

A Shared Vision for a Natural Floodplain

Feasibility Study: A Summary of the Options

1. Do nothing
2. Maintain according to obligations
3. Full repair of embankments
- 4a. Removal of all embankments
- 4b. Removal of embankments at Lynchat
- 4c. Removal of embankments at Lynchat, Dell, Insh & Coull
5. Increased breaching of embankments
6. Removal of bank protection
7. In channel restoration measures on tributaries
8. Channel realignment/re-meandering on tributaries
9. Reinstatement of stream diversions
- 10a. Block internal ditches
- 10b. Reduce connectivity between the main drain & Loch Insh

Planning for the Future

In 2016, RSPB Insh Marshes commissioned a feasibility study to look at restoration options for the future to ensure the sustainability of Insh Marshes, not only as an important site for flora and fauna but by continuing to offer flood protection.

The report examined the impact of different options for restoring the marshes to a more naturally functioning river and floodplain system. This was done by interpreting flood models of varying frequency and intensity, based on topographical and hydrological information from Insh Marshes and previous flood events. More information on these models can be found on the following page.

The rest of this document contains a brief description of each option followed by a summary of the potential changes expected for management, ecological features and flood risks, along with our conclusions.

None of the options presented would prevent the River Spey from flooding. However, as you will discover in this summary, some options offer benefits to the functionality of the floodplain and allow the marsh to help buffer predicted outcomes of climate change, whilst others had multiple negative impacts.

The options we are considering to incorporate in future projects, following feedback from stakeholders such as SEPA and Nature Scot, are marked with an asterisk ‘*’.




You can find more information on how we will proceed, once a option has been chosen, in the last few pages of this document.

Legend

Flood risk

- ✓ Positive change
- ✗ Negative change
- Change is uncertain (due to circumstances of the option or location)

Ecology and maintenance

-  Positive change
-  Negative change
-  Change is uncertain (due to circumstances of the option or location)

Sections

A. Ruthven North	E. Invertromie	I. Insh fen	M. Lynchat east
B. Ruthven South	F. Dell Farm	J. Coull Fen	N. Balavil south
C. Gordonhall west	G. Dell west	K. Lynchat cementary	O. Balavil North
D. Gordonhall east	H. Dell east	L. Lynchat west	

The Flood Models

The **baseline models** show us how water will move through the floodplain during various potential flood events in 2028 when no actions are undertaken. Potential impacts of **climate change** are also incorporated.

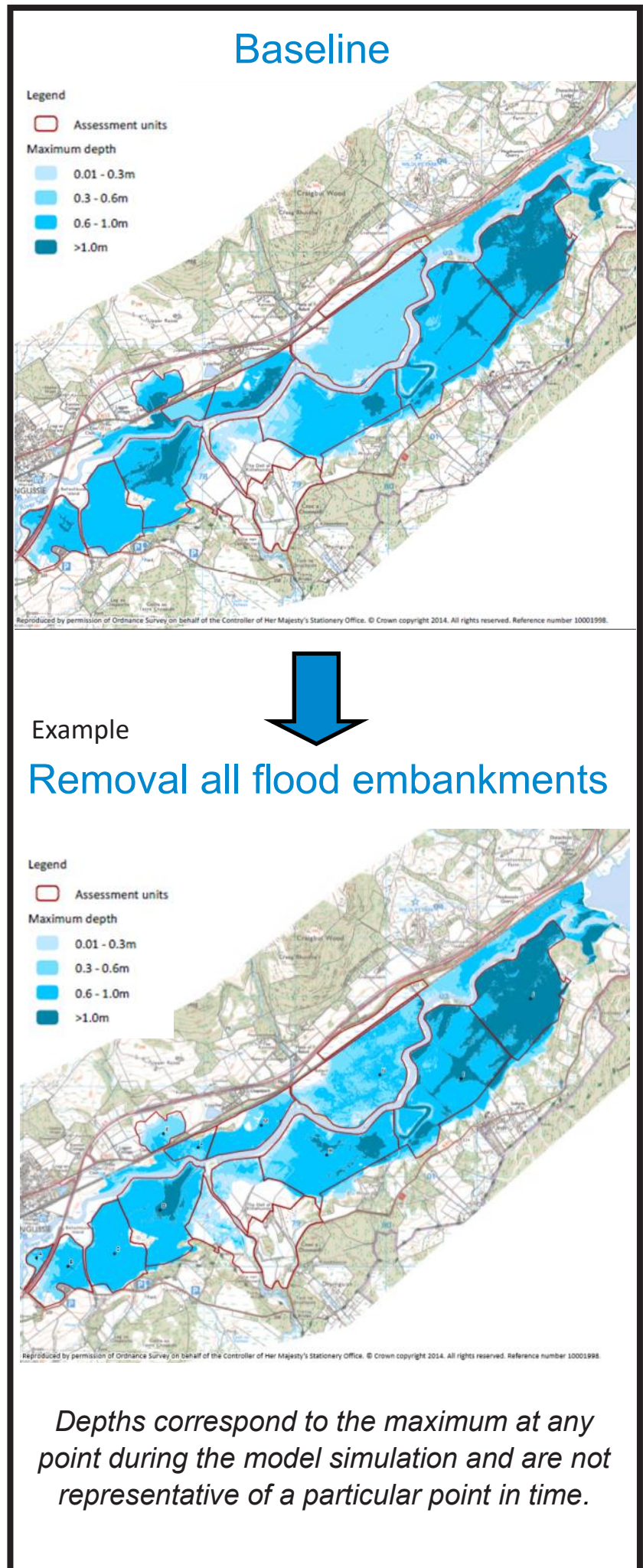
The models are then adjusted to provide us with information on the **impact of proposed options** on flow directions, flood frequency, depth and duration in each compartment within the reserve.

This information is crucial to **evaluate future management requirements**, the impacts on important **ecological features** and **flood risk**.

Frequent flood events, like the one shown on the right, occurring on average once every two years, are relevant to assess changes in channel morphology and impacts on important ecological features.

More extreme flood events, occurring on average once every 200 years, have been assessed to evaluate changes in flood risk to land adjacent to the marshes and downstream.

The **interpretation** of the models results in a combination of positive, negative and uncertain changes throughout the reserve for each option. **Let us have a look!.....**



Option 1: Do Nothing

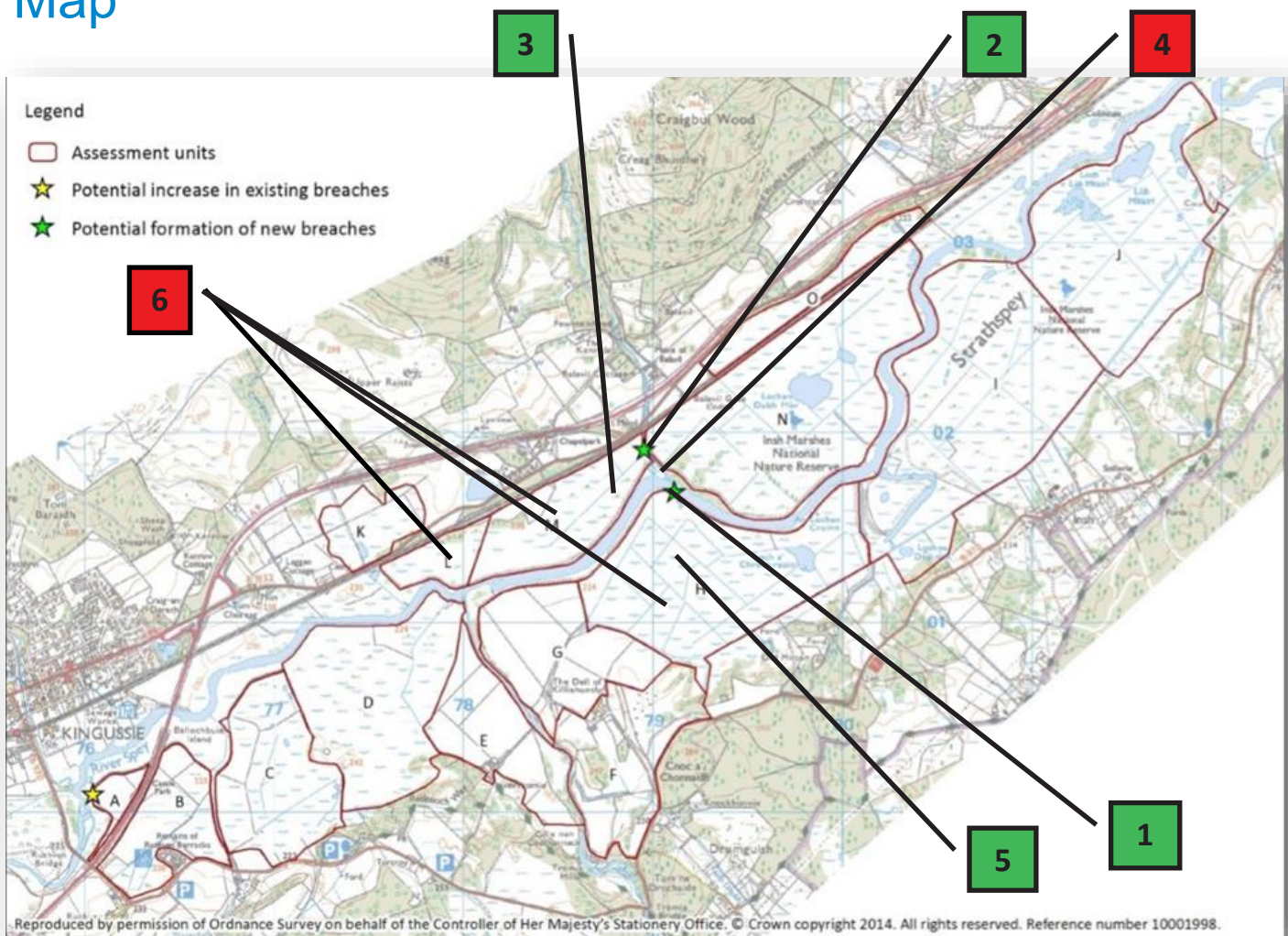
Description

No maintenance and no new work would take place on Insh marshes to alter how it functions. Natural processes of erosion and deposition in the River Spey and its tributaries will continue. More specifically, this would result in tributaries like the River Tromie and Raitts Burn to spill onto the floodplain in low flood levels over their current embankments due to sediment deposition. It is likely that some new breaches will appear in the current embankments.

Hydrological changes

Some areas of the marsh will flood more frequently through new breaches. On the other hand, other areas will have a reduced flood duration and depth due to an increase in the size of current breaches.

Map



Ecology and maintenance

1. More breaches will be created in the current embankments. These will change how water flows through the marshes, altering habitats and species diversity. With increased flooding it is expected that wader and duck numbers will increase.
2. Raitts Burn will develop into a more natural river channel creating new floodplain waterbodies and frequently flooded zones.
3. As Raitts Burn breaches, there will be more water on the floodplain at Lynchat east. This will increase fen communities and possibly attract more waders, ducks, water rail & spotted crake.
4. An uncontrolled breach of Raitts Burn could have a short term negative impact on fish habitats and fish passage from the River Spey into the burn.
5. A breach at the Dell may lead to a slight increase in wader and duck numbers
6. Willow will continue to develop on areas of the marsh that are drier, negatively impacting the special habitats & species that are protected on the site. Where floodwater drains more quickly, through extended breaches, willow will establish beyond the point where it can not effectively be managed.

Flood risk

- o Negligible change in flow or flood levels expected next to the marshes or downstream.
- o There is a potential risk to the stability of the railway from upstream incision of the riverbed, after an uncontrolled breach of Raitts Burn.
- o An uncontrolled breach of Raitts Burn could reduce or prevent access to Balavil and Lynchat.
- o If the bed of Raitts Burn is lowered, due to breaching or it changing its course, flood and erosion risk to the railway may be reduced.

Our conclusion

Uncontrolled changes on Insh Marshes could occur very quickly during flood conditions. There might also be unexpected changes and potential loss of the characteristic habitats and species which make Insh Marshes special. We also see signs on site that suggest these changes are likely to be more pronounced than assumed in the feasibility study.

This option is not favourable due to increasing habitat management costs and the risk of unpredictable changes. With funding available we would like to explore other options offering more opportunities for Insh Marshes and the surrounding communities.

Option 2: Maintain According to Obligations

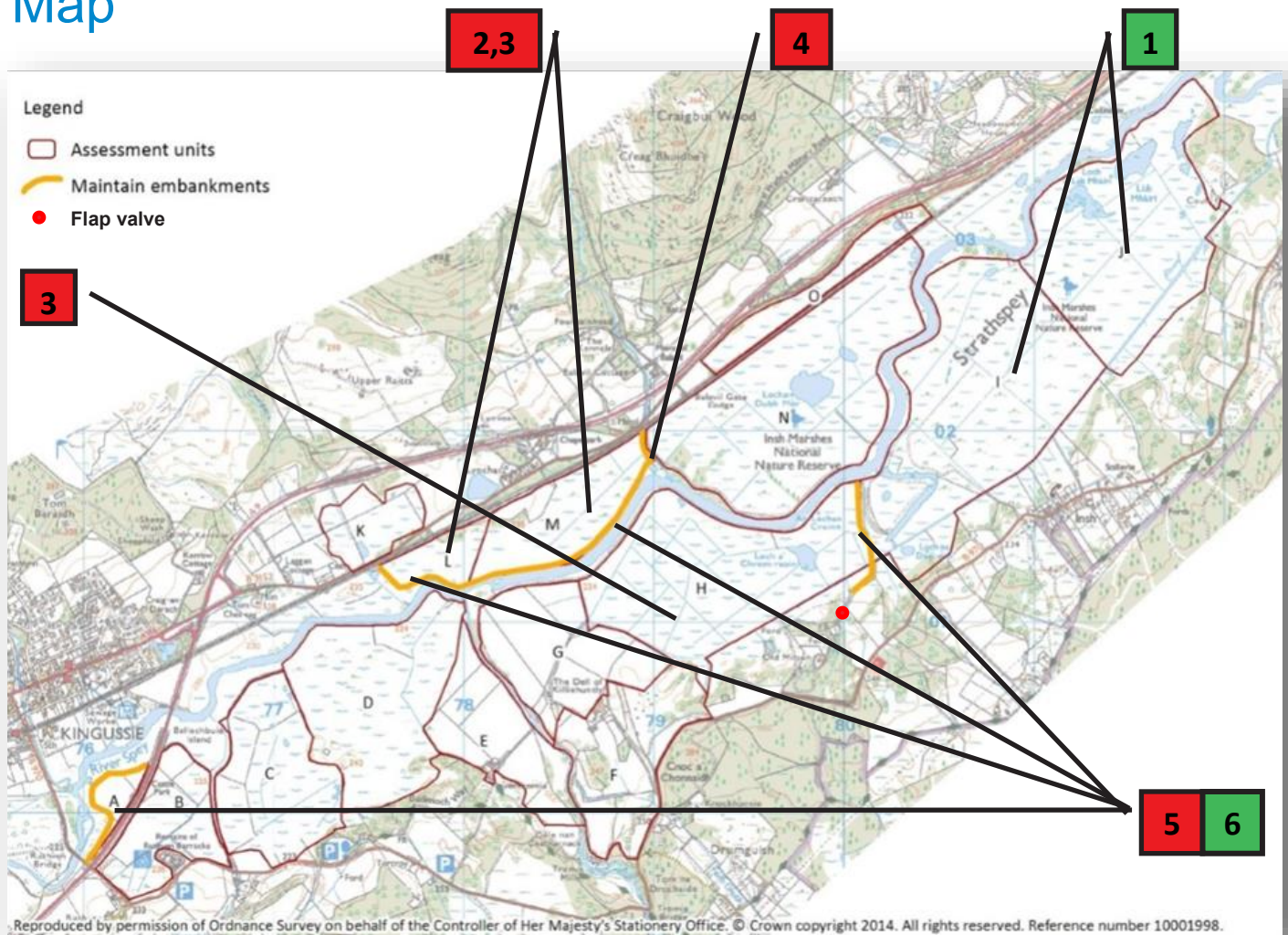
Description

River embankments, and some internal embankments, will be maintained to meet current obligations. Repairs to existing breaches and a reinstatement of the Main Drain flap valve would be required. This flap valve prevents water from flowing into Dell from Insh fen (Unit I) during flood conditions.

Hydrological changes

With these measures, areas with functioning embankments will become significantly drier with less frequent flooding, whilst the duration of floods would increase since water will be trapped behind the embankments. Some areas close to Loch Insh will have an increase in flood depth due to water backing up from Loch Insh.

Map



Ecology and maintenance

1. A slight increase in flooding is possible around the edge of these compartments due to increased flooding depth. This could benefit waders and ducks.
2. The hydrological regime in these areas becomes less suitable for the special habitats and species, which are protected on the site. Wetland fen habitats would succeed to drier grasslands and unsuitable conditions for rare species such as cowbane and water sedge would develop.
3. Increased maintenance and cost to clear vegetation, such as willow. This could increase to the point where it cannot be managed by the existing staff resource.
4. Ongoing management on Raitts Burn embankments required, involving erosion protection works.
5. Increased cost and need for maintenance of embankments.
6. Increased access for habitat maintenance.

Flood risk

- It is still possible that a breach will cause bank instability where the railway crosses Raitts Burn.
- Access to private fishing could be prevented or reduced due to breaches in the embankment on Raitts Burn.
- Small increase in flood levels in 1 in 200 year flood upstream of Raitts Burn / Balavil (section N), but slight reduction downstream.
- Small decrease in flood levels and peak flow during 1 in 200 year flood at Kin-craig.

Our conclusion

This option offers no solution to underlying issues such as sedimentation and erosion processes. Changes on Insh Marshes could occur very quickly during flood conditions. In addition, there might be unexpected changes resulting in the loss of the characteristic habitats and species which make Insh Marshes special.

Although this is the current management, it is not sustainable due to the predicted increase in habitat management and embankment maintenance costs. With funding available we would like to explore other options which offer better opportunities for Insh Marshes and the surrounding communities.

Option 3: Full repair of embankments

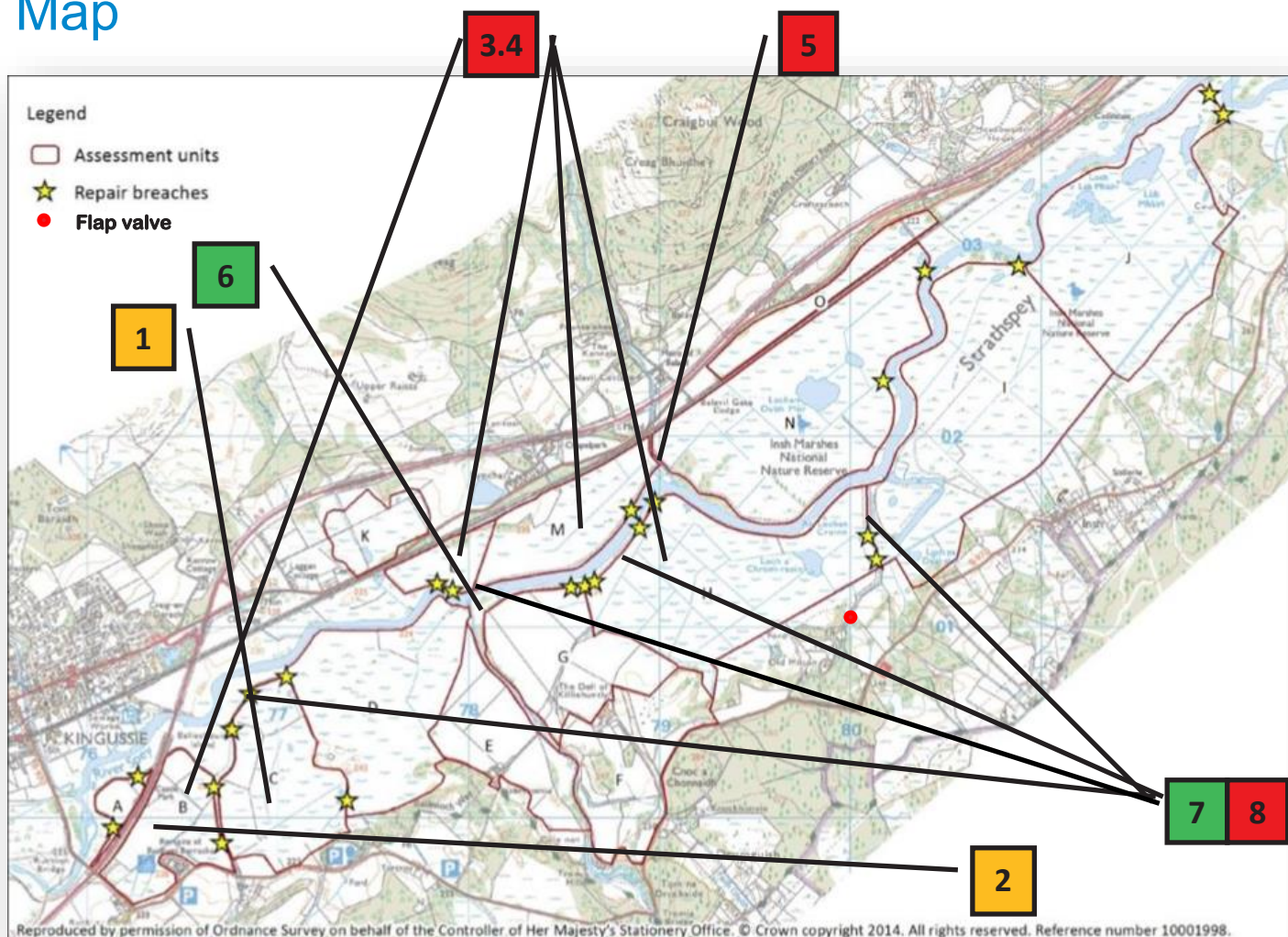
Description

A reinstatement of the embankments through the repair of all existing breaches. This would include repairing the breaches on embankments along the tributaries. Also the flap valve on the main drain between Dell east (Unit H) and Insh fen (Unit I) would be reinstated.

Hydrological changes

Water will be contained in the River Spey channel during flood events, only spilling onto the floodplain if levels cause water to overtop the embankments. This will convey water downstream faster, past the marshes, resulting in resulting in drier conditions. If water does overspill during a large flood event, it will be trapped on the marsh and drain slowly. As a consequence, the marshes will be unable to provide as much water storage during repeated flood events.

Map



Ecology and maintenance

1. Drier conditions might result in a slight increase in lapwing numbers, but a decrease in Snipe numbers.
2. Slight decrease in wader species due to reduction in flood frequency.
3. The hydrological regime in these areas becomes less suitable for the special habitats and species which are protected on the site. The wetland habitats would succumb to drier grasslands. Some protected species such as lapwing and skylark could benefit from these drier conditions.
4. Increased maintenance and cost to clear vegetation, such as willow. This will increase to the point where it cannot be managed by current RSPB staff resource.
5. Ongoing management on Raitts Burn embankments required, involving erosion protection works.
6. Potential benefit to alder woodland if channel dynamics and deposition increase at this location
7. Access maintained and improved with embankments all in place.
8. Increased cost and maintenance of embankments, likely to increase further over time with predicted climate change.

Flood risk

- ✓ Slight decrease in flood levels and peak flow during 1 in 200 year flood (<0.1m) at Kinncraig.
- × Potential increase flood levels and flood risk in 1 in 200 year flood upstream of Balavil/Raitts Burn (N) (0.1 - 0.2m), but slight reduction downstream.
- × Increase in flood levels and flood risk adjacent to marshes in 1 in 2 year flood.
- It is still possible that a breach will cause bank instability where the railway crosses Raitts burn.
- Access to private fishing could be prevented or reduced due to breaches in the embankment on Raitts Burn.

Our conclusion

While this option would provide more access, the overall impact on protected habitats and wildlife are negative. The flooding data shows a potential negative impact on surrounding communities on the upper half of the floodplain, and its therefore undesirable as an option to be taken forwards.

This option was included for comparison purposes only. Repairing the embankments is considered unaffordable and unsustainable. It will cause further negative impacts on protected wildlife and on flood risk to parts of the surrounding area.

Option 4a: Full removal of all embankments

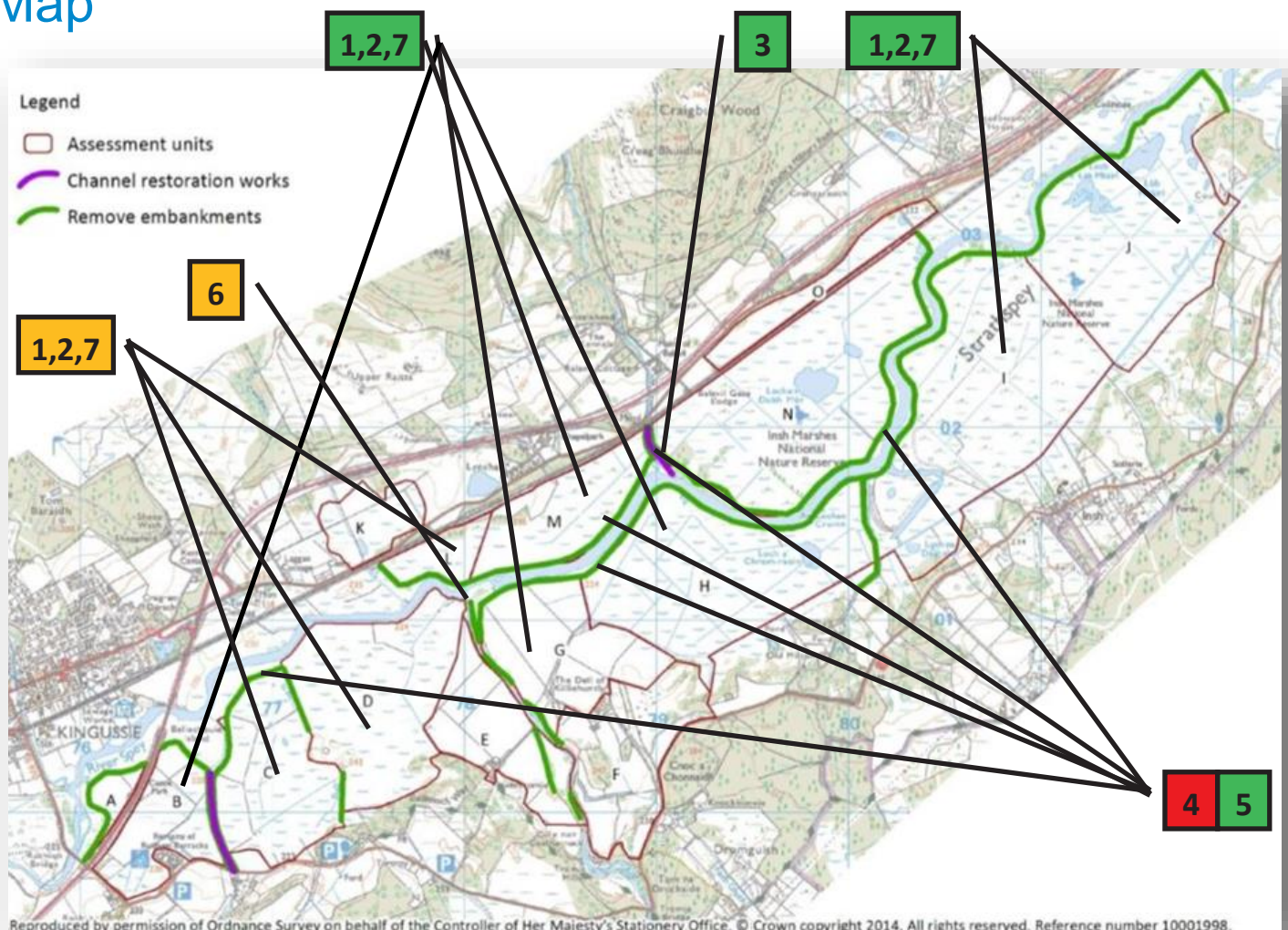
Description

All embankments lowered to a level which is similar to the ground behind them, simulating a natural levee, including the embankments along River Tromie, Ruthven Burn & Raitts Burn. The river beds of both Raitts and Ruthven Burns would be lowered and regraded, with the possibility of needing realignment as they are currently above the level of the floodplain.

Hydrological changes

During higher flow events in the catchment, water will flood onto the marshes more regularly than currently in most areas. This would provide capacity for water storage and improve wetland habitats. In high flood events, the marshes will flood and water will move through the system, returning to the River Spey & Loch Insh as river levels drop.

Map



Ecology and maintenance

1. With varying certainty, there is a significant increase in the area and quality of the wetland habitats expected across these compartments, as well as an increase in numbers for waders and ducks. Some areas would also provide more habitat for birds such as water rail and spotted crakes on Lynchat (Units L & M). Rare plants such as cowbane and water sedge could also benefit.
2. Reduced habitat management required to clear vegetation succession like willow scrub to retain special habitats.
3. Returning Raitts Burn to a more natural channel presents potential benefits for fish species and other aquatic organisms.
4. Access could be reduced or prevented due to lack of embankments unless mitigation is employed.
5. Reduced need for maintenance of embankments.
6. Potential benefit to alder woodland if channel dynamics and deposition increase at this location.
7. A better connection between the river channel and the floodplain will increase the likelihood of the formation of new pools or frequently flooded areas on the floodplain, benefitting pioneer species and successional processes.

Flood risk

- ✓ Reduced flood levels and flood risk in 1 in 2 year flood on land adjacent to the marshes.
- ✓ Potential reduced flood risk from reduction in flood levels in 1 in 200 year flood (by 0.1m to 0.5m) adjacent to the marshes.
- ✓ Flood and erosion risk to railway may be reduced in moderate flood events.
- Minor increase in flood levels for a 1 in 200 year flood (<0.1m) at Kincaig and potential increased flood risk to local receptors. Small increase in peak flows.

Our conclusion

This option would provide more habitats for specialist wetland species, making the reserve more suitable for a variety of wildlife. It offers positive benefits for upstream receptors but this needs to be considered against the minor impacts downstream.

This option offers many benefits for habitat improvement and flood risk management. However, it requires a large input of funding which is currently unavailable. To start with, we would prefer to pursue an option where changes can be assessed and monitored more thoroughly.

Option 4b: Removal of embankments at Lynchat*

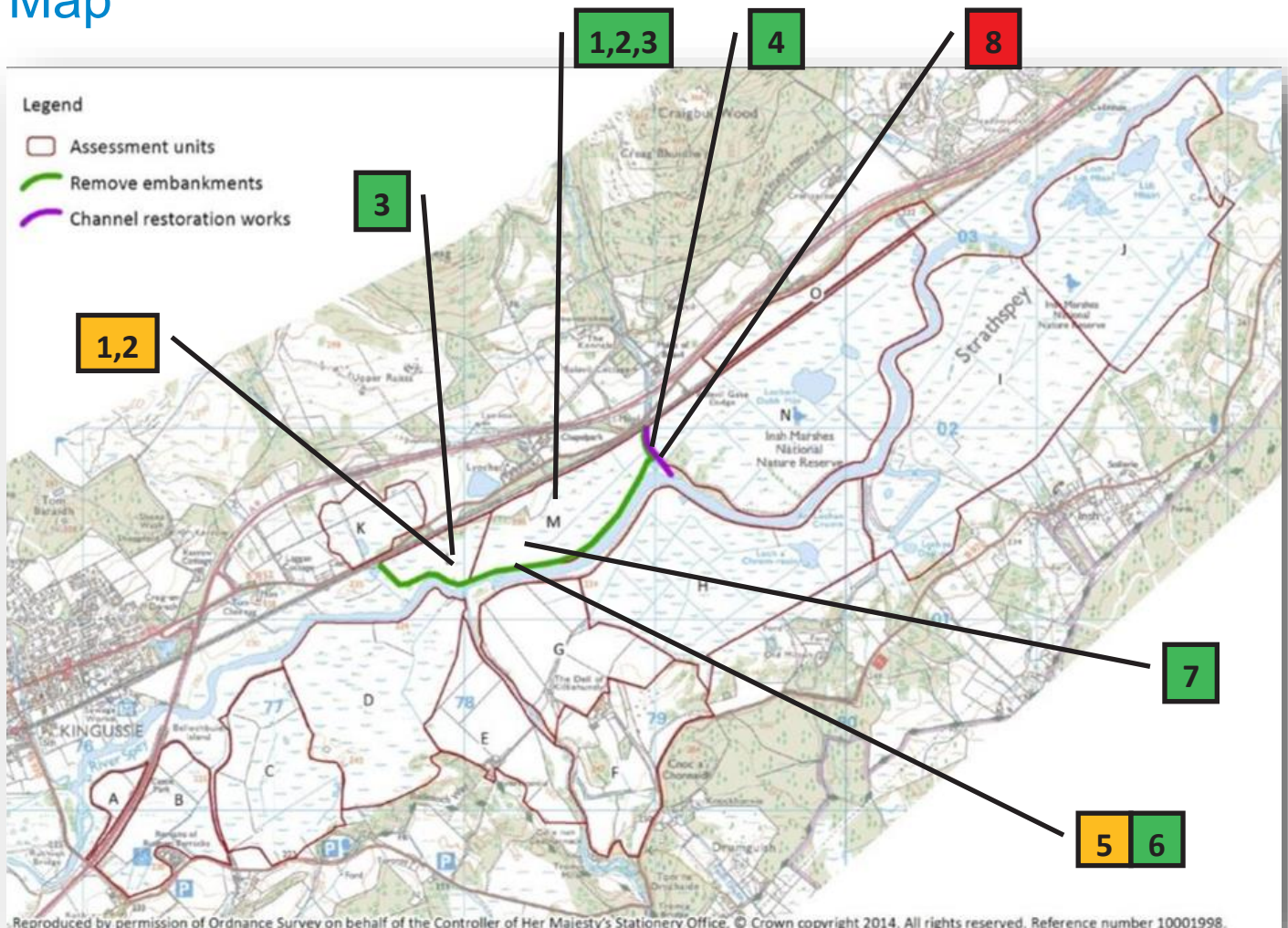
Description

With this option, the Lynchat embankment would be lowered to a level similar to the ground along the River Spey, simulating a natural levee. There would also be work on Raitts Burn to lower and re-grade the river bed, as it currently sits above the level of the floodplain (known as perched) due to historical modifications.

Hydrological changes

Water will flow into Insh Marshes at specific points more regularly, while slightly reducing flood depth and extent in the compartments upstream of the bank removal.

Map



Ecology and maintenance

1. An increase in valuable wetland habitats is expected as drier grasslands will develop into to fen and swamp communities.
2. A likely increase of wader and duck numbers as well as water rail and spotted crane.
3. Reduced habitat management required to clear vegetation succession like willow scrub to retain special habitats.
4. Returning Raitts Burn to a more natural channel presents potential benefits for fish species and other aquatic organisms such as the protected fresh water pearl mussel.
5. Access could be reduced or prevented due to lack of embankments.
6. Reduced need for maintenance of embankments.
7. A better connection between the river channel and the floodplain will increase the likelihood of the formation of new pools or frequently flooded areas on the floodplain, benefitting pioneer species and successional processes
8. Access Balavil is prevented or reduced, but could be improved if left hand embankment along Raitts Burn is retained and protected from erosion.

Flood risk

- ✓ Reduced flood levels and flood risk in 1 in 2 year flood on land adjacent to the marshes.
- ✓ Potential reduced flood risk from reduction in flood levels in 1 in 200 year flood (by 0.1m to 0.2m) adjacent to the marshes.
- ✓ Flood and erosion risk to railway may be reduced at moderate flood events.
- Minor increase in flood levels and flood risk in 1 in 200 year flood (<0.1m) at KinCraig and local receptors.

Our conclusion

This option would provide more suitable habitats for the protected wetland species that make Insh Marshes special. It offers positive benefit for upstream receptors but this needs to be considered against the minor impacts downstream.

Bank removal is considered at this scale as it offers potential benefits for wildlife without increasing flood risks to adjacent land. It is also possible to carry out this work and monitor the changes carefully with funding that is currently available. Further work will be required to assess flood risk before this option can be taken forward.

Option 4c: Removal of embankments at Lynchat, Dell, Insh & Coull

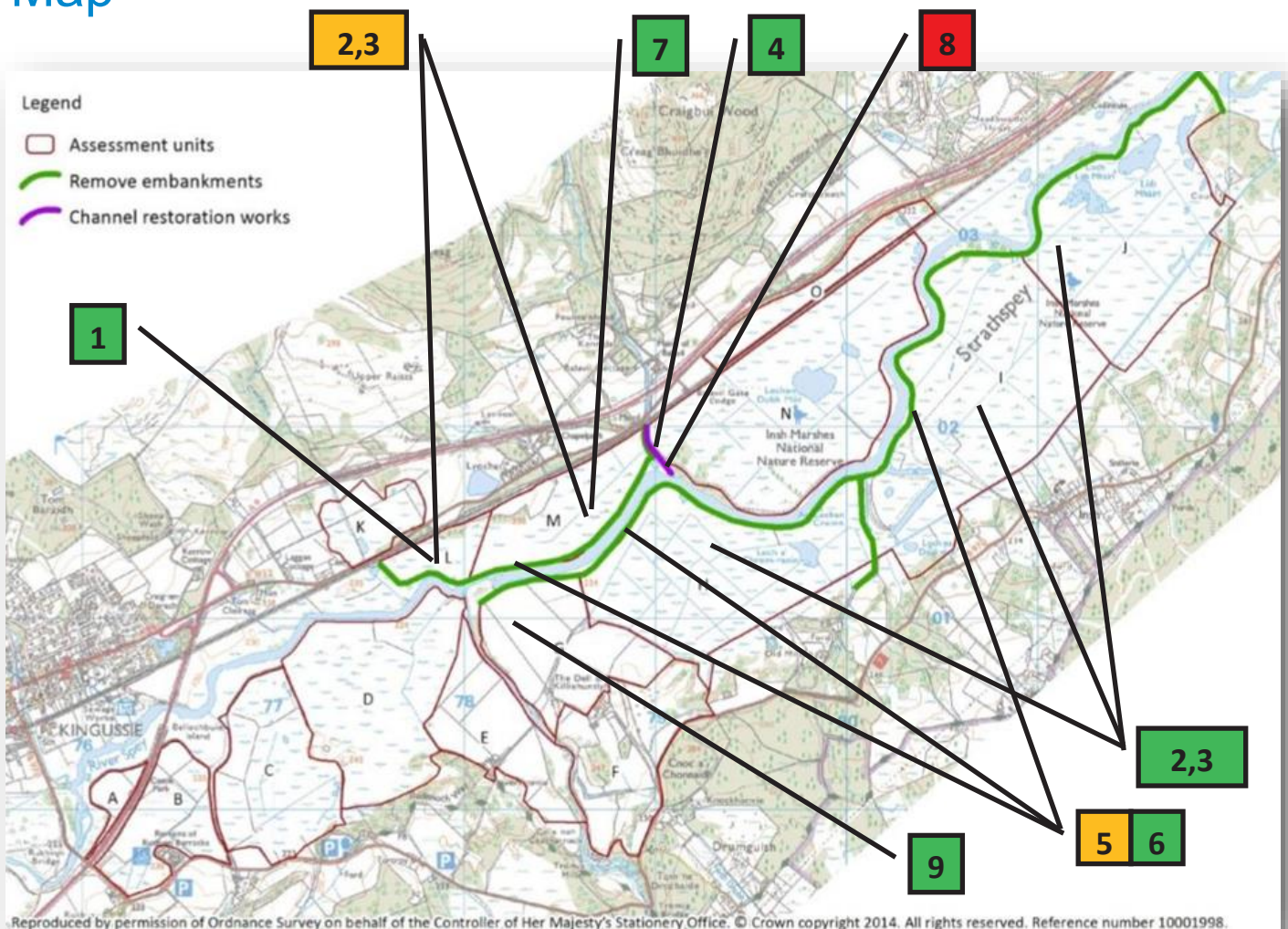
Description

These embankments will be lowered to a level similar to the ground behind along the River Spey, including those along Raitts Burn and internal embankments between Dell East (Unit H), Insh Fen (Unit I) and Coull Fen (Unit J). There would also be work on Raitts Burn to lower the river beds as it currently sits above the level of the floodplain (known as perched).

Hydrological changes

During higher flow events in the catchment, water will flood onto the marshes more regularly than currently, providing capacity for water storage. Some areas located more upstream of Insh Marshes will have a reduced flooding depth and extent.

Map



Ecology and maintenance

1. An increase in valuable wetland habitats is expected as drier grasslands will develop into fen and swamp communities. This will also provide opportunities for cowbane and water sedge.
2. A likely to increase of wader and duck numbers as well as water rail and spotted crane on Lynchat (Units L & M).
3. Reduced habitat management required to clear vegetation succession like willow scrub to retain special habitats.
4. Returning Raitts Burn to a more natural channel presents potential benefits for fish species and other aquatic organisms such as the protected fresh water pearl mussel.
5. Access could be reduced or prevented due to lack of embankments.
6. Reduced need for maintenance of embankments.
7. A better connection between the river channel and the floodplain will increase the likelihood of the formation of new pools or frequently flooded areas on the floodplain, benefitting pioneer species and successional processes.
8. Access to Balavil is prevented or reduced, but could be improved if left embankment along Raitts burn is retained and protected from erosion.
9. Slight increase in wader numbers.

Flood risk

- ✓ Reduced flood levels and reduced flood risk to adjacent land in 1 in 2 year flood.
- ✓ Potential reduced flood risk and reduction in flood levels in 1 in 200 year flood (by 0.1m - 0.5m)
- ✓ Flood and erosion risk to railway may be reduced in moderate flood events
- Minor increase in flood levels and flood risk in 1 in 200 year flood (<0.1m) at Kincaig and local receptors. Negligible increase at peak flows.

Our conclusion

This option would provide more habitats for protected wetland species that make Insh Marshes special. It offers positive benefits for upstream receptors but this needs to be considered against the minor impacts downstream.

This option offers many benefits for habitat improvement and flood risk management. However, it requires a large input of funding which is currently unavailable. To start with, we would prefer to pursue an option where changes can be monitored more thoroughly.

Option 5: Increased breaching of embankments

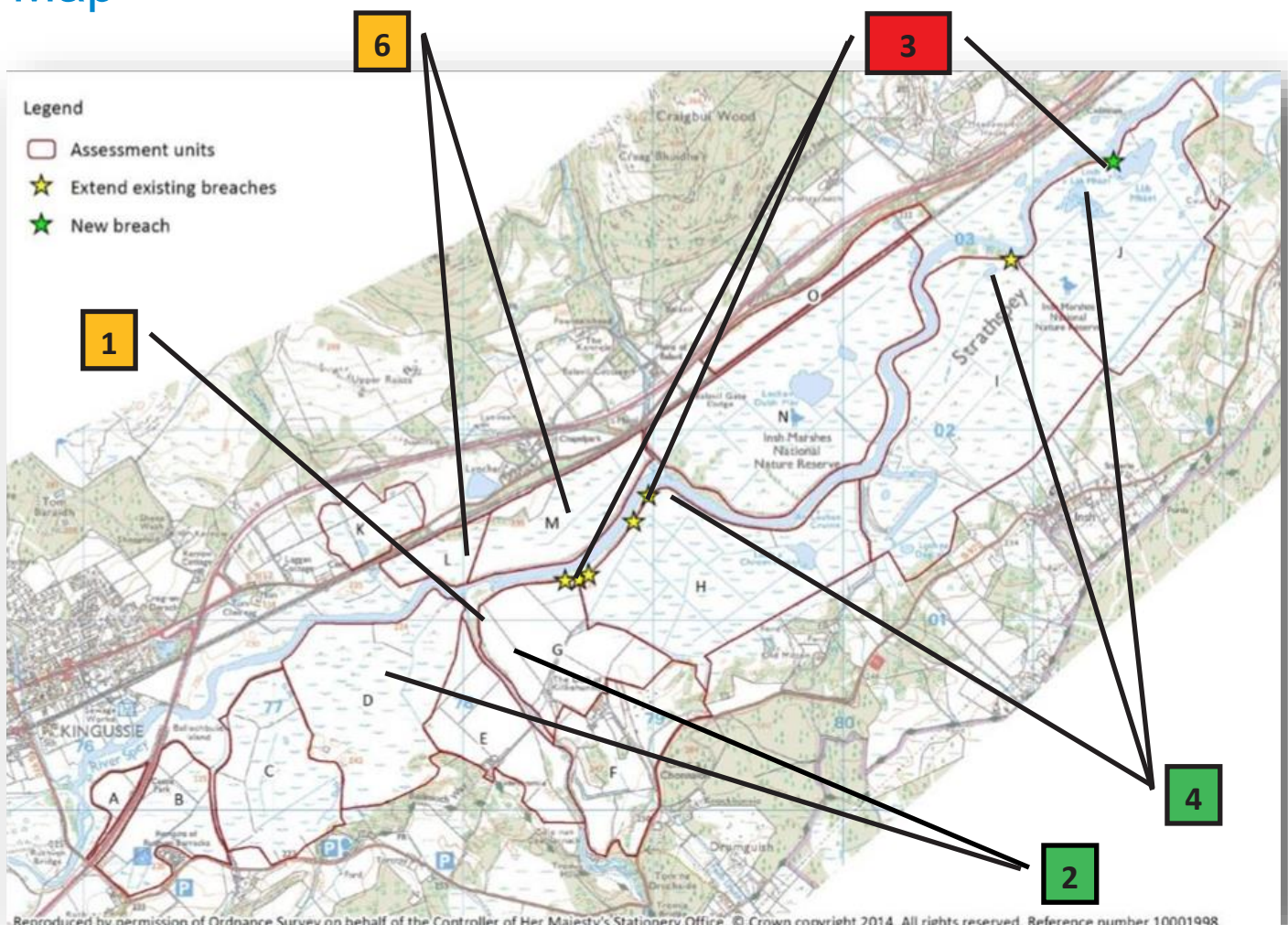
Description

As a considerably less costly alternative to removing all the embankments, some of the current breaches in embankments would be extended to at least 50 metres in length and new breaches created to provide more connectivity between the river and the floodplain.

Hydrological changes

During higher water events, areas with breaches will flood more regularly than they do at the moment improving the wetland habitats at those points. Most of this flood water will drain back slowly in to the River Spey and Loch Insh as their water levels fall. Areas without breaches will have a reduced flood depth and/or frequency.

Map



Ecology and maintenance

1. Potential benefit to alder woodland at the mouth of the River Tromie if channel dynamics and deposition increase at this location.
2. Slight increase in waders in on Invertromie Fen (Unit D) and Dell west (Unit H) with increased flooding.
3. Reduced access at the locations of the breaches .
4. Potential benefit to existing floodplain lochans from increased connectivity with adjacent watercourses and floodplain conveyance.
5. A better connection between the river channel and the floodplain will increase the likelihood of the formation of new pools or frequently flooded areas on the floodplain, benefitting pioneer species and successional processes.
6. A similar level of scrub maintenance will need to be maintained.

Flood risk

- ✓ Reduced flood levels and flood risk in 1 in 2 year flood on land adjacent to the marshes.
- ✓ Potential reduced flood risk from reduction in flood levels in 1 in 200 year flood (<0.1m) adjacent to the marshes.
- Minor increase in flood levels and flood risk in 1 in 200 year flood (<0.1m) at Kincaig and local receptors. No change in peak flow.

Our conclusion

Impacts on protected wildlife and species are mixed and depend strongly on the locations of the breaches.

This is not a preferred option for the floodplain as a whole. There are similar levels of maintenance as for the existing conditions and predicted benefits for protected habitats and wildlife are limited.

Option 6: Remove bank protection*

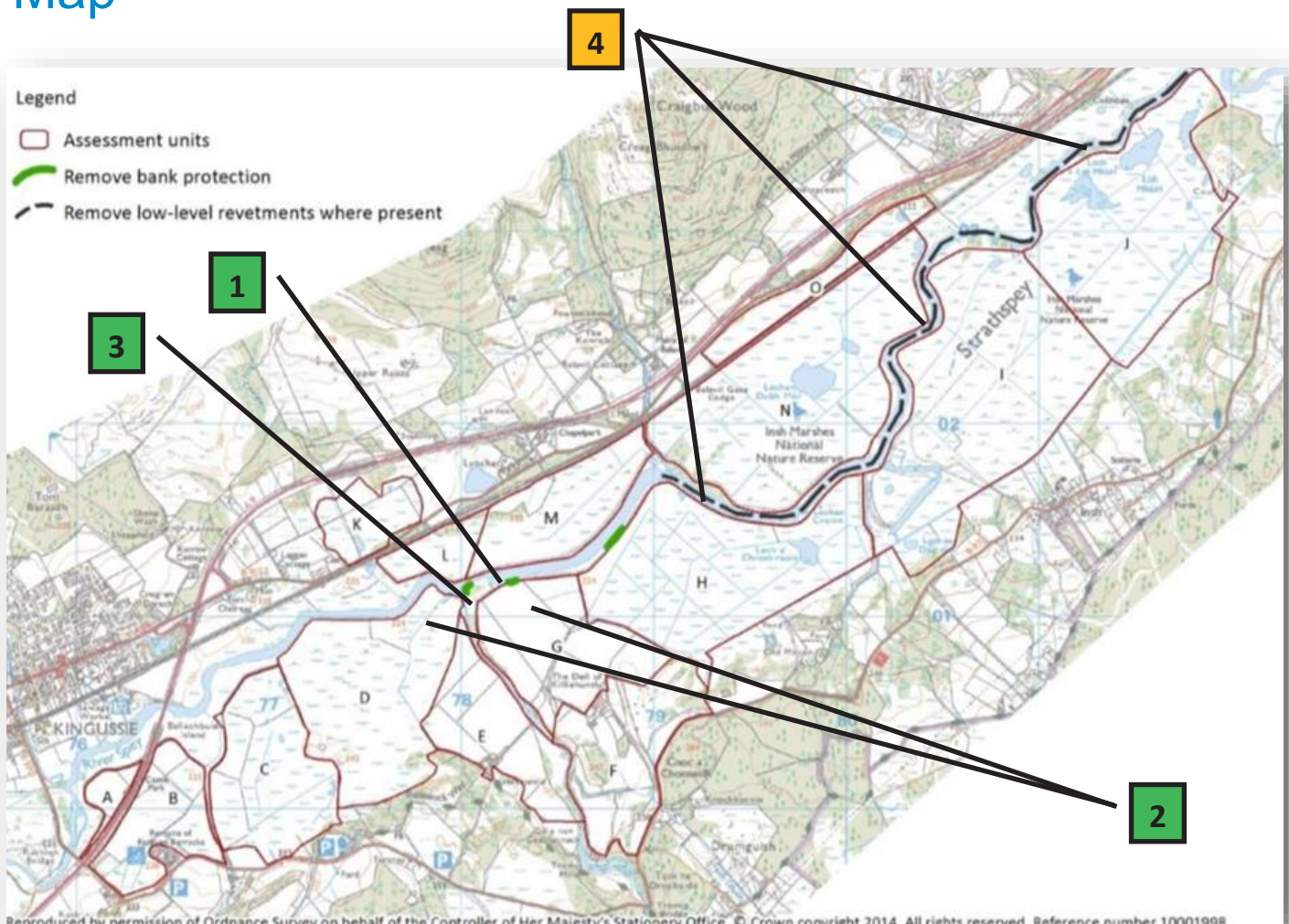
Description

The bank protection on the Spey, at the mouth of the River Tromie, would be removed along with the revetments, below average water level, on the River Spey. Removal of the bank protection at the A9 embankment is not included in this option. The hydrological changes and flood risk of this option were not modelled.

Hydrological changes

Removal of these structures will allow an increase in the rivers natural processes of erosion and deposition. Due to the low water energy, the potential for change is low over the short term (10 years) but over the longer term could allow the river to change shape and course. This could create new flooded areas on the floodplain and over a longer time period, allow the tributaries and river to change course.

Map



Ecology and maintenance

1. Increased bank erosion and channel change on the River Tromie at its confluence with the River Spey.
2. A better connection between the river channel and the floodplain will increase the likelihood of the formation of new pools or frequently flooded areas on the floodplain, benefitting pioneer species and successional processes.
3. Potential benefit to alder woodland if channel dynamics and deposition increase at this location.
4. Reduced access is possible if embankments breach at different points, but the location of breaches can be controlled by selective removal.

Flood risk

- Change only expected if additional breaches occur, then similar to option 5.

Our conclusion

The potential benefits at the Tromie confluence are significant as it allows the river to behave in a more natural way. Flood risk changes are unlikely to occur since there is a slow flow on this section of the Spey.

Part of this option is likely to be considered in conjunction with other options. It is likely that removal of some in-bank protection works could provide substantial local benefits to protected habitats and wildlife and does not present additional risks. Furthermore, the costs are within the scope of current funding.

Option 7: In-channel restoration measures on tributaries *

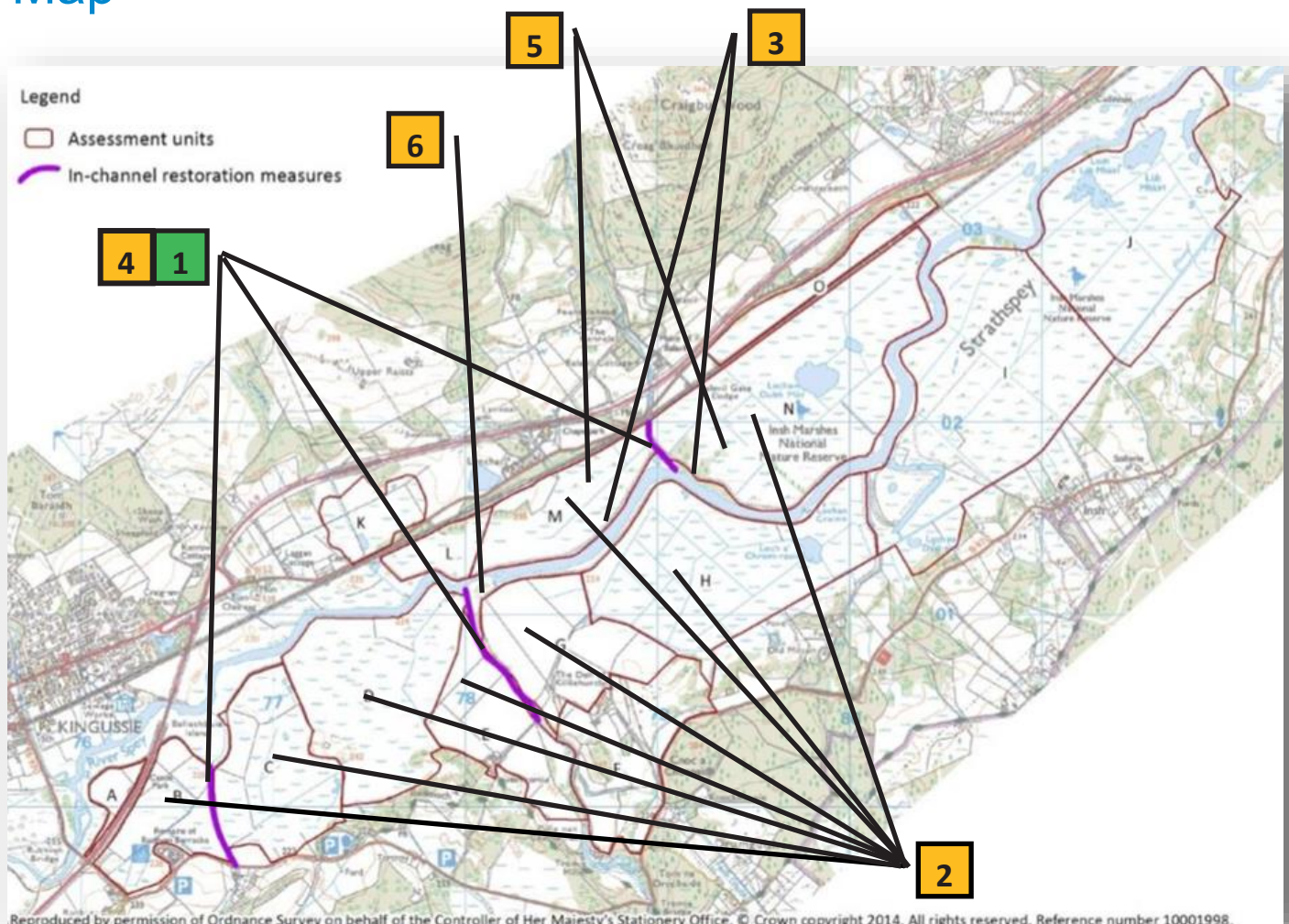
Description

Woody material or boulders would be placed in tributary channels (Ruthven Burn, River Tromie & Raitts Burn) to deflect flow and promote natural river processes in these straightened channels. There would be no work on the embankments surrounding these channels.

Hydrological changes

Woody material/boulders are likely to change the river flow patterns causing deposition of sediment, pools, and riffles. Depending on placement, the in-channel works could cause new breaches to develop in embankments. Depending on the location, different sections of the floodplain will experience a moderate increase in flood frequency, depth and duration.

Map



Ecology and maintenance

1. Potential benefit for fish species, including salmon, freshwater pearl mussel and other aquatic organisms from improved morphological forms and processes.
2. Potential increase in wader and duck numbers. The habitat for water rail and spotted crane could also increase depending on where breaches occur.
3. Access could be prevented or reduced at Balavil South (Unit N) or Lynchat East (Unit M) depending on where breach occurs on Raitts Burn.
4. A better connection between the river channel and the floodplain will increase the likelihood of the formation of new pools or frequently flooded areas on the floodplain, benefitting pioneer species and successional processes.
5. Change in habitat for Balavil South (Unit N) or Lynchat East (Unit M) due to sediment deposition.
6. Potential benefit to alder woodland at the mouth of the River Tromie if there are changes in the river and deposition.

Flood risk

- ✓ No or negligible change in flow or flood levels expected next to the marshes or downstream.
- ✓ Reduced flood risk to railway if Raitts Burn embankments breach.
- Uncontrolled breach of Raitts Burn could cause upstream incision causing instability to the railway crossing the burn.

Our conclusion

Even though local changes could be unpredictable, the impact on flood risks is low and this option offers significant benefits for protected habitats and wildlife, in both the aquatic and terrestrial environments. There would be a limited initial cost and ongoing maintenance.

We are interested in exploring this option for the various tributaries and might consider implementing these measures in conjunction with other options. To reduce risks on infrastructure, we would prefer a more active approach for Raitts Burn.

Option 8: Channel realignment/ Re-meandering on tributaries*

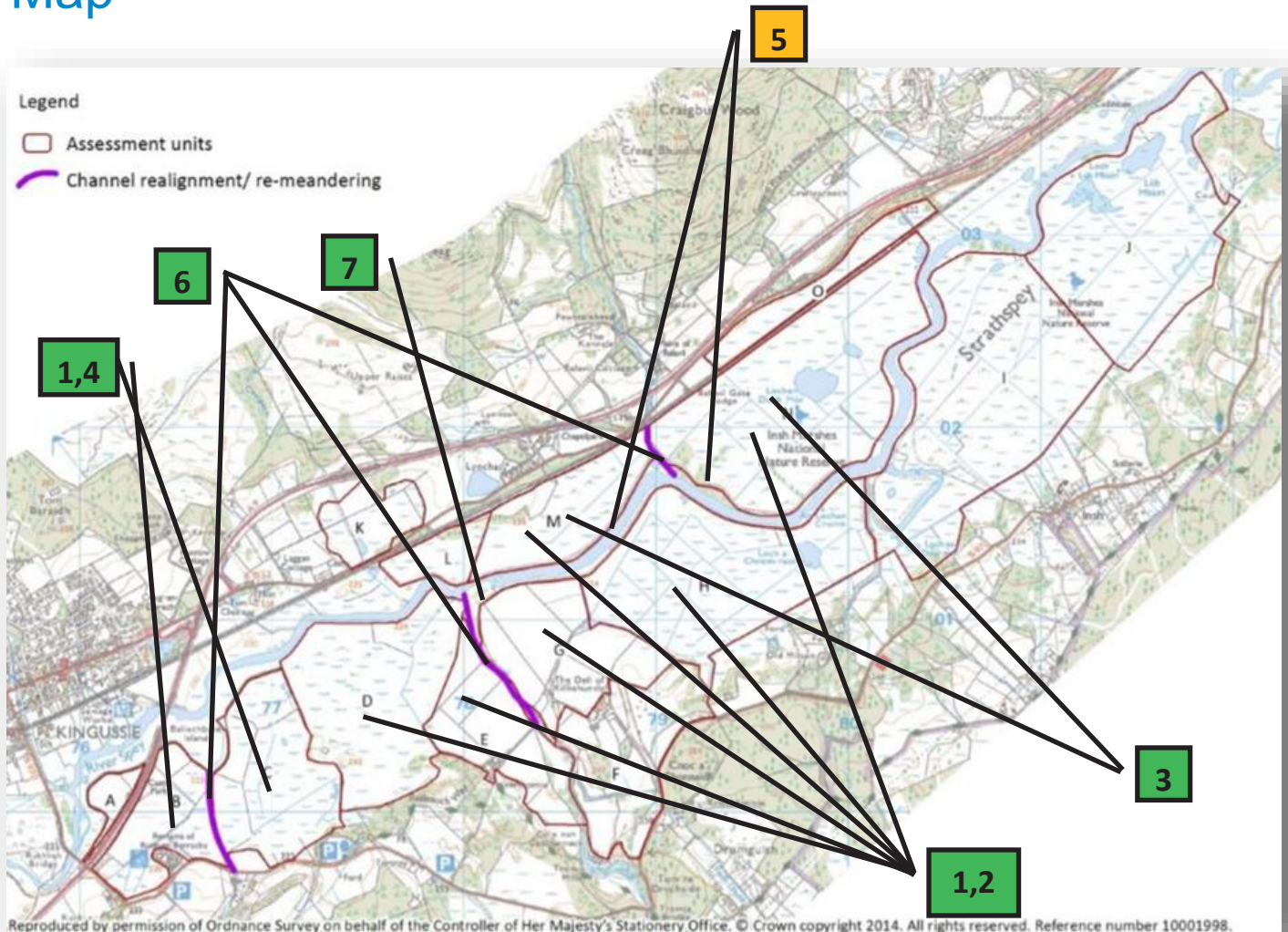
Description

Work undertaken on the tributaries of Ruthven Burn, River Tromie and Raitts Burn to restore the natural shape of the river & establish natural processes of sediment erosion and deposition. It would involve the embankments on these tributaries being removed as part of the restoration work.

Hydrological changes

The removal of these embankments will not have the same impact as removing embankments on the Spey. The channels would not be perched anymore and there would be better connection between the tributaries and the floodplain, with the tributaries flooding adjacent land more frequently and developing more natural processes of erosion, deposition and channel migration.

Map



Ecology and maintenance

1. A better connection between the river channel and the floodplain will increase the likelihood of the formation of new pools or frequently flooded areas on the floodplain, benefitting pioneer species and successional processes.
2. Potential for the increase of wader and duck numbers.
3. More suitable habitat for water rail and spotted crake is also possible here.
4. Slight increase in waders numbers
5. Access for private fishing could be reduced/prevented on one of the banks of Raitts Burn by its realignment, unless mitigation is provided.
6. Potential benefit for fish species, freshwater pearl mussel and other aquatic organisms from improved morphological forms and processes.
7. Potential benefit to alder woodland at the mouth of the River Tromie with changes in the river and deposition.

Flood risk

- ✓ Lowering of the bed of Raitts Burn will reduce flood and erosion risk to the railway at moderate flood events.
- Potential changes in flood risk for local flood receptors, but less overall impact than bank removals on the Spey.

Our conclusion

This option provides an overall positive impact on Insh Marshes, especially for aquatic and riparian habitats, by greatly improving local connectivity between the channels and surrounding floodplain. No negative consequences for flood risk are highlighted.

We are interested to explore this option on Ruthven and Raitts Burn and might consider implementing these measures in conjunction with other options.

Option 9: Reinstatement of stream diversions

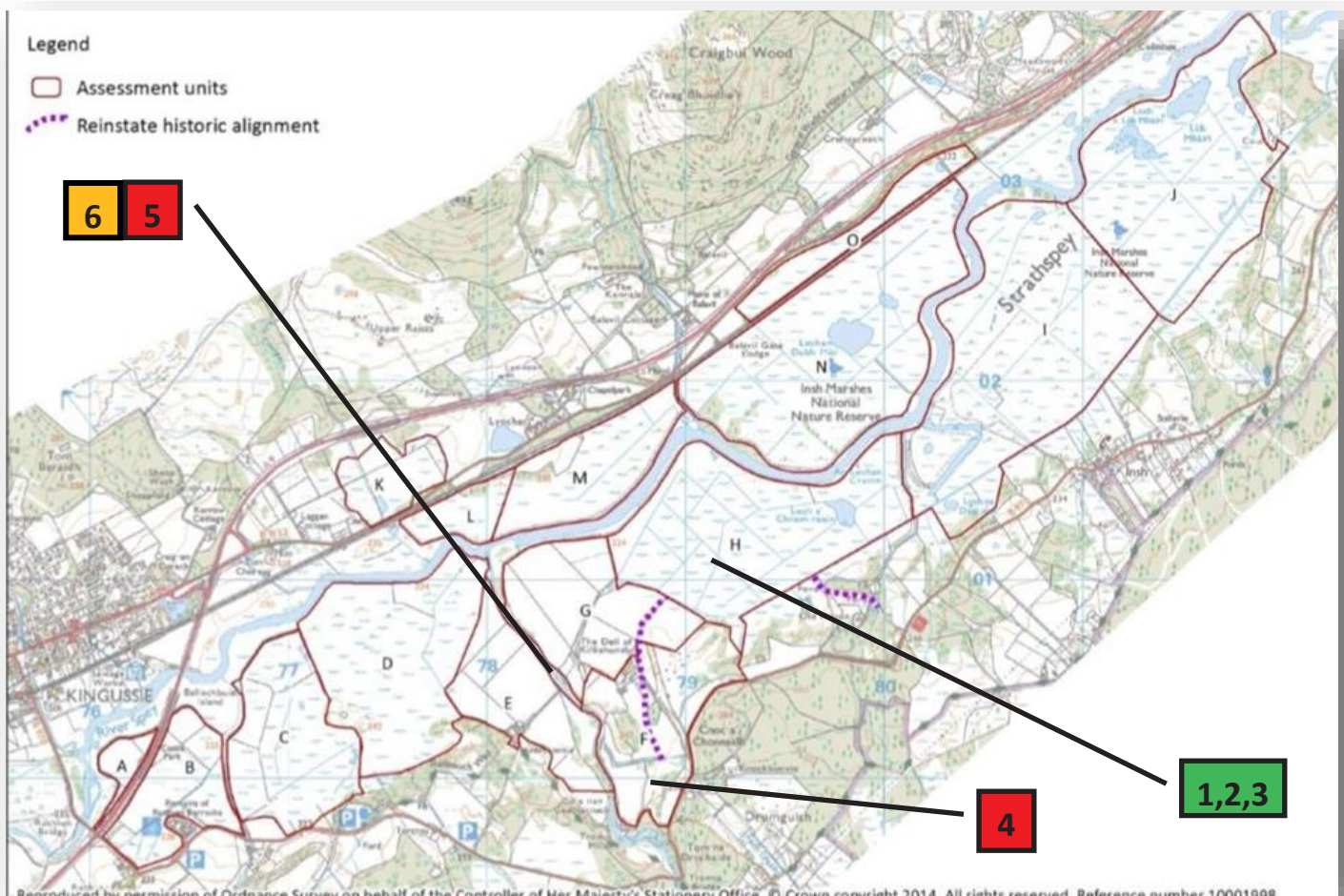
Description

Work undertaken to reinstate pre-1970s alignment of two hillslope tributaries (Feith Dhubh and Allt Baile Mhuilinn).

Hydrological changes

Both streams will flow into Dell East (Unit H) rather than into the River Tromie and the Main Drain at Insh Fen (Unit I), their current alignment. This will increase the length of the Feith Dhubh and improve the river processes whilst bringing more water to the Dell. A reduced flow is expected into Insh Fen (Unit I).

Map



Ecology and maintenance

1. Reduced habitat management required to clear vegetation succession like willow scrub to retain special habitats.
2. Fen communities in Dell East (Unit H) may increase with flow from Feith Dhubh.
3. Slight increase in waders and ducks.
4. Mitigation may need to be looked at for some water discharges.
5. Feith Dhubh not connected to Tromie or Spey so inaccessible to fish migration.
6. Small reduction in flow into River Tromie but not considered significant so little impact on processes in the River Tromie

Flood risk

- Route for Feith Dhubh may improve flood risk for Dell of Killiehuntly farm.

Our conclusion

If technical issues could be overcome, the positive impact on Dell East would be welcome on Insh Marshes.

Although the benefits in Dell East are desirable, possible solutions for the discharge issues will need to be explored before we would consider these actions.

Option 10a: Block internal drainage ditches & reduce connectivity with River Spey*

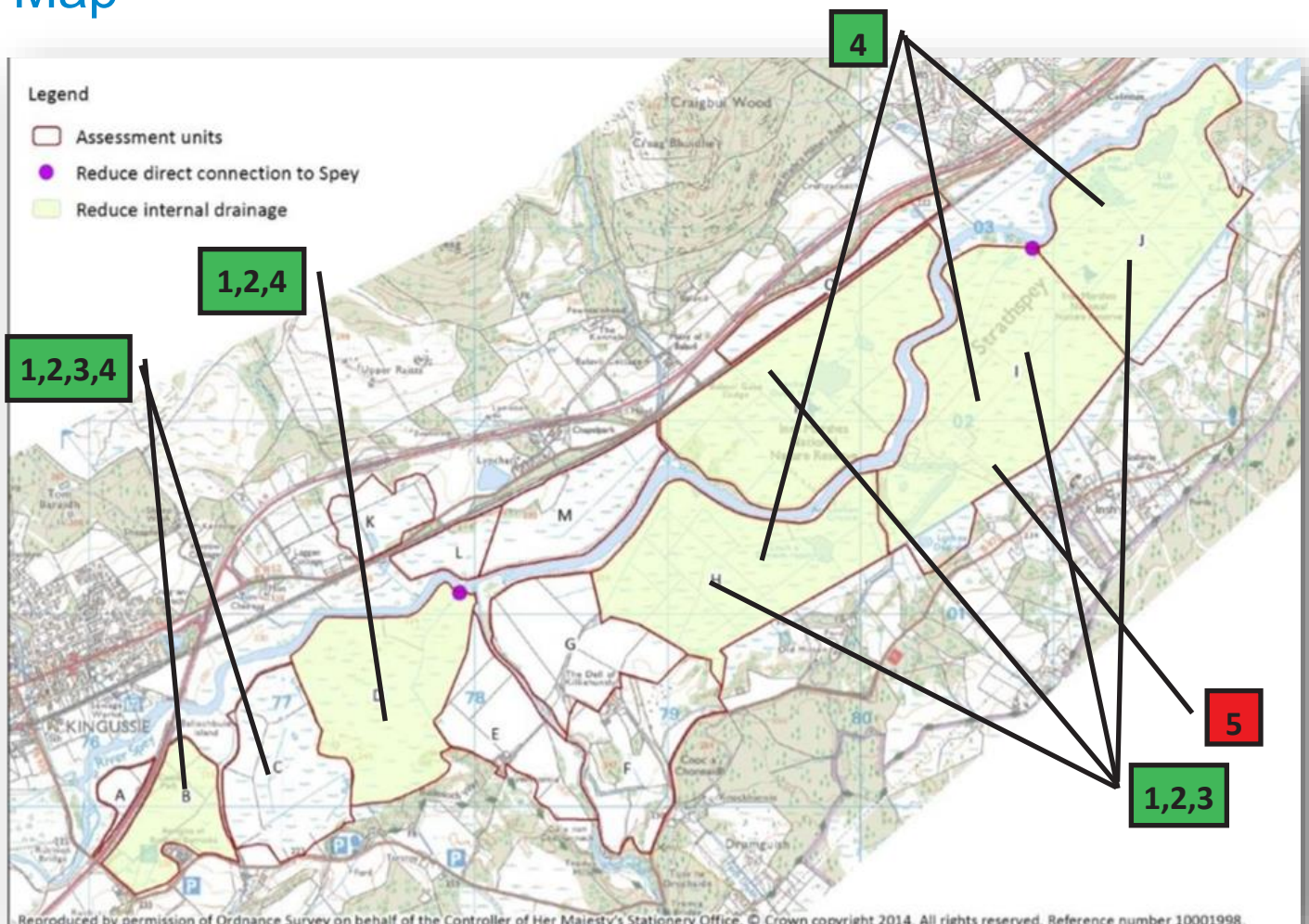
Description

Work undertaken to block the internal drainage ditches through the marshes. It could also include blocking the connections between Invertromie Fen (Unit D) and the River Spey, Insh Fen (Unit I) and the River Spey and Ruthven South's (Unit B) connection with Ruthven Burn.

Hydrological changes

Some areas of the marsh will not flood as regularly as their connection with the Spey has been blocked. However, there will be higher groundwater levels maintained particularly in the drier months. Areas on the marsh will be flooded for longer as the water will take more time to drain away. A reduction of the depth of flooding is expected at Insh Fen (Unit I).

Map



Ecology and maintenance

1. Reduced habitat management required to clear vegetation succession like willow scrub to retain special habitats.
2. An increase in water levels will lead to habitat improvements with succession of grasslands to protected fen, marsh and swamp communities.
3. Rare species such as cowbane and water sedge could increase.
4. An increase in wader numbers is possible. In some compartments duck numbers may also increase.
5. Dilution for the waste water treatment works discharge may be reduced.

Flood risk

- ✓ No change in flow or flood levels expected next to the marshes or downstream.

Our conclusion

There would be long term benefits for the vegetation communities on Insh Marshes, particularly protecting them from dry spells in the summer, making them more robust in the context of climate change. The reduction of ongoing vegetation management requirements are welcome. This option will also improve the condition of the underlying peatland helping carbon sequestration.

Depending on available funding, these actions are considered on various areas within the reserve.

Option 10b: Reduce connectivity between the Main Drain & Loch Insh

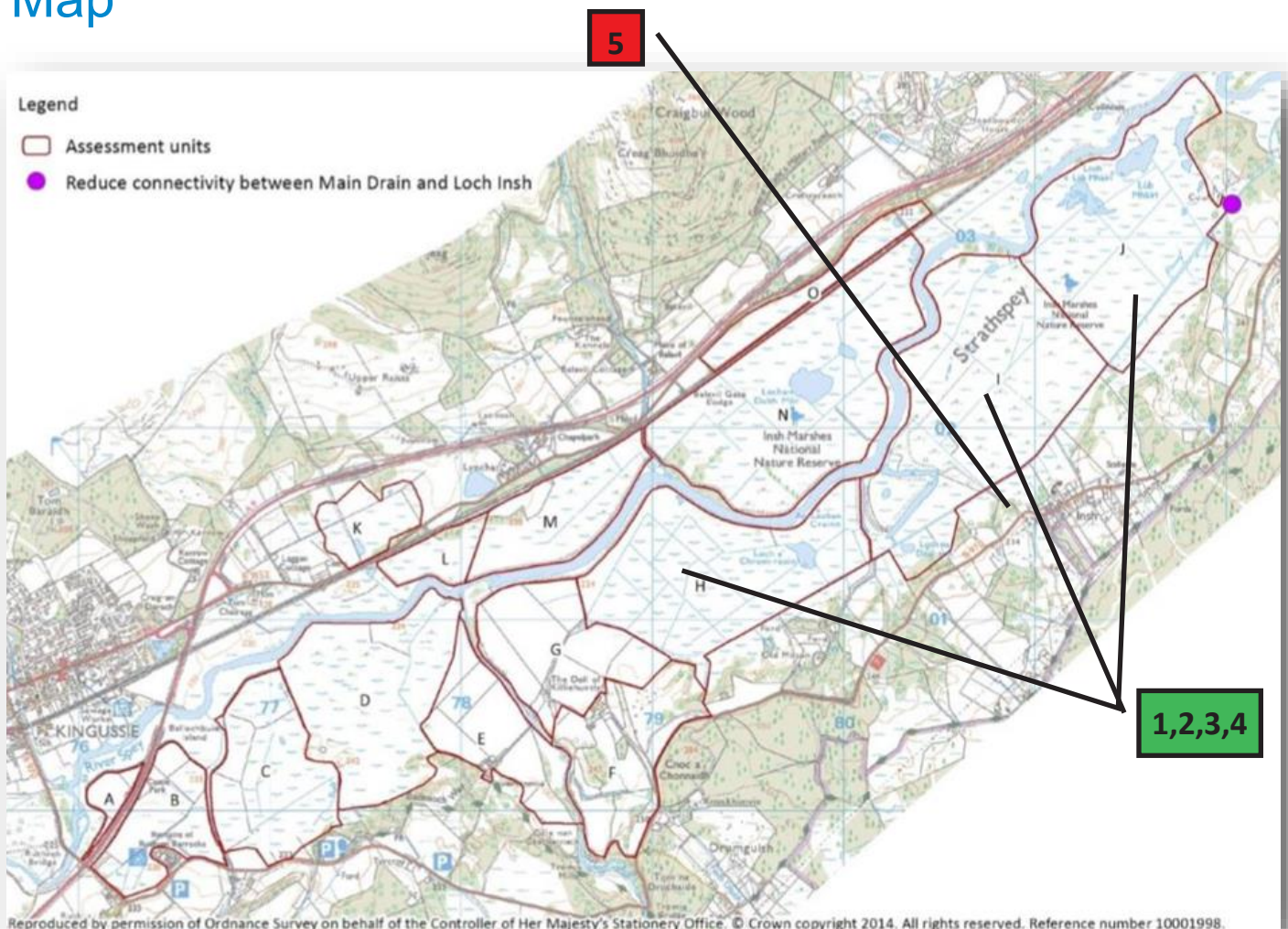
Description

The Main Drain running from South West to North East along the side of the marshes would be blocked to reduce connectivity with Loch Insh and reduce the rate that water from the marsh drains into the Loch. It would be blocked downstream of the drain, near Coull (Unit J). Assumption is that it would be blocked to a similar level of the adjacent ground.

Hydrological changes

This work would reduce the rate that the marsh drains water into Loch Insh, allowing some areas to stay wetter for longer. There would be no significant changes during a 1 in 2 year flood as with higher loch levels, connectivity with the marsh is remained.

Map



Ecology and maintenance

1. Important wetland habitats would benefit from the increase water levels with an increase in the area of fen and swamp communities.
2. Reduced requirement for maintenance through willow scrub clearance.
3. Rare species such as cowbane and water sedge could increase.
4. Slight increase in wader & duck numbers.
5. Mitigation required for discharge from the waste water treatment works if the main drain no longer connects with Loch Insh.

Flood risk

- ✓ No change in flow or flood levels expected next to the marshes or downstream.

Our conclusion

The conditions for valuable habitats and species could improve in a considerable area of Insh Marshes. Currently there is no solution for the discharge of the waste water treatment works. This option will also improve the condition of the underlying peatland helping carbon sequestration.

Possible solutions for the discharge issues will need to be explored before we would consider this option.

What next...

The Feasibility Study summarised and evaluated the potential benefits and negatives of each option using a multi-criteria assessment. After considering feedback on the assessment from a wide range of stakeholders, the RSPB is considering five projects to take forward. They offer significant improvements to both terrestrial and aquatic habitats, allow rare plants, fish and invertebrates to thrive on Insh Marshes and increase the resilience to climate change.

RSPB preferred options

- 1. Reconnecting the river and floodplain.**
 - a. Embankment removal at Lynchat.**
- 2. Naturalising river dynamics.**
 - a. Channel re-meandering of Ruthven and Raitts Burns.**
 - b. Removing in bank protection on the River Tromie.**
 - c. In channel measures on the tributaries i.e. installation of woody debris or boulders.**
- 3. Improving wetland habitat.**
 - a. Ditch blocking in the wetland with high connectivity to the river, that are susceptible to summer droughts.**

Preparing the projects

Any further action will be subject to further consultation with a wide number of stakeholders, determining legal implications, further assessment of the impacts on important ecological features and flood risks, acquiring the necessary permissions, undertaking necessary pre-construction surveys and monitoring, a thorough preparation and continuous supervision of construction works and finally post-construction monitoring. Using the embankment removal at Lynchat as an example, a small taste of the planning required to assess the feasibility of any of the projects can be found on the next page.

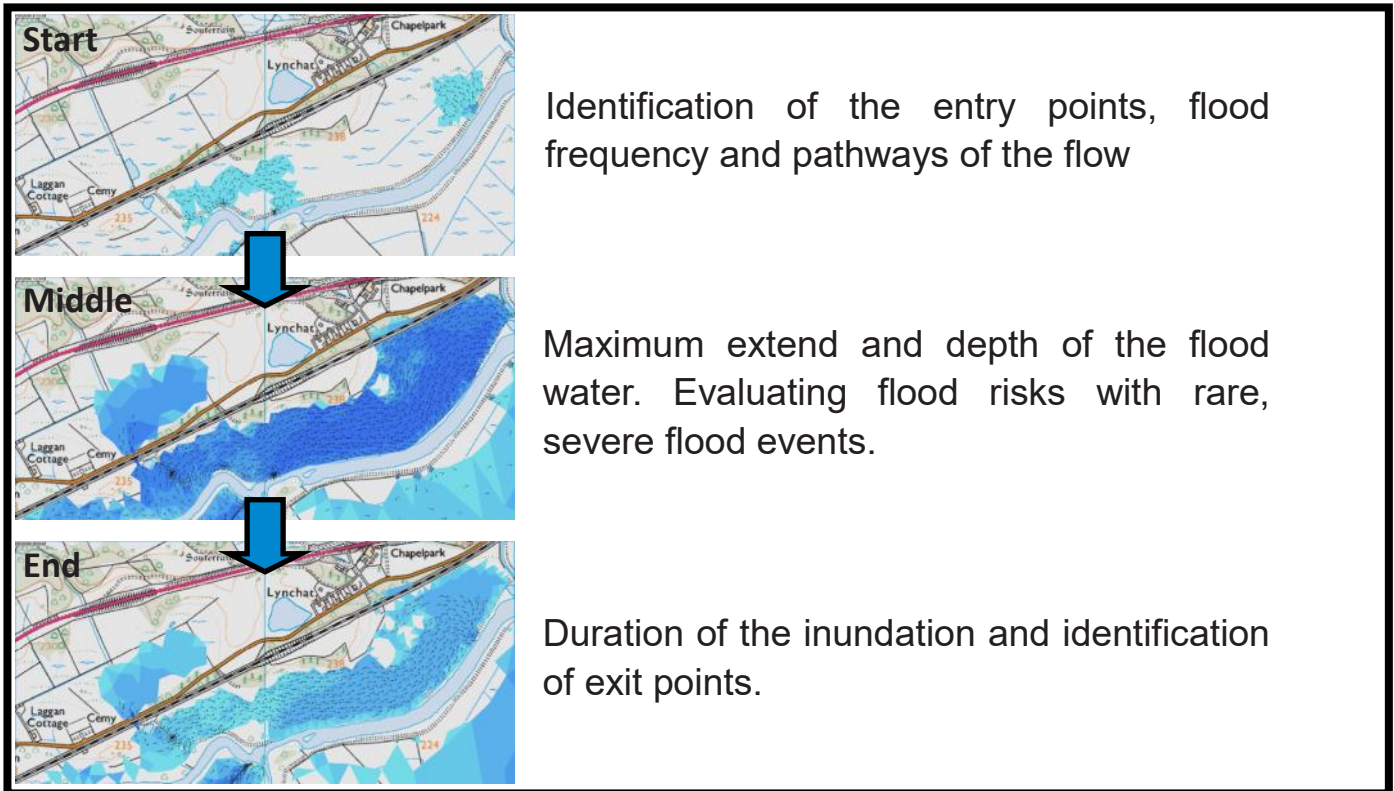
A long term vision

It is RSPB's ambition to transform Insh Marshes into a prime example of a naturally functioning floodplain and river system. On their own, the proposed projects will not suffice to fulfil that ambition. They will, however, provide the opportunity to monitor changes in hydrological regime, ecologically important features and morphological conditions with minimal risk, prior to undertaking projects of a larger scale.

Preparing projects: An example

Detailed flood modelling

The hydrological and ecological implications of bank removal at Lynchat will be similar to those predicted for option 4b, but more detailed flood modelling work is needed to determine the local ecological impacts associated with the project.



Updating ecological information

Gathering up-to-date information on current vegetation communities and other important ecological features of the site and their response to the predicted habitat changes is crucial. This information will help us to communicate clearly with stakeholders, determine legal implications and acquire the necessary permissions to proceed with any work.

Planning the work

Detailed planning and consistent monitoring will allow for a cost efficient and safe implementation of the work. Specialized techniques and machinery will be deployed by experienced contractors to minimize negative impacts on the environment. The timing will be crucial and, if required, mitigation measures can be incorporated in the plans. The suggested method for removing embankments in the Feasibility Study, for example, is subject to the origin of the material, the protection status of the vegetation type behind the embankment and is not advised when flooding is likely to occur shortly after.

Projects will be closely monitored, providing us with valuable information to eventually realise our shared vision for a natural floodplain.

How To Get Involved

Visit the website for more information & to share your thoughts & to sign-up to the below events:

www.cairngormsconnect.org.uk/projects/insh

We invite you to come and learn more at the events below

Event	Date	Location
1 hr on site walk	20 & 21 Nov	Insh Marshes
Online webinar	25 Nov	From home

An exhibition will be displayed at the Insh Marshes lookout hide throughout the project



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RSPB Insh Marshes is managed by RSPB Scotland. It forms part of the Cairngorms Connect partnership which aims to enhance habitats, species and ecological processes towards a 200-year vision. This is supported by funding from the Endangered Landscape Programme.

