stream are close to the protected transit route for guided buses or local rail set out in Policy TR8, however all options would have similar impacts. All options will help to improve pedestrian and cycle routes under Policy TR5.

Evaluating opportunities for partnering/funding at Area 4

Stakeholder requirements and objectives

Option 4A utilises an engineered channel and limits the range of environmental habitats which could benefit the area. All options provide equal opportunities for meeting other key requirements and objectives.

Opportunities for development, both public and private

The proposed works in this area optimise the use of the existing floodplain and do not reduce flood risk in areas which could be suitable for development under current planning policy. The areas of

South Hinksey which are protected by the raised embankment are already developed with no opportunities for additional future development within the village.

Opportunities for public and private sector funding

As noted above, all options have similar flood risk benefits in the area. There are no direct beneficiaries in this area other than the residents of South Hinksey.

Whilst there is significant service infrastructure in this area, the operators have indicated their plant is already sufficiently resilient with respect to flood risk. Therefore the opportunities for additional funding in this area are limited.

Scoring on Institutional objectives at Area 4

Refer to Appendix C.4 of the main report for the scoring of all Sub-Objectives at Area 4.

Evaluation of Institutional objectives at Areas 5&6

Provides Benefits and Minimises Impact on Interested Parties at Areas 5&6

Residents / Landowners / Tenants

There are no residents in this area who would be directly affected by the proposed options in Areas 5&6.

The landowner for the fields affected by the proposed works has major reservations regarding the impacts on the land use of the meadows from all of the options. There are also significant concerns over the impact on the setting and condition of the meadow if any of the options are taken forward. Public access for walking activities will be reduced by Option 5B&6B. The landowner also expressed concern over Option 5A&6A due to the change in setting and profile for the Thames Path.

The tenant farmer for the fields has indicated concerns over the impacts of all options, lowering the second stage on the grazing areas would create wetter for longer periods of the year and would reduce the viability of grazing. Option 5B&6B will sever the fields and create difficulties with crossings for both animals and vehicles. It was noted that if this option was taken forward this could be reduced by following the course of an existing ditch closer to the railway than the route indicated on the current option plans.

Local Authorities

Limited specific comments were received for Areas 5&6 from Local Authorities which are not covered elsewhere in the environmental and landscape aspects of this assessment. Generally Options 5B&6B and 6C were preferred to minimise impact on the River Thames and on the setting of Sandford Lane.

Public

Feedback from the public on for these areas indicated that overall Option 5B&6B was preferred. Option 5A&6A was the second choice and Option 6C was least preferred. However the feedback from the Kennington drop-in meeting, which is closest to the works, indicated that whilst Option 5A&6A was the first choice option, Option 6C was preferred over Option 5B&6B. For consistency the overall public ratings have been used for the purposes of this appraisal.

Other interested local organisations and businesses

Other organisations consulted as part of this process didn't have any significant comments other than potential environmental impacts which are covered in other parts of this assessment process.

Evaluating potential policy conflict and planning outcomes at Areas 5&6

Links to River Basin Management Plan

None of the options in this area are in direct conflict with the overall aims and objectives of the River Basin Management Plan. All options maintain and maximise the use of the existing flood plain. Option 5A&6A will impact on the setting of the River Thames through this reach and also on the Thames Path.

Impacts on Navigation in the Oxford Area

Option 5A&6A would potentially impact on navigation along this reach by creating a shelf as part of the second stage along the main river. This could create a hazard to navigation at certain flows and levels. Other options will not impact on navigation activities.

Links to Existing Planning Policy

There are a number of Planning Policies which could affect the scheme in this location, however the proposed works are in line with flood risk planning guidance.

All options will potentially be in conflict with the Green Belt planning policy in force in the area. The impacts on the Thames Path by Option 5A&6A may be also be contrary to guidance on helping to improve pedestrian and cycle routes.

Evaluating opportunities for partnering/funding at Areas 5&6

Stakeholder requirements and objectives

All options have an impact of on the MG4 status grassland in this area. Option 5A&6A impacts on the Thames Path, however the other options also restrict public access in and east–west direction and additional footbridges would be required at strategic locations in the area to maintain these routes.

Opportunities for development, both public and private

The proposed works in this area optimise the use of the existing floodplain and do not reduce flood risk to any areas locally. Other forms of development in the area covered by this scheme would be contrary to planning guidance.

Opportunities for public and private sector funding

As noted all options have similar flood risk benefits in the area. There are no direct beneficiaries in this area.

National Grid and SSSE have significant service infrastructure in this area but they have indicated their plant is already sufficiently resilient with respect to flood risk. Therefore, the opportunities for additional funding from direct beneficiaries in this area are very limited.

Access to the site from Kennington Road via Sandford Lane is restrictive and there may be an opportunity to work with the industrial estate owner in the area to facilitate an upgrade to this road, however this applies to all options and is not a differentiator between the options.

Scoring on Institutional objectives at Areas 5&6

Refer to Appendix C.5&6 of the main report for the scoring of all Sub-Objectives at Areas 5&6.

Evaluation of Institutional objectives at Area 7

Provides Benefits and Minimises Impact on Interested Parties at Area 7

Residents / Landowners / Tenants

There are twenty five residential house boats which would be directly impacted by the works proposed in Option 7A. These residences would be impacted both during the construction phase as they would need to be temporarily relocated. In the permanent situation, it is possible one of the residential moorings would be lost and the setting of the mooring area would be impacted. All residents affected by the works proposed under Option 7A and the landowner for this area have indicated their objection to this option.

Options 7B and 7C have minimal impacts on local residents.

The landowner on the right bank of the Weirs Mill Stream downstream of the residential area will also be impacted by Option 7A and has voiced objections to the scheme. Other landowners in the area are concerned about the impacts of Options 7B and 7C on the Site of Special Scientific Interest between Weirs Mill Stream and the River Thames.

Local Authorities

Limited specific comments were received for Area 7 from Local Authorities. The specific comments received are covered elsewhere in this appraisal so all options have been score neutrally in this section to avoid double counting.

Public

Feedback from the public on Options in Area 7 tend to match the views of the local residents with Option 7C being rated as the most favoured. Option 7B was the next favoured, and Option 7A the least favoured. However Option 7A was the preferred option at only two of the five drop-in sessions. Other two drop-in sessions identified Option 7C being the preferred option. The overall least preferred option was 7A.

Other interested local organisations and businesses

Other organisations consulted as part of this process indicated that Option 7B is likely to be the least favoured options. This is mainly due to the fact most of the other interested organisations tend to be orientated toward environmental considerations.

There are no businesses that will be directly affected by the works.

Evaluating potential policy/legislative conflict and planning outcomes at Area 7

Links to River Basin Management Plan

Some options in this area will have some element of conflict with the overall aims and objectives of the River Basin Management Plan. These are related to potential impacts on designated sites for Options 7B and 7C. These options will need careful design and monitoring if they are chosen for implementation.

Impacts on Navigation in the Oxford Area

None of the options in this area will have direct impacts on river based navigational operations in the Oxford area. However, Option 7C could help to create a circular navigation route for small craft and kayaks by connecting Weirs Mill Stream to the River Thames although a portage may be required at the confluence with the Thames.

Links to Existing Planning Policy

Oxford City Council Planning Policy CS11 – Flooding and Policy NE11 – Land Drainage and River Engineering Works apply to these options. The proposed works are in line with these policies in terms of reducing flood risk.

Planning Policy CS4 – Green Belt will require all of the options to justify the need for the scheme to achieve planning consent. Policy CS12 - Biodiversity applies to Options 7B and 7C which could contradict the aims of this policy due to some impacts on the designated meadows in this area.

Evaluating opportunities for partnering/funding at Area 7

Stakeholder requirements and objectives

Option 7A impacts on residential boat moorings which are in short supply in the Oxford area. All options are designed to provide a level of enhanced flood risk protection to Abingdon Road to ensure it is kept open longer during flood events.

Opportunities for development, both public and private

The proposed works in this area for Options 7A and 7C are designed to lower water levels in residential areas, this will have the benefit of helping to reduce flood risk to any vacant sites within these residential areas which could create local small scale development opportunities. Option 7B does not lower water levels in the area but provides raised protection, this will have a more limited wider benefit outside of the directly protected areas.

Opportunities for public and private sector funding

There is limited opportunity of seeking significant funding from direct beneficiaries in this area although some local businesses along Abingdon Road may contribute.

Option 7C may attract some funding if recreational benefits associated with kayaking or rowing can be demonstrated.

Scoring on Institutional objectives at Area 7

Refer to Appendix C.7 of the main report for the scoring of all Sub-Objectives at Area 7.

Appendix C - Score Matrices for First-Phase Appraisal

Appendix C.2

FINAL

OXFORD FLOOD ALLEVIATION SCHEME
FIRST-PHASE SCORING MATRIX for AREA 2

	OBJECTIVES	OPTION 2A	OPTION 2B	OPTION 2C	OPTION 2D
		Existing channel retained and shallow scrape to convey larger flow	New 2 stage channel across farmland and existing channel modified to form a	Existing channel retained and second stage on farmland downstream of pylon	As Option 2C but with second stage starting upstream of pylon
2	**SOCIAL OBJECTIVES**				
2ii	**Improve landscape opportunities**				
	Avoids impact on views of Oxford	4	3	2	1
	Echances/add to areas of landscape character and setting	4	3	2	1
	Average	4.00	3.00	2.00	1.00
	Weighted Average x 1.5	6.00	4.50	3.00	1.50
2iii	**Improve recreational opportunities**				
	Maximises pedestrian and cycleway routes	4	2	3	3
	Maximises fishing and water based recreation	3	3	3	3
	Maximises opportunities for horse riding	4	2	3	3
	Average	**3.67**	**2.33**	**3.00**	**3.00**
	Weighted Average x 1.5	5.50	3.50	4.50	4.50
	Sub-total of Averages	**11.50**	**8.00**	**7.50**	**6.00**
3	**TECHNICAL OBJECTIVES**				
3i	**Minimise engineering risks**				
	Retaining existing groundwater regime	4	2	4	4
	Minimise introduction of engineered elements	3	2	4	4
	Reduce risk of blockages and frequency of maintenance	2	4	2	2
	Unweighted Average	3.00	2.67	3.33	3.33
3ii	**Mimimise infrastructure and services disruption**				
	Impact on infrastructure and public highways	3	2	3	3
	Impact on existing services	3	3	3	1
	Unweighted Average	3.00	2.50	3.00	2.00
3iii	**Safeguards health and safety in buildability and maintenance**				
	Buildability	3	3	3	2
	Working at height	3	3	3	3
	Confined spaces	3	3	3	3
	Unweighted Average	3.00	3.00	3.00	2.67
	Sub-total of Averages	**9.00**	**8.17**	**9.33**	**8.00**
4	**ENVIRONMENTAL OBJECTIVES**				
4i	**Improve ecological opportunities**				
	Any effect on SSSIs to be net beneficial	3	3	3	3
	Maximises wider environmental habitat created	5	5	4	4
	Maximises in-channel habitat created	3	4	3	3
	Fisheries improvements	3	5	4	4
	Unweighted Average	3.50	4.25	3.50	3.50
4ii	**Accords with WFD assessment**				
	Impact on hydrological regime	3	2	3	3
	Impact on River continuity	3	3	3	3
	Impact on morphological conditions	3	5	4	4
	Unweighted Average	3.00	3.33	3.33	3.33
4iii	**Keep environmental impact to acceptable levels**				
	Minimises impacts to Scheduled Monuments and archaeology	3	2	3	2
	Minimises ecological impacts	2	1	2	1
	Unweighted Average	2.50	1.50	2.50	1.50
	Sub-total of Averages	**9.00**	**9.08**	**9.33**	**8.33**
5	**INSTITUTIONAL OBJECTIVES**				
5i	**Provide Benefits and Minimise Impacts on Interested Parties**				
	Residents / Landowners/ Tenants	2	1	2	2
	Local Authorities	3	2	2	2
	Public	3	4	2	2
	Other interested local organisations and businesses	2	2	2	2
	Unweighted Average	2.50	2.25	2.00	2.00
5ii	**Potential policy / legislative conflicts or conforms with wider planning outcomes**				
	Links to River Basin Management Plan	3	3	3	3
	Impacts on Navigation in area	3	3	3	3
	Links to existing planning policy	3	2	2	2
	Unweighted Average	3.00	2.67	2.67	2.67
5iii	**Provide opportunities for partnering/funding**				
	Meets stakeholder requirements and objectives	3	3	3	3
	Provides opportunities for development, both public and private	3	3	3	3
	Provides opportunities for public and private sector funding	2	4	3	3
	Unweighted Average	2.67	3.33	3.00	3.00
	Sub-total of Averages	**8.17**	**8.25**	**7.67**	**7.67**
	Total scores	**37.67**	33.50	33.83	30.00

Key	Category	Score
	HIGH --	1
	MEDIUM -	2
	LOW/NEUTRAL	3
	MEDIUM +	4
	HIGH ++	5

Appendix C.3

FINAL

OXFORD FLOOD ALLEVIATION SCHEME
FIRST-PHASE SCORING MATRIX for AREA 3

	OBJECTIVES	OPTION 3A	OPTION 3B	OPTION 3C	OPTION 3D
		New 2-stage channel	New 2-stage channel with an offline lake	New 2-stage channel with an online lake	New 2-stage channel with a series of offline ponds
2	**SOCIAL OBJECTIVES**				
2ii	**Improve landscape opportunities**				
	Avoids impact on views of Oxford	2	2	2	2
	Echances/add to areas of landscape character and setting	3	3	3	3
	Average	2.50	2.50	2.50	2.50
	Weighted Average x 1.5	3.75	3.75	3.75	3.75
2iii	**Improve recreational opportunities**				
	Maximises pedestrian and cycleway routes	3	3	3	3
	Maximises fishing and water based recreation	2	3	4	2
	Maximises opportunities for horse riding	1	1	1	1
	Average	**2.00**	**2.33**	**2.67**	**2.00**
	Weighted Average x 1.5	3.00	3.50	4.00	3.00
	Sub-total of Averages	**6.75**	**7.25**	**7.75**	**6.75**
3	**TECHNICAL OBJECTIVES**				
3i	**Minimise engineering risks**				
	Retaining existing groundwater regime	3	3	2	3
	Minimise introduction of engineered elements	3	3	2	3
	Reduce risk of blockages and frequency of maintenance	3	3	2	3
	Unweighted Average	3.00	3.00	2.00	3.00
3ii	**Mimimise infrastructure and services disruption**				
	Impact on infrastructure and public highways	3	2	2	2
	Impact on existing services	3	3	3	3
	Unweighted Average	3.00	2.50	2.50	2.50
3iii	**Safeguards health and safety in buildability and maintenance**				
	Buildability	3	2	2	3
	Working at height	3	3	3	3
	Confined spaces	3	3	3	3
	Unweighted Average	3.00	2.67	2.67	3.00
	Sub-total of Averages	**9.00**	**8.17**	**7.17**	**8.50**
4	**ENVIRONMENTAL OBJECTIVES**				
4i	**Improve ecological opportunities**				
	Any effect on SSSIs to be net beneficial	3	3	3	3
	Maximises wider environmental habitat created	4	4	3	5
	Maximises in-channel habitat created	4	4	4	4
	Fisheries improvements	4	4	3	4
	Unweighted Average	3.75	3.75	3.25	4.00
4ii	**Accords with WFD assessment**				
	Impact on hydrological regime	2	2	1	2
	Impact on River continuity	2	2	1	2
	Impact on morphological conditions	3	3	2	3
	Unweighted Average	2.33	2.33	1.33	2.33
4iii	**Keep environmental impact to acceptable levels**				
	Minimises impacts to Scheduled Monuments and archaeology	4	2	2	3
	Minimises ecological impacts	2	2	2	2
	Unweighted Average	3.00	2.00	2.00	2.50
	Sub-total of Averages	**9.08**	**8.08**	**6.58**	**8.83**
5	**INSTITUTIONAL OBJECTIVES**				
5i	**Provide Benefits and Minimise Impacts on Interested Parties**				
	Residents / Landowners/ Tenants	2	1	1	2
	Local Authorities	3	3	3	3
	Public	3	4	4	3
	Other interested local organisations and businesses	3	3	3	4
	Average	2.75	2.75	2.75	3.00
5ii	**Potential policy / legislative conflicts or conforms with wider planning outcomes**				
	Links to River Basin Management Plan	3	3	2	3
	Impacts on Navigation in area	3	3	3	3
	Links to existing planning policy	3	2	2	3
	Average	3.00	2.67	2.33	3.00
5iii	**Provide opportunities for partnering/funding**				
	Meets stakeholder requirements and objectives	4	3	3	4
	Provides opportunities for development, both public and private	3	4	4	3
	Provides opportunities for public and private sector funding	3	3	3	4
	Average	3.33	3.33	3.33	3.67
	Sub-total of Averages	**9.08**	**8.75**	**8.42**	**9.67**
	Total of Averages	**33.92**	32.25	29.92	33.75

Key	Category	Score
	HIGH --	1
	MEDIUM -	2
	LOW/NEUTRAL	3
	MEDIUM +	4
	HIGH ++	5

Appendix C.4

FINAL

OXFORD FLOOD ALLEVIATION SCHEME
EVALUATION DATA FOR CORRIDOR OPTIONS IN AREA 4

	OBJECTIVES	OPTION 4A	OPTION 4B	OPTION 4C
		New single 2-stage channel	New two 2-stage channels	New two 2-stage channels and new constrained channel
2	**SOCIAL OBJECTIVES**			
2ii	**Improve landscape opportunities**			
	Avoids impact on views of Oxford	3	2	2
	Echances/add to areas of landscape character and setting	3	2	2
	Average	3.00	2.00	2.00
	Weighted Average x 1.5	4.50	3.00	3.00
2iii	**Improve recreational opportunities**			
	Maximises pedestrian and cycleway routes	3	2	3
	Maximises fishing and water based recreation	2	2	2
	Maximises opportunities for horse riding	3	3	3
	Average	**2.67**	**2.33**	**2.67**
	Weighted Average x 1.5	4.00	3.50	4.00
	Sub-total of Averages	**8.50**	**6.50**	**7.00**
3	**TECHNICAL OBJECTIVES**			
3i	**Minimise engineering risks**			
	Retaining existing groundwater regime	3	2	2
	Minimise introduction of engineered elements	4	3	2
	Reduce risk of blockages and frequency of maintenance	4	3	2
	Unweighted Average	3.67	2.67	2.00
3ii	**Mimimise infrastructure and services disruption**			
	Impact on infrastructure and public highways	3	3	2
	Impact on existing services	3	3	2
	Unweighted Average	3.00	3.00	2.00
3iii	**Safeguards health and safety in buildability and maintenance**			
	Buildability	3	3	2
	Working at height	3	3	3
	Confined spaces	3	3	3
	Unweighted Average	3.00	3.00	2.67
	Sub-total of Averages	**9.67**	**8.67**	**6.67**
4	**ENVIRONMENTAL OBJECTIVES**			
4i	**Improve ecological opportunities**			
	Any effect on SSSIs to be net beneficial	3	3	3
	Maximises wider environmental habitat created	4	5	5
	Maximises in-channel habitat created	4	5	5
	Fisheries improvements	4	4	5
	Unweighted Average	3.75	4.25	4.50
4ii	**Accords with WFD assessment**			
	Impact on hydrological regime	2	1	1
	Impact on River continuity	2	2	1
	Impact on morphological conditions	4	4	3
	Unweighted Average	2.67	2.33	1.67
4iii	**Keep environmental impact to acceptable levels**			
	Minimises impacts to Scheduled Monuments and archaeology	1	1	1
	Minimises ecological impacts	3	3	3
	Unweighted Average	2.00	2.00	2.00
	Sub-total of Averages	**8.42**	**8.58**	**8.17**
5	**INSTITUTIONAL OBJECTIVES**			
5i	**Provide Benefits and Minimise Impacts on Interested Parties**			
	Residents / Landowners/ Tenants	2	2	1
	Local Authorities	3	3	3
	Public	3	4	3
	Other interested local organisations and businesses	2	2	3
	Unweighted Average	2.50	2.75	2.50
5ii	**Potential policy / legislative conflicts or conforms with wider planning outcomes**			
	Links to River Basin Management Plan	2	3	3
	Impacts on Navigation in area	4	4	4
	Links to existing planning policy	2	3	3
	Unweighted Average	2.67	3.33	3.33
5iii	**Provide opportunities for partnering/funding**			
	Meets stakeholder requirements and objectives	2	3	3
	Provides opportunities for development, both public and private	3	3	3
	Provides opportunities for public and private sector funding	3	3	3
	Unweighted Average	2.67	3.00	3.00
	Sub-total of Averages	**7.83**	**9.08**	**8.83**
	Total of Averages	34.42	32.83	30.67

Key	Category	Score
	HIGH --	1
	MEDIUM -	2
	LOW/NEUTRAL	3
	MEDIUM +	4
	HIGH ++	5

Appendix C.5&6

FINAL

OXFORD FLOOD ALLEVIATION SCHEME

FIRST-PHASE SCORING MATRIX for AREAS 5&6

	OBJECTIVES	OPTION 5A and 6A	OPTION 5B and 6B	OPTION 6C
		New second stage channel on right Bank of River Thames	New 2-stage channel	As Option 5B&6B but returning to the Thames upstream of Sandford Lane.
2	**SOCIAL OBJECTIVES**			
2ii	**Improve landscape opportunities**			
	Avoids impact on views of Oxford	2	2	2
	Echances/add to areas of landscape character and setting	3	2	2
	Average	2.50	2.00	2.00
	Weighted Average x 1.5	3.75	3.00	3.00
2iii	**Improve recreational opportunities**			
	Maximises pedestrian and cycleway routes	3	2	2
	Maximises fishing and water based recreation	3	3	3
	Maximises opportunities for horse riding	3	3	3
	Average	**3.00**	**2.67**	**2.67**
	Weighted Average x 1.5	4.50	4.00	4.00
	Sub-total of Averages	**8.25**	**7.00**	**7.00**
3	**TECHNICAL OBJECTIVES**			
3i	**Minimise engineering risks**			
	Retaining existing groundwater regime	4	2	2
	Minimise introduction of engineered elements	4	2	3
	Reduce risk of blockages and frequency of maintenance	3	3	3
	Unweighted Average	3.67	2.33	2.67
3ii	**Mimimise infrastructure and services disruption**			
	Impact on infrastructure and public highways	3	2	2
	Impact on existing services	3	2	2
	Unweighted Average	3.00	2.00	2.00
3iii	**Safeguards health and safety in buildability and maintenance**			
	Buildability	3	3	3
	Working at height	3	2	3
	Confined spaces	3	3	3
	Unweighted Average	3.00	2.67	3.00
	Sub-total of Averages	**9.67**	**7.00**	**7.67**
4	**ENVIRONMENTAL OBJECTIVES**			
4i	**Improve ecological opportunities**			
	Any effect on SSSIs to be net beneficial	3	3	3
	Maximises wider environmental habitat created	4	5	4
	Maximises in-channel habitat created	3	5	4
	Fisheries improvements	4	5	4
	Unweighted Average	3.50	4.50	3.75
4ii	**Accords with WFD assessment**			
	Impact on hydrological regime	3	2	2
	Impact on River continuity	3	2	2
	Impact on morphological conditions	2	2	2
	Unweighted Average	2.67	2.00	2.00
4iii	**Keep environmental impact to acceptable levels**			
	Minimises impacts to Scheduled Monuments and archaeology	2	3	3
	Minimises ecological impacts	2	3	3
	Unweighted Average	2.00	3.00	3.00
	Sub-total of Averages	**8.17**	**9.50**	**8.75**
5	**INSTITUTIONAL OBJECTIVES**			
5i	**Provide Benefits and Minimise Impacts on Interested Parties**			
	Residents / Landowners/ Tenants	1	2	2
	Local Authorities	3	3	3
	Public	4	3	2
	Other interested local organisations and businesses	3	3	3
	Unweighted Average	2.75	2.75	2.50
5ii	**Potential policy / legislative conflicts or conforms with wider planning outcomes**			
	Links to River Basin Management Plan	2	3	3
	Impacts on Navigation in area	1	3	3
	Links to existing planning policy	2	3	3
	Unweighted Average	1.67	3.00	3.00
5iii	**Provide opportunities for partnering/funding**			
	Meets stakeholder requirements and objectives	2	3	3
	Provides opportunities for development, both public and private	3	3	3
	Provides opportunities for public and private sector funding	3	3	3
	Unweighted Average	2.67	3.00	3.00
	Sub-total of Averages	**7.08**	**8.75**	**8.50**
	Total of Averages	**33.17**	32.25	31.92

Key	Category	Score
	HIGH --	1
	MEDIUM -	2
	LOW/NEUTRAL	3
	MEDIUM +	4
	HIGH ++	5

Appendix C.7

FINAL

OXFORD FLOOD ALLEVIATION SCHEME

FIRST-PHASE SCORING MATRIX for AREA 7

	OBJECTIVES	OPTION 7A	OPTION 7B	OPTION 7C
		Widening of Weirs Mill Stream	Proposed additional culverts at Donnington Bridge Road	Proposed constrained channel
2	**SOCIAL OBJECTIVES**			
2ii	**Improve landscape opportunities**			
	Avoids impact on views of Oxford	2	3	3
	Echances/add to areas of landscape character and setting	1	2	3
	Average	1.50	2.50	3.00
	Weighted Average x 1.5	2.25	3.75	4.50
2iii	**Improve recreational opportunities**			
	Maximises pedestrian and cycleway routes	2	2	4
	Maximises fishing and water based recreation	3	3	3
	Maximises opportunities for horse riding	3	3	3
	Average	**2.67**	**2.67**	**3.33**
	Weighted Average x 1.5	4.00	4.00	5.00
	Sub-total of Averages	**6.25**	**7.75**	**9.50**
3	**TECHNICAL OBJECTIVES**			
3i	**Minimise engineering risks**			
	Retaining existing groundwater regime	3	3	2
	Minimise introduction of engineered elements	4	3	2
	Reduce risk of blockages and frequency of maintenance	4	2	3
	Unweighted Average	3.67	2.67	2.33
3ii	**Mimimise infrastructure and services disruption**			
	Impact on infrastructure and public highways	2	2	4
	Impact on existing services	2	3	2
	Unweighted Average	2.00	2.50	3.00
3iii	**Safeguards health and safety in buildability and maintenance**			
	Buildability	2	3	2
	Working at height	3	3	2
	Confined spaces	3	2	3
	Unweighted Average	2.67	2.67	2.33
	Sub-total of Averages	**8.33**	**7.83**	**7.67**
4	**ENVIRONMENTAL OBJECTIVES**			
4i	**Improve ecological opportunities**			
	Any effect on SSSIs to be net beneficial	2	2	4
	Maximises wider environmental habitat created	4	3	4
	Maximises in-channel habitat created	3	3	4
	Fisheries improvements	3	3	4
	Unweighted Average	3.00	2.75	4.00
4ii	**Accords with WFD assessment**			
	Impact on hydrological regime	2	5	2
	Impact on River continuity	2	5	3
	Impact on morphological conditions	2	4	4
	Unweighted Average	2.00	4.67	3.00
4iii	**Keep environmental impact to acceptable levels**			
	Minimises impacts to Scheduled Monuments and archaeology	3	3	3
	Minimises ecological impacts	2	1	2
	Unweighted Average	2.50	2.00	2.50
	Sub-total of Averages	**7.50**	**9.42**	**9.50**
5	**INSTITUTIONAL OBJECTIVES**			
5i	**Provide Benefits and Minimise Impacts on Interested Parties**			
	Residents / Landowners/ Tenants	1	2	2
	Local Authorities	3	3	3
	Public	4	3	2
	Other interested local organisations and businesses	2	1	2
	Unweighted Average	2.50	2.25	2.25
5ii	**Potential policy / legislative conflicts or conforms with wider planning outcomes**			
	Links to River Basin Management Plan	3	2	2
	Impacts on Navigation in area	3	3	4
	Links to existing planning policy	3	2	2
	Unweighted Average	3.00	2.33	2.67
5iii	**Provide opportunities for partnering/funding**			
	Meets stakeholder requirements and objectives	2	3	4
	Provides opportunities for development, both public and private	4	3	4
	Provides opportunities for public and private sector funding	3	3	4
	Unweighted Average	3.00	3.00	4.00
	Sub-total of Averages	**8.50**	**7.58**	**8.92**
	Total of Averages	30.58	32.58	**35.58**

Key	Category	Score
	HIGH --	1
	MEDIUM -	2
	LOW/NEUTRAL	3
	MEDIUM +	4
	HIGH ++	5

Appendix D - Preliminary Service Clash Review at First-Phase

Introduction

The data used to produce this analysis is based on a preliminary C2 asset search conducted by Zetica Limited in July 2015. C2 returns form asset owners are known to have a low level of accuracy. In order to increase confidence, and reduce the possibility of unknown clashes occurring during the constructions phase, more detailed survey would be recommended. This would include a full GPR survey of the site, with trial pits to validate the GPR survey. Further trial pits would be recommended in areas with a high density of services.

As part of the Oxford Flood Alleviation Scheme many options have been proposed. In order to further this to outline design stage, a services analysis has been conducted to identify those areas where a clash occurs between existing services and the proposed design. The extent of this project is fairly large and so has been split into numerous areas for ease of understanding.

For each proposed option to obtain a service clash a 5 metre 'buffer' was formed around the perimeter of the option and every intersection within the buffered area was noted.

Summary of preliminary service review at Area 2

For this area, there are four proposed options; 2A, 2B, 2C and 2D. The service clashes in this area consisted of National Grid – Electricity and High Voltage Electricity, with one surface water sewer clash with Options 2C and 2D. The total number of clashes for each option were as follows:

- Option 2A – 10 clashes
- Option 2B – 10 clashes
- Option 2C – 7 clashes
- Option 2D – 9 clashes

Many of the encounters were running parallel with the edge of the option boundary, with few running through the field area.

Summary of preliminary service review at Area 3

This area also has four proposed solutions: 3A, 3B, 3C and 3D. The service clashes in this area consisted of High Voltage Electricity, with a few National Grid – Electricity and one gas and surface water pipe (intersecting through all options). The total number of clashes were as follows:

- Option 3A – 11 clashes
- Option 3B – 11 clashes
- Option 3C – 10 clashes
- Option 3D – 10 clashes

This area had many services running through the field and all recorded clashes tend to go through all proposed options.

Summary of preliminary service review at Area 4

This area has three proposed solutions: 4A, 4B and 4C. This area encounters numerous existing services and is located nearby a railway line and a few pylons. Towards the Northern end of this site, there are a few clashes with services which are all High Voltage cables or National Grid – Electricity. Towards the centre and Southern side of the site there are multiple other services running including: clean water pipes, gas pipes, communication lines and water sewers.

There is a high density of services at both proposed crossings at Old Abingdon Road. A number of trial pits investigations will likely be required at these locations.

The total number of clashes were as follows:

- Option 4A – 25 Clashes
- Option 4B – 23 Clashes
- Option 4C – 28 Clashes

Summary of preliminary service review at Areas 5&6

These areas have been combined and three options have been proposed: 5A&6A, 5B&6B and 6C. The clashes in this area mainly consisted of the National grid electricity, with a few HV Electricity lines. The total number of clashes per option was as follows:

- Option 5/6A – 7 Clashes
- Option 5/6B – 11 Clashes
- Option 6C – 13 Clashes

This area had services running in multiple directions running both parallel and across the site.

Summary of preliminary service review at Area 7

This area also has four proposed solutions: 7A, 7B and 7C. The clashes in this area were from a variety of services, including High and Low voltage electricity, National Grid electricity, water pipes, gas pipes, communication lines and others. The total number of clashes per option were as follows:

- Option 7A – 14 Clashes
- Option 7B – 10 Clashes
- Option 7C – 6 Clashes

Appendix E - Proposed New Hinksey Defence

This document is entitled ‘IMSE500177-HGL-02-04-RE-C-000112-Proposed_New_Hinksey_Defence’

TECHNICAL MEMORANDUM

Oxford FAS: Proposed Raised Defence at New Hinksey

PREPARED FOR:	Environment Agency
COPY TO:	Chris Weeks, Zaid Omar, Andrew Brown
PREPARED BY:	Phil Marsh
DATE:	20 May 2016
PROJECT NUMBER:	661656 – Revision 2

1. Background

The Oxford Flood Alleviation Scheme (FAS) Project is developing an outline business case (OBC) for a preferred flood risk management option which will significantly reduce the frequency and extent of flooding through Oxford.

The previous Strategy and Initial Assessment stages of the scheme proposed a significant section of bypass channel through land on the right bank of the River Thames in the Kennington / Sandford area of Oxford. The general concept of this proposal was to help reduce water levels in the River Thames in the Munday's Bridge / A423 Bypass area of the Hinksey Stream.

Following the upgrading and recalibration of the fluvial model during the outline design process, it was found that the flood level reduction as a result of the new southern section of the scheme was not as great as originally anticipated. This resulted in a review of alternatives to try and provide additional flood risk reduction to the New Hinksey and Grandpont areas of Oxford.

2. Concept of Defence

2.1 Mechanism of Flooding to Abingdon Road

The initial mechanism of fluvial flooding to the New Hinksey area is from the River Thames and Weirs Mill Stream to the east. Flood water flows across the meadows and Cowmead allotments and onto Abingdon Road.

The review of the southern section of the originally proposed scheme highlighted that the northern section of the scheme, from Botley Road to Munday's Bridge reduced flood levels in the New Hinksey area. However due to the ground levels and hydraulic gradient in the flood plain, a further reduction was unlikely to be achievable with the size of additional channel which was practical and realistically achievable in the Sandford area.

The originally proposed works to Weirs Mill stream at the Initial Assessment stage was also designed to reduce the flood levels in this area, however practical difficulties in implementing many of the options proposed and a reduction in the scale anticipated benefits from works in this area meant that further alternatives were investigated.

The alternative to lowering the flood levels is to prevent flood water reaching properties using traditional raised defences to cut off fluvial flow routes. A review of the LiDAR levels for the area indicated that a raised defence between high ground in the area of the Four Pillars Hotel at the north end running south to tie into the raised Weirs Lane / Donnington Bridge Road could stop overland flows. It is anticipated this defence would need to be in the order of 1.2 to 1.5m high to prevent overtopping during the predicted 1% AEP event. Whilst the Initial Assessment indicated

there would be residual flood risk in some areas of New Hinksey area the raised defence option indicated that levels of reduced flood risk up to the 1% Annual Exceedance Event (AEP) could be achievable for fluvial flood risk.

2.2 Options

Following a series of model runs, a number of data gathering site visits and review of the LiDAR levels; three potential options for the raised defence were identified. These were:

- Option 1 – Adjacent to Abingdon Road
- Option 2 – Set back from road and through allotments
- Option 3 – Set back from road and around allotments

Each of the above alignment options are discussed in the following sections and the proposed alignments of each of the options is shown on Figure 1.

Figure 1 – Alignment of defence options.

3. Alignment Options

3.1 Option 1 – Adjacent to Abingdon Road

This option would the involve the installation of an embankment from the area of high ground close to the Four Pillars Hotel running west to Abingdon Road. The raised defence would then take the form of a wall replacing the fence and railings along the boundary of Abingdon Road to the southern side of the Cowmead Allotments. The defence would then run east and then south around the residential properties in the Chatham Road area to tie into the elevated B4495 Weirs Lane.

This option has the benefit of the least land take and maintaining as much of the existing flood plain as possible. The wall could run along the edge of the pavement on Abingdon Road to avoid the large number of services which run below the pavement area. However there are also some services within the verge along with a significant number of mature trees which would need to be removed, this would significantly change the landscape character of the area.

Flood gates would be required for the access points along this section of road including the allotments, stables, sportsground and Thames Water pumping station. This would introduce an operational and maintenance requirement and a potential weak spot in the defence. This would also inconvenience landowners with access restrictions when gates are closed during flood warning periods but flood water is not present.

Construction would be from Abingdon Road and would require the pavement to be closed during construction to facilitate a working area, some sections of temporary traffic lights would be required to allow deliveries and some operations to take place. This would create significant disruption for users of Abingdon Road during construction period. Protection to the service would also have to be provided due to the additional loading from construction plant on the pavement area.

Photograph 1 – View along Abingdon Road showing trees which would be lost with Option 1.

3.2 Option 2 – Set Back From Road and Through Allotments

This option considers moving the defence back from Abingdon Road closer the River Thames. It would still run from near the Four Pillars hotel to Weirs Lane. In this option it is proposed to run an embankment from the hotel area south across the paddocks just to the west of the field boundary to the east side of the sports ground.

The defence would then run around the allotment area back to Old Abingdon Road. This follows the alignment of the proposed smaller short term defence proposed by Oxford City Council around the allotments. A flood gate would still be required at the entrance to the allotments as there is insufficient space to install a ramp. The use of an embankment rather than all walls would also help reduce costs by utilising site won alluvium generated from the channel construction.

South of the allotments, the defence would take the same alignment as Option 1 down to Weirs lane.

This option removes the sports ground from the fluvial flood plain. However it creates simpler earth defence which is more cost effective to construct and simple to maintain. Whilst the construction process would be disruptive to the tenants of the horse paddocks the general disruption on Abingdon Road would be significantly reduced over Option 1.

The footprint of the embankment would be in the order of 10m wide which would create an area of landtake within the paddocks as it is preferable to fence off the defence to prevent grazing by horses which can damage the integrity of the earth defence. There are also a line of mature trees along the boundary which it is desirable to retain so the embankment would need to be moved away from the tree root zones to avoid the risk of damage to the root systems.

Figure 2 below shows the 1% AEP flood outlines for this option.

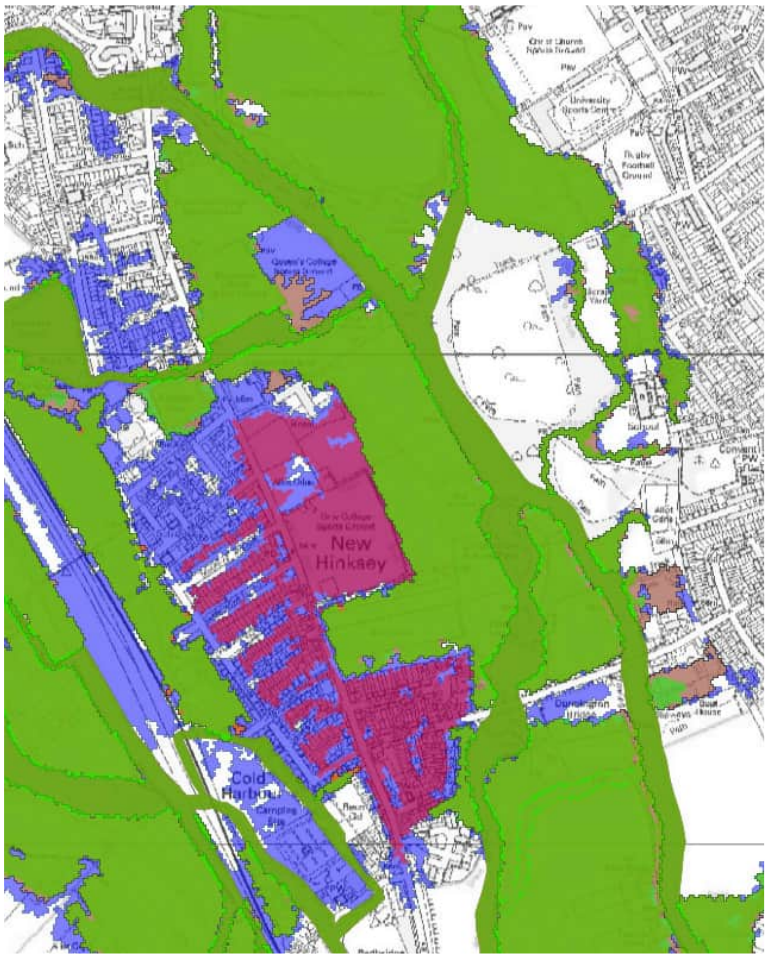


Figure 2 – I% AEP event predicted flood outline, blue area is flood at Do-Minimum, purple is residual flooding with Southern Channel works in Sandford, Green with New Hinksey defence Option 2 . The brown areas on this image indicate the areas of benefit from the option of a new channel across Hinksey Meadows SSSI (Option 7C in the January consultation exercise).

Photograph 2 – Cowmead Allotments boundary fence, looking along alignment route of defence on southern side of allotments.

3.3 Option 3 – Set Back From Road Around Allotments

This option is predominantly the same as Option 2 for the majority of the length of the defence but would pass directly to the east of the Cowmead Allotments. This would put the allotments on the dry side of the defence and remove from the fluvial flood plain.

This reduces some area of existing flood plain however it avoids the need for a flood gate and creates a completely passive defence which significantly reduces operational risks. It is also shorter than the other options so reduces both construction and maintenance costs.

The drainage ditch at the eastern edge of the allotments will need to remain and be maintained to ensure drainage in the allotments is unaffected by the new defence.

Figure 3 overleaf shows the 1% AEP flood outlines for this option.

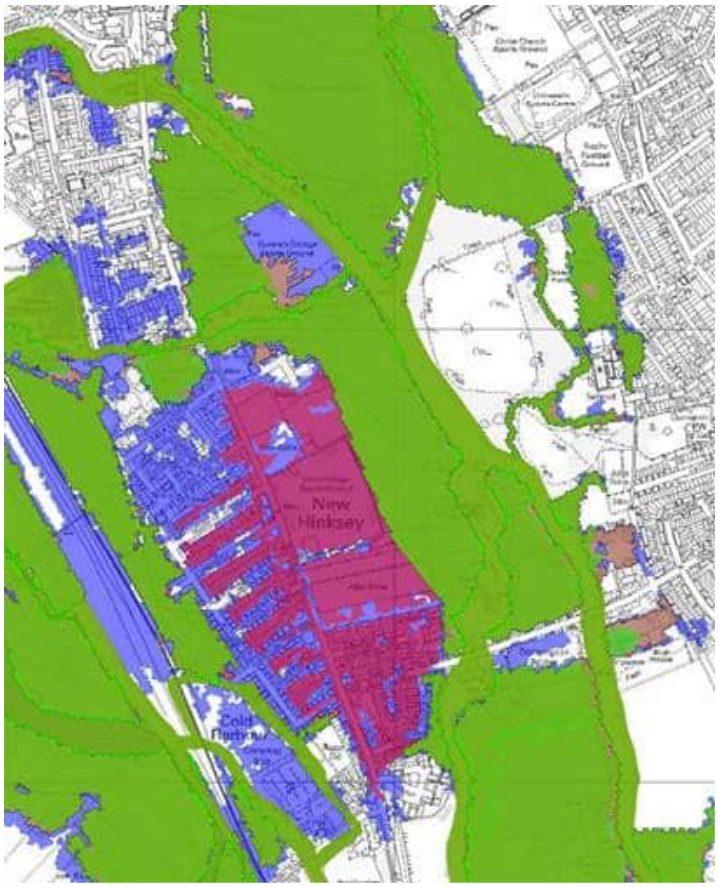


Figure 3 – I% AEP event predicted flood outline, blue area is flood at Do-Minimum, purple is residual flooding with Southern Channel works in Sandford, Green with New Hinksey defence Option 3. The brown areas on this image indicate the areas of benefit from the option of a new channel across Hinksey Meadows SSSI (Option 7C in the January consultation exercise).

Photograph 3 – Location of northern end of embankment behind the Four Pillars Hotel.

4. Options Assessment

4.1 Review

The table overleaf summarises the benefits and disadvantages of each of the options to determine the preferred alignment option. The ticks below each of the review boxes indicates the preferred option for that particular category.

Category	Option 1 – Adjacent to Abingdon Road	Option 2 - Set back from road and through allotments	Option 3 - Set back from road and around allotments
Flood defence and drainage (all defences provide a similar level of protection) Preferred Option	Whilst the wall would provide a robust defence the need for flood gates reduces the robustness of the defence and introduces an operational requirement which equates to potential weak spots. No space to use ramps in place of flood gates. Limited space to deal with seepage which could cause uplift on the footpath along the road. The drainage in the meadows would be unaffected by this option.	This option reduces the number of flood gates and uses a passive defence set back from the road. However the area around the allotments retains a flood gate. Some buffer included to help manage seepage and surface water in the area.	The set back along this route provides a buffer to accommodate any seepage below the defence before it impacts on the road or properties. This may also help manage low levels of surface water. A full depth cut off under the embankment is not desirable as this will impede normal groundwater flows so some leakage is expected. Drainage to the allotments will need to be modified through the defences. Passive defence with no flood gates. ✓
Links to policies Preferred Option	This option retains as much of the existing designated floodplain as possible. However due to the high visual impacts, see below, this option may also be controversial from a planning aspect ✓	This option helps to retain a larger area of the existing flood plain but retains the allotments within the flooded area. It also reduces the visual on the trees and access points along Abingdon Road.	This option places the flood defence closer to the river and therefore reduces the area of active flood plain. The modelling completed to date indicates that the overall scheme, which these defences are one component, have an overall benefit to flood risk reduction in Oxford with no adverse impacts. Land defended will be classified as Flood Zone 3.
Health, Safety and Security Preferred Option	Numerous known services alongside the road. This is an EA RAG List RED item. Flood gates have a long term maintenance liability and safety risk around not being closed when required. The majority of this option will be subject to working adjacent and on the highway. The pavement will need to be closed during the work. People plant interface will be very restricted and will directly impact on the H&S risk to operatives. This is a busy road and there will be a high public interface which increases risk. Security for the allotments and sports ground will need to be retained by use of a security fences on top of the wall to bring ensure the same level of security.	This option is similar to Option 1 along the section past the allotments and therefore has similar H&S issues. Security will need to be maintained along the allotments section however in other areas the existing field boundaries could be retained to maintain security between meadows.	This option is a passive defence with much more limited maintenance requirements, no operational requirements as there are no flood gates. There are small number of services the embankment will need to cross including a large gas main, however these are crossed perpendicular so have a reduced risk compared to those in Option 1. Reduced public interface especially along Abingdon Road will avoid a lot of risk in this area. No need for traffic management on Abingdon Road. More available space to ensure people plant interface can be adequately segregated and managed. This option has no impact on security along Abingdon Road ✓
Buildability Preferred Option	This option alongside Abingdon Road will require closure of the footpath during construction which will create disruption for Abingdon Road users. Construction methodology will be restricted due to space constraints. Single way traffic working on Abingdon Road may be required for periods to allow space for delivery of materials during construction. Protection will need to be provided to services below the pavement. The Thames Water pumping station will be impacted by this alignment. Access to the allotments and sports ground will be restricted during construction.	This option will significantly reduce disruption on Abingdon Road although there will still be impacts during the construction of works alongside the allotments. Maintaining access to allotments will be difficult during construction in this area.	This option is located in the meadows away from Abingdon Road. Construction is relatively straightforward with good access for plant. No requirement for traffic management on Abingdon Road. Limited disruption other than additional traffic for deliveries of embankment materials. There will be disruption to the grazing activities in the meadows during construction and it may be necessary provide some alternative grazing due to the construction activity upsetting the horses. There are small number of services which need to be protected in the Meadows during construction. ✓
Environment Preferred Option	This option has the highest carbon footprint for the implementation phase of the scheme. The loss of the trees along Abingdon Road is also a loss of habitat along the edge of the urban environment. It would not be possible to replant the trees in this location to long term root damage to the defence.	This option will significantly reduce the impact on trees along Abingdon Road. The need for the walls and flood gate at the allotments will increase the carbon footprint over that of Option 3.	As the material is won locally for the majority of this option, this has the smallest carbon footprint of the options. By setting the defence line back from tree lines it will be possible to minimise the removal of trees and hedges to less than the other options. However this will increase landtake from horse grazing. ✓
Landscape Preferred Option	This option would have a major impact on the trees alongside Abingdon Road. Given its high profile location a high quality of finish would be required to the wall. Flood gates tend to have an industrial appearance which would not be in keeping with the area. Being close to the road this option is also the most likely to suffer from vandalism.	This option would require the loss of a number of trees along the southern side of the allotments which act as a screen to the adjacent houses. The embankment along the fields is set back from the road and not generally visible close up. It could be blended into the fields to reduce the visual impact.	There will be some loss of isolated trees and hedges where the embankment crosses field boundaries but these are smaller areas than in other options. The grass embankment can be fitted into the landscape with limited visual impact. This option has the largest footprint and hence landtake of all options, ramps will need the provided for horse access between the fields. ✓
Cost Preferred Option	Based on published standard rate per metre of flood defence, walls are more expensive to construct than earth embankment defences. The need for several ramps or flood gates will further increase the construction and maintenance costs.	This option will be cheaper to construction than option 1 as there is less wall but more expensive than Option 3 due to the need for the wall and flood gate for the allotment area.	The use of material excavated from the channel works will keep both construction and maintenance costs down. Although this route has the highest land compensation costs it is the shortest and its passive operation will result in this option having the lowest Whole Life Cost. ✓

5. Preferred Option

5.1 Wider Considerations

Whilst the focus of this review has been on the fluvial flood risk reduction to the New Hinksey area, there are a number of other considerations which need to be reviewed before taking forward the preferred option.

No Phase 1 habitat survey has been undertaken in the areas covered by this note, these are planned to be completed shortly and the options will need review once this is completed to ensure that any environmental constraints or impacts are dealt with appropriately.

Upon completion of the modelling exercise to confirm the flood risk benefits, other areas were reviewed to ensure that there were no areas of additional flood risk created elsewhere as a result of the proposed defence.

The flood map outlines in Figures 2 and 3 and a review of the predicted flood levels indicate that no additional areas are put at additional flood risk.

The velocities and levels were also reviewed on Weirs Mill Stream to ensure that no increase in flood levels or velocities was created over the existing situation for any given flood which could create problems for the residential boat moorings in this area. No increases were identified in this area.

The levels of predicted flooding and durations for flooding in the area of the Hinksey SSSI were also reviewed and no changes for a given event were predicted by the model.

This is due to the proposed channel reducing the flows and levels in the New Hinksey area which compensates for the additional reduction in flood plain crated by the proposed defence.

The design of the embankment will require careful consideration in relation to seepage and the need for a partial cut off to reduce seepage to an acceptable rate whilst minimising impacts on overall groundwater movement.

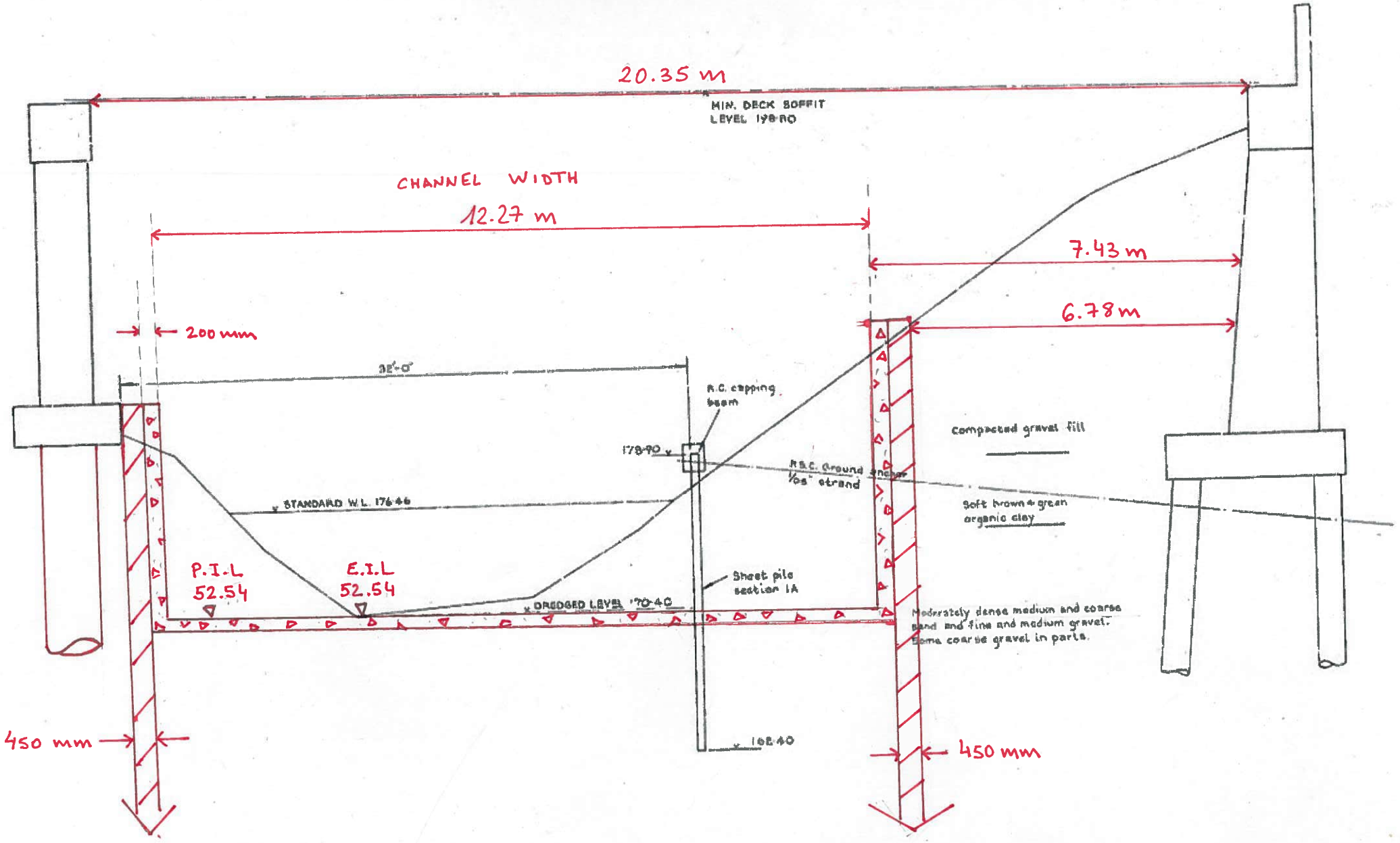
It should also be noted that additional drainage works may also be required to try and reduce groundwater flooding which will not be reduced by the implementation of the embankment.

5.2 Recommendation

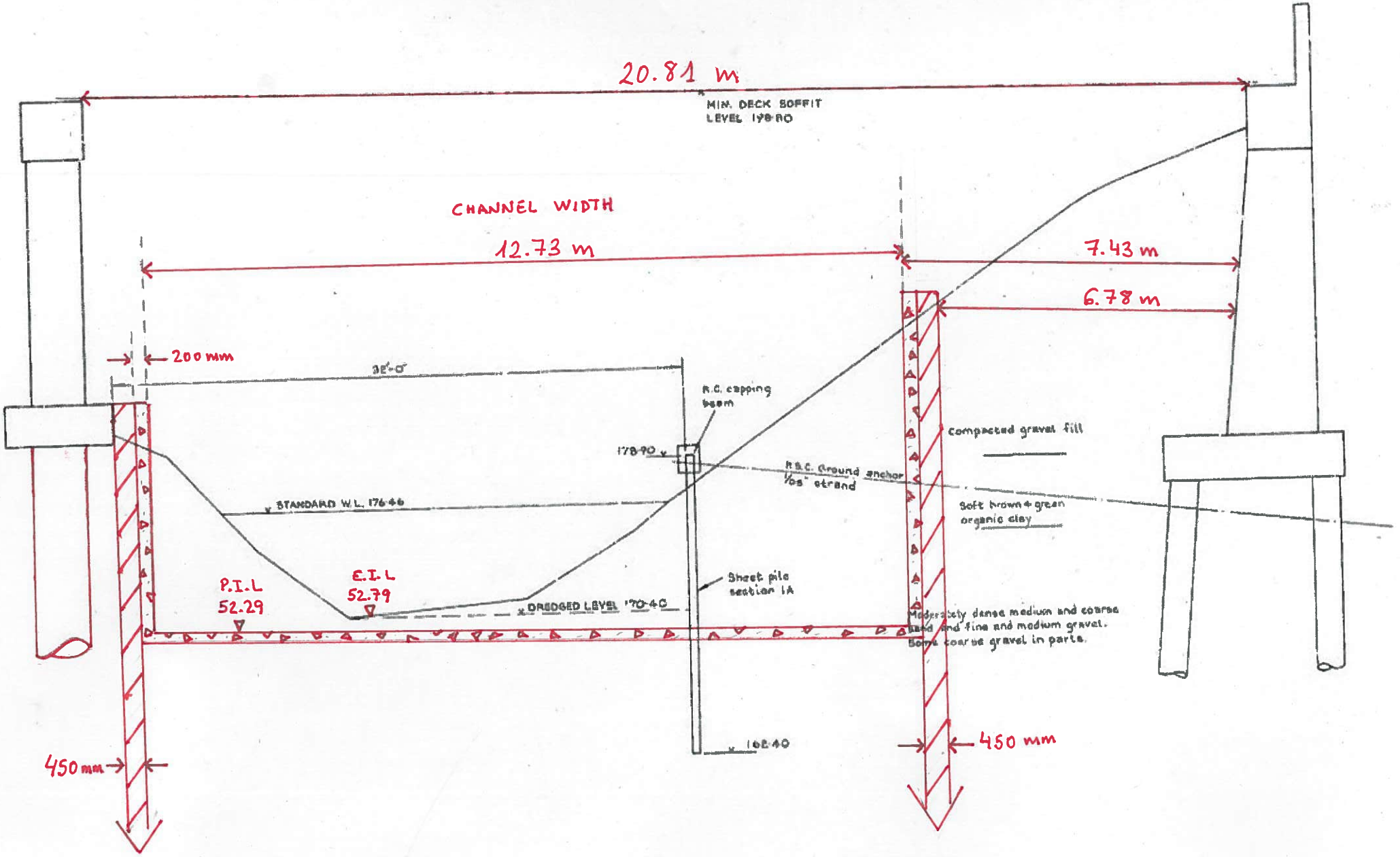
Based on the modeling undertaken and the discussions in this technical note and the scoring in Section 4, it is recommended that Option 3 is taken forward as part of the outline design for the Outline Business Case Document. This will be reviewed again once the Phase 1 habitat survey has been carried out in the area. Option 3 provides additional fluvial flood risk benefits for the New Hinksey area whilst keeping down visual impacts. It also maximises the ease of construction and minimum maintenance costs and uses surplus site won material from other parts of the scheme to keep down the carbon footprint of the overall scheme.

Appendix F - Sketches for the Proposed Channels Modifications at the A423 Railway Bridge

EASTERN SIDE



WESTERN SIDE



Appendix G - Score Matrix for Second-Phase Appraisal

Appendix G

FINAL

OXFORD FLOOD ALLEVIATION SCHEME
SECOND-PHASE SCORING MATRIX

OBJECTIVES	OPTION 4A	OPTION 4B	OPTION 5A	OPTION 5B
	Small channel on its own	Small channel with raised defences	Medium channel on its own	Medium channel with raised defences
ECONOMIC OBJECTIVES				
Reduce the risk of floods impacting on infrastructure				
Keeps strategic roads open, Abingdon Rd and Botley Rd (£Benefits in £M)	3	3	4	5
Average	3.00	3.00	4.00	5.00
Reduce the risk of flooding to commercial properties				
Number of commercial properties taken out of very high risk (1:10)	3	4	4	5
Number of commercial properties taken out of high risk (1:20)	2	4	3	5
Number of commercial properties taken out of insurance benchmark (1:75)	2	4	3	5
Average	2.33	4.00	3.33	5.00
Maximise Net Present Value				
Net Present Value	2	3	4	5
Average	2.00	3.00	4.00	5.00
SOCIAL (FLOOD RISK) OBJECTIVES				
Reduce the risk of flooding to residential properties				
Number of residential properties taken out of very high risk (1:10)	2	5	5	5
Number of residential properties taken out of high risk (1:20)	2	3	4	5
Number of residential properties taken out of insurance benchmark (1:75)	2	3	4	5
Average	2.00	3.67	4.33	5.00
Total scores of Averages	9.33	13.67	15.67	**20.00**

Key	Category	Score
	HIGH --	1
	MEDIUM -	2
	LOW/NEUTRAL	3
	MEDIUM +	4
	HIGH ++	5