Llanwern Rail Facilities - Phase 1 Planning

Flooding Consequences Assessment

October 2018
## Issue and Revision Record

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Executive summary

Mott MacDonald has been commissioned by Transport for Wales (TfW), on behalf of Welsh Government, to prepare and submit an application seeking full planning permission for the design and construction of a 1.6km long Major Events Stabling Line (MESL) on land adjacent to the existing Tata Steelworks Service Lines in Llanwern, South Wales. This is Phase 1 of the Llanwern Rail Facilities project.

To support the planning application for Phase 1, a Flooding Consequences Assessment (FCA) has been undertaken. The purpose of the FCA is to identify the acceptability of flooding consequences in accordance with Planning Policy Wales (TAN15) and local planning guidance. The FCA was undertaken in consultation with Natural Resources Wales and the Lead Local Flood Authority (LLFA), Newport City Council.

The Site is located on a strip of land between the Tata Llanwern Steelworks service lines and the Network Rail main line railway, south of the village of Llanwern. The Site is at risk of fluvial, surface water (pluvial) and tidal flooding. NRW has confirmed that tidal flooding is considered the predominant source of flood risk at this Site. NRW data shows that the Site was not affected by flooding in Llanwern village in December 1999 and NRW has further confirmed that there is no record of historical flooding at the Site.

The TAN 15 Development Advice Map (DAM) indicates that all of the Site area falls within development advice zone C1 “areas of the floodplain which are developed and served by significant infrastructure, including flood defences”. As the Site is located in zone C1, the Local Planning Authority (LPA) should accept the principle of general infrastructure development at the site, subject to parts (i) or (ii) and (iii) and (iv) of the TAN 15 Justification Test being passed.

If the principle of development at this Site is accepted by the LPA then, in order for the development to proceed, it will be necessary to demonstrate that the potential consequences of flooding as a result of the development are acceptable in terms of the criteria set out in TAN 15 (Part (iv) of the Justification Test).

In terms of these criteria, the FCA demonstrates that:

- All criteria in A1.12 have been satisfied bar two which are:
  - “Escape and evacuation routes shown…. to be operational under all conditions”. The development will not provide rail facilities for public services or be accessible by the general public. However, the risk to a small number of operational personnel will be managed through early evacuation in response to a flood warning (tidal flooding) or evacuation by site operational personnel or emergency services (fluvial event, Monks’ Ditch).
  - “no flooding elsewhere”. The proposed embankment in the floodplain of the Monks’ Ditch will cause a minor change to fluvial flood risk in the locality of the development but no significant increases to third parties or flood-sensitive receptors such as Llanwern Village or the adjacent Glan Llyn development. The construction of the rail embankment will result in net infilling, but this is not considered significant in terms of the local and wider tidal flood cell.

- It is not possible to meet A1.14 and A1.15 criteria. The proposed levels of all built infrastructure are maximised as far as is reasonably practicable within the constraints of the site, i.e. the need to tie in with existing infrastructure and meet rail design standards. Also, a
higher (and subsequently wider) embankment would have greater fluvial flood risk and environmental impacts and require additional crossings/diversions of local reens.

- In relation to A1.15 criteria, TAN15 states that the values provided for tolerable conditions are not definitive. Rather, they are indicative and reflect conditions in which, given the presence of adequate warnings and preparation, appropriately equipped personnel could undertake emergency activities. The developer and operator will ensure that arrangements for receiving flood warnings, and preparations for emergency activities for flood events, are in place prior to the Scheme being operational.

Section 8 will be satisfied subject to the proposed surface water drainage strategy being developed into an appropriate detailed SuDS drainage design, once topographical survey and dimensional information of the existing drainage and reen system is obtained (see recommendations below).

The assessment has identified the following activities that will be required to be undertaken.

- Further information on the capacity and geometry of the reens and how the water flows through the system in locations where new culverts or diversions are proposed should be obtained. This information will be used to develop a detailed SuDS drainage design which will be submitted to Newport City Council (as Lead Local Flood Authority) for approval, prior to commencement of any parts of the development.

- Further consultation should be undertaken with NRW and Newport City Council (as Lead Local Flood Authority) especially where the detailed designs of the drainage system propose culvert extensions, infilling or diversions. Land Drainage consent will need to be obtained from NRW for any infilling, diversion or culverting of a reen, (temporary or permanent).

- If the planning application for the development is submitted after 7 January 2019, when schedule 3 of the Flood and Water Management Act 2010 is commenced in Wales, the surface water management design will need to be approved by a SuDS Approving Body (SAB) within the Lead Local Flood Authority, Newport City Council. Any SAB approval will be needed in addition to planning permission and prior to the commencement of construction.

- Prior to the Site being operational and utilising the information in this FCA (e.g. hydraulic modelling), a Flood Emergency Plan should be developed to set out the procedures, roles, responsibilities, and triggers for evacuating the Site.

Subject to the principle of the Scheme being accepted at this location, and the implementation of the recommendations outlined above, the flood risks and consequences to and from the development will be limited and managed as far as is reasonably practicable within the Site and Scheme constraints. From a flood risk standpoint, we envisage that there is no reason for the development not to proceed.
1 Introduction

1.1 Project Description
Mott MacDonald has been commissioned by Transport for Wales (TfW), on behalf of Welsh Government, to prepare and submit an application seeking full planning permission for the design and construction of a 1.6km long Major Events Stabling Line (MESL) on land adjacent to the existing Tata Steelworks Service Lines in Llanwern, South Wales. This is Phase 1 of the Llanwern Rail Facilities Programme.

The MESL will be used for stabling of rolling stock for major events in the area, to enable flexibility for future train requirements, and proving of trains prior to use on the rail network. The MESL will be electrified in a future phase of work. This proposed 1.6km length of MESL was formerly known as Option 6a.

To support the planning application for Phase 1, a Flooding Consequences Assessment (FCA) has been undertaken. The purpose of the FCA is to identify the acceptability of flooding consequences in accordance with Planning Policy Wales (TAN15) and local planning guidance. The scope of the FCA reflects the stage of planning consideration and current level of detail available. The FCA was undertaken in consultation with Natural Resources Wales and the Lead Local Flood Authority (LLFA), Newport City Council.

The wider Llanwern Rail Facilities Programme will include an extension of the MESL by circa 2.4km east (to achieve a total length of circa 4km), electrification of the MESL, a new Llanwern railway station and passenger line (including Park & Ride and footbridge), and connections to the South Wales Main Line (Relief Lines). The further phases of the project will be the subject of a subsequent planning application. This FCA supports the planning application associated with Phase 1 works only, and it is acknowledged that further flood assessment may be required for subsequent phases.

The information and recommendations presented within this assessment are dependent upon the accuracy and reliability of the information, correspondence and data available to Mott MacDonald at the time of the assessment. Any party developing detailed design should not rely on assumptions made in this report but should satisfy themselves in that regard.

The FCA includes an assessment of the predicted effects of climate change over the lifetime of the development. Our assessment of the effects of climate change is based on the guidance provided by Welsh Government in place at the date of this report. These recommendations may change in the future, increasing the extent of predicted effects, and we would recommend that you seek further advice should this occur during the lifetime of the project.

Mott MacDonald has followed accepted procedure in providing the services but given the residual risk associated with any prediction and the variability which can be experienced in flood conditions Mott MacDonald takes no liability for, and gives no warranty against, actual flooding of any property (client’s or third party) or the consequences of flooding in relation to the performance of the service. The FCA has been prepared for the purposes of supporting the proposed planning application only.

1.2 Site location and description
The proposed rail development Site is located approximately eight miles east from the centre of Newport, South Wales.
The Site is aligned roughly west–east and bordered by the existing South Wales Mainline to the north and the Tata service lines and the Glan Llyn development to the south. Along the southern boundary of the steelworks site runs the A4810 which links the M4 from junction 23A at Magor with the A48 at Liswerry (a predominantly residential suburb on the south-eastern side of Newport). The Site is more widely bordered by the M4 which runs approximately two and a half miles to the north and the Severn Estuary which lays approximately three miles to the south. The Gwent Levels immediately to the south is a significant area of wetlands (Figure 1.1).

The existing South Wales Mainline passes north of the proposed Site and provides opportunity for transport links for both passengers and freight.

**Figure 1.1: Location of Site (red ellipse)**

![Location of Site (red ellipse)](image)

Source: Mott MacDonald, 2018 and OS Open data

The site is approximately 3.1 hectares in area, and approximately 1.6km long and 19m wide (Figure 1.2). There is no topographical survey of the Site available as dense vegetation currently prevents full access to the Site and ecological permits need to be obtained before vegetation can be cleared for access. Figure 1.3 shows indicative land level values, taken from Lidar data (2018) and Figure 1.4 provides an indicative cross section of the Site and surrounding land. This shows that the existing topography of the Site is between 6 m AOD and 6.5 m AOD. The Site is approximately 2m lower than the adjacent South Wales Mainline. The Tata Llanwern steelworks service lines are around 1m higher than the Site (i.e. 1m lower than the South Wales Mainline).
Figure 1.2: Location of the Site (edged in red)

Source: Mott MacDonald, 2018. Base Mapping: Crown copyright and database 2016, Ordnance Survey. Site boundary is approximate, land is contained within the planning red line boundary shown on the Site Location Plan (Drawing number 367590-MMD-48-XX-DR-C-0001, Appendix A);
Figure 1.3: Indicative land levels

Source: Extract from Digital Terrain Model (DTM) using Lidar data, 2018 (Lle), See Hydraulic Modelling Report

Figure 1.4: Indicative cross section of Site and surrounding land (location of cross section shown in Figure 1.3). Vertical scale is mAOD and horizontal is m

Source: Extract from Digital Terrain Model (DTM) using Lidar data, 2018 (Lle), See Hydraulic Modelling Report

The main hydrological features are indicated on Figure 1.5. The Monks’ Ditch, categorised by NRW as “Main River”, runs north-south adjacent to the eastern boundary of the Site. Liswerry Pill (also categorised by NRW as “Main River”) runs north-east to south-west beyond the
western extent of the Site. A third Main River, the Ridings/Hundred Perches Reen, runs beyond the eastern boundary of the Site. In addition, the Site is traversed by a network of drainage channels (known as 'reens'). A key reen is Longditch Reen which runs north-south at the western extent of the Site (ST 34924 87469). The Site lies approximately 4.5km to the north west of the Severn Estuary shoreline at Redwick on the Caldicot Levels.

Figure 1.5: Main hydrological features in the area

![Map showing hydrological features](image)


1.3 Scope of Works

General Arrangement, long-section and cross section drawings (367590-MMD-48-XX-DR-C-0002 to 367590-MMD-48-XX-DR-C-0006 and 367590-MMD-48-XX-DR-TR-0400) are included in Appendix A. The Scheme comprises the construction of the following:

- A single track stabling line (MESL) circa 1.6km long;
- Associated earthworks and landscaping;
- Drainage and other engineering works.

In order to obtain full planning permission for Phase 1, we have carried out the outline design and technical assessment, as well as multiple assessments in terms of ecology, environment, heritage and archaeology.

The proposed rail embankment varies between 6.33m AOD (east near Monks’ Ditch) and 7.73m AOD (western extent).

Neither the MESL crossing of Monks’ Ditch, nor the overhead line equipment for the MESL, form part of Phase 1 works and are therefore outside the scope of this FCA.
2 Sources of Information and Consultations

Mott MacDonald accessed the following sources of information in the preparation of this FCA:

- Natural Resources Wales’ ‘Product 4’ data, reference ATI-13364a (received 16 August 2017), 170823_ATI-13364b and 170823_ATI-13364a (both received 07 September 2017) and provided in Appendix B.
- Newport City Council Preliminary Flood Risk Assessment (PFRA) (URS Scott Wilson, April 2011) provided by Newport City Council on 12 September 2017.
- Groundsure Insight Utilities Layout Plan, drawing number PEM602503, dated 14 September 2017, provided in Appendix E.
- Existing Drainage Plan for the adjacent Glan Llyn Development, provided by St Modwen Development Ltd, drawing number PI/FLRS/SK/W/801/001 dated February 2008, included in Appendix F.1.

We also consulted with Natural Resources Wales, and with Newport City Council as Lead Local Flood Authority.

2.1 Planning Policy Wales (PPW)

Planning Policy Wales (PPW) provides the planning policy framework under which the Local Planning Authorities (LPAs) must prepare their Local Development Plans (LDPs). This should encourage patterns of development that are economically, socially and environmentally sustainable. As part of this, PPW highlights the need to reduce flood risk by avoidance of development within high risk areas, as opposed to the previous approach of flood defence and mitigation of the consequences of flooding.
2.2 Technical Advice Note 15: Development and Flood Risk (TAN15)

Accompanying PPW, Technical Advice Note 15: Development and Flood Risk (TAN 15) provides technical guidance on the assessment of flooding risk and consequences and includes advice on what should be included in FCAs.

2.2.1 Development Advice Zones

Figure 1 of TAN 15 defines three Development Advice Zones (A, B, and C), which are summarised in Table 2.1. The figure also attributes different planning actions for each of the zones.

Table 2.1: Development Advice Zones

<table>
<thead>
<tr>
<th>Zone</th>
<th>Sub-Zone</th>
<th>Description of Zone</th>
<th>Use within PPW and TAN 15</th>
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<tbody>
<tr>
<td>A</td>
<td></td>
<td>Considered to be at little or no risk of fluvial or tidal/coastal flooding</td>
<td>Used to indicate that justification test is not applicable and no need to consider flood risk further</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>Areas known to have been flooded in the past evidenced by sedimentary deposits</td>
<td>Used as part of precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>Based Environment Agency / NRW extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal)</td>
<td>Used to indicate that flooding issues should be considered as an integral part of decision making by the application of the justification test including assessment of consequences</td>
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<tr>
<td>C1</td>
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<td>Areas of the floodplain which are developed and served by significant infrastructure, including flood defences</td>
<td>Used to indicate that development can take place subject to application of justification test, including acceptability of consequences</td>
</tr>
<tr>
<td>C2</td>
<td></td>
<td>Areas of the floodplain without significant flood defence infrastructure</td>
<td>Used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered</td>
</tr>
</tbody>
</table>

Source: Figure 1, Planning Policy Wales TAN 15

2.2.2 Development category

Section 5 of TAN 15 states "particular flooding consequences may not be acceptable for particular types of development … the precautionary framework identifies the vulnerability of different land uses to flooding".

TAN 15 divides types of development into the following three categories: emergency services, highly vulnerable development, and less vulnerable development.

Table 2 of TAN 15 identifies transport and utilities infrastructure developments as "less vulnerable development".

2.2.3 Justifying the location of development

The overarching aim of TAN15 is to ensure that new development is "directed away from zone C and towards suitable land in zone A, otherwise to zone B, where river or coastal flooding will be less of an issue".
Furthermore, Section 6 of TAN 15 states that “highly vulnerable development in zone C2 should not be permitted”, and that all other new development should only be permitted within zones C1 and C2 if determined by the planning authority to be justified in that location.

TAN 15 goes on to state that development can only be justified in that location if it can be demonstrated that:

(i) Its location in zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement; or

(ii) Its location in zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region;

and,

(iii) it concurs with the aims of PPW and meets the definition of previously developed land (PPW fig 2.1); and

(iv) The potential consequences of a flooding event for a particular type of development have been considered, and in terms of the criteria contained in sections 5 and 7 and appendix 1 (of TAN 15) found to be acceptable.

2.2.4 Assessment of flooding consequences

Appendix 1.2 of TAN 15 states that an assessment of flooding consequences should develop a full appreciation of:

- The consequences of flooding on the development.
- The consequences of the development on flood risk elsewhere within the catchment for a range of potential flooding scenarios up to that flood having a probability of 0.1%

The assessment can be used to establish whether appropriate mitigation measures can be incorporated within the design of the development to ensure that development minimises risk to life, damage to property and disruption to people, etc.

Appendix 2 of TAN 15 recognises that flood consequences will change over time as a result of climate change.

2.2.4.1 Acceptability criteria for flooding consequences

Appendix 1.11 and Appendix 1.12 of TAN 15 present the main criteria for deciding whether developments in flood risk areas are acceptable in line with part (iv) of the Justification Test (see Section 2.2.3 above).

- Section A1.12 states “a site should only be considered for development if the following conditions can be satisfied;
  - Flood defences must be shown by the developer to be structurally adequate particularly under extreme overtopping conditions (i.e. that flood with a probability of occurrence of 0.1%)
  - The cost of future maintenance for all new/approved flood mitigation measures, including defences must be accepted by the developer and agreed with the Environment Agency.
  - The developer must ensure that future occupiers of development are aware of the flooding risks and consequences
– Effective flood warnings are provided at the Site
– Escape/evacuation routes are shown by the developer to be operational under all conditions
– Flood emergency plans and procedures produced by the developer must be in place
– The development is designed by the developer to allow the occupier the facility for rapid movement of goods/possessions to areas away from the floodwaters
– Development is designed to minimise structural damage during a flooding event and is flood proofed to enable it to be returned to its prime use quickly in the aftermath of the flood.
– No flooding elsewhere.”

● Section A1.14 states “development should be designed to be flood-free during the 1% fluvial flood… and 0.5% tidal flood” and “there is therefore a frequency threshold of flooding below which flooding of development should not be allowed”.

● Section A1.15 of TAN 15 states “beyond the threshold frequency, proposed development would be expected to flood under extreme conditions”. TAN 15 provides indicative guidance on what are considered to be tolerable conditions for different types of developments. Values for general infrastructure developments are given in Table 2.2 below.

Table 2.2: Indicative values for tolerable flood conditions (in events beyond the “threshold frequency”)

<table>
<thead>
<tr>
<th>Type of Development</th>
<th>Maximum depth of flooding (mm)</th>
<th>Maximum rate of rise of flood waters (m/hr)</th>
<th>Maximum speed of inundation of flood risk (hrs)</th>
<th>Maximum velocity of flood water (metre/sec)</th>
</tr>
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<tr>
<td>General Infrastructure</td>
<td>600</td>
<td>0.3</td>
<td>2</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Source: Section A1.15 TAN 15

2.2.5 Surface water management

Section 8 of TAN 15 defines the surface water requirements for new developments, as follows:

● Surface water run-off from new developments should be managed so that the development does not increase the risk of flooding elsewhere.

● Sustainable Drainage Systems (SuDS) should be implemented, wherever they will be effective, in all new development proposals, irrespective of the Development Advice Zone in which they are located.

● The aim should be for new development not to create additional run-off when compared with the undeveloped situation, and for redevelopment to reduce run-off where possible.

Consideration must also be given to maintaining the effectiveness of any drainage systems.

2.3 Local planning policy and guidance

Newport City Council confirmed that it does not have a Strategic Flooding Consequences Assessment (SFCA).
2.4 Consultation with Natural Resources Wales

2.4.1 ‘Product 4’ flood data
On 17 July 2017 NRW provided ‘Product 4’ flood risk data, which is included in Appendix B.

2.4.2 Pre-application consultations
A number of pre-application consultations have been held with NRW to inform the FCA. These are:

- Face-to-face meeting to discuss the overarching flood risk aspects of the entire (all Phases) of Llanwern Rail Facilities proposal (2 October 2017).
- Telcon to discuss the initial designs that had been undertaken for the entire (all Phases of) Llanwern Rail Facilities proposal (20 July 2018).
- Review of Baseline Hydraulic Model of Monks’ Ditch (commenced August 2018, NRW reply outstanding).

The agendas and records of discussion of the two meetings are included in Appendix B.2.

At these meetings NRW confirmed that, for the purposes of assessment in line with TAN15, the lifetime of 75 years should be adopted for the development and the ‘Product 4’ flood data for the year 2090 provides representative climate change data for this 75-year lifetime of development.

2.4.3 Guidance Note (GN028) – Modelling for Flood Consequence Assessments
The latest version of NRW Guidance Note (GN028) – Modelling for Flood Consequence Assessments was published in July 2018, and it is understood that this replaced guidance in Good Practice Guide GPG 101. GN028 provides advice for developers and their consultants preparing flood risk documentation to support development planning proposals.

GN028 states that the FCA must include;

- an assessment of the risk and consequences of flooding to and from the development.
- consideration of an appropriate allowance for climate change in line with current government guidance at the time of application. Current national planning policy requires climate change to be considered on all fluvial flows up to and including the 1% (1 in 100) annual probability of occurrence and on all coastal flood levels up to and including the 0.1% (1 in 1000) annual probability of occurrence.
- an assessment of the flood consequences of the development to third parties for an appropriate range of fluvial flows and coastal flood levels (including climate change) up to and including the 0.1% annual probability of occurrence (1 in 1000 in any given year).

2.4.4 Correspondence with the Internal Drainage District (IDD)
Internal Drainage Districts (IDDs) are typically found in low-lying land where a particular need for water level management has been identified. IDD boundaries are determined in accordance with the Land Drainage Act (1991).

The Site lies within the Caldicot & Wentlooge IDD. Natural Resources Wales (NRW) administers the IDDs in Wales.

On 24 August 2017, the IDD Engineer in NRW was contacted and provided the following (Appendix B.3):

- A copy of the Land Drainage Byelaws and guidance notes for applicants.
The IDD boundary map for the area concerned. The IDD Engineer also attended the pre-application meeting (see section 2.4.2).

2.5 Consultation with LLFA (Newport City Council)

2.5.1 Request for local flood information

Newport City Council flood risk team was contacted on 8 September 2017 and requested to provide local flood risk information for the Site. This was provided on 12 September 2017 and is included in Appendix C.

2.5.2 Newport City Preliminary Flood Risk Assessment (PFRA) and Flood Risk Management Plan (FRMP)

The EC Floods Directive has been transposed into UK law through the Flood Risk Regulations (2009) and the Flood and Water Management Act (FWMA) (2010). Under the Flood Risk Regulations (2009), Newport City Council must prepare and undertake a Preliminary Flood Risk Assessment (PFRA) to assess the harmful consequences of past and potential future floods and to identify significant flood risk areas (termed a “Flood Risk Area”). Flood Risk Management Plans (FRMPs) setting out risk management objectives and strategies for each of the Flood Risk Areas are identified in the PFRA.

The PFRA concluded that there was only one potential Indicative Flood Risk Area within the Newport City Council administrative area. This Indicative Flood Risk Area was located in the north-west of Newport City Council administrative area (near the boundary with Caerphilly County Borough). However, following further consultation this was not taken forward as a Flood Risk Area as it was deemed as not having a significant present or future flood risk.

Whilst no Flood Risk Area was identified, in common with all Wales LLFAs, Newport City Council opted to prepare a FRMP. Section 7.12.5 of the FRMP identifies a number of measures to reduce local flood risk in the Llanwern Ward. A number of these measures relate to addressing local issues in villages near to the Site (e.g. Llanwern and Bishton); however, none apply to the Site.

2.6 Site walk over

A Site walk over survey was undertaken on 30 August 2017. There was limited access to some areas of the Site due to the dense vegetation cover and rail restrictions. Photographs of the areas visited are provided in Appendix D.
3 Assessment of the suitability of the Site for development proposed

3.1 Development advice zone

The TAN 15 Development Advice Map (DAM) indicates the extents of the Development Advice Zones for areas in Wales. The DAM indicates that all of the Site area lies within zone C1. No areas of the Site lie within development advice zone C2 Figure 3.1).

Figure 3.1: Extract from Development Advice Map (approximate Site boundary outlined in red)


3.2 Justifying the location of Scheme in principle

As stated in Section 2.2.3, in accordance with TAN 15 the LPA should accept the principle of infrastructure Scheme at the Site, subject to parts (i) or (ii) and (iii) and (iv) of the TAN 15 Justification Test being passed.

The LPA will determine parts (i) or (ii) and (iii) of the Justification Test. This FCA addresses part (iv) of Justification Test.
4 Assessment of flooding consequences

4.1 Historical records of flooding

4.1.1 Information from NRW ‘Product 4’ data

Figure 5 of the Product 4 data provided by NRW (Appendix B.1) illustrates the approximate extent of flooding from the Monks’ Ditch that occurred in Llanwern Village in December 1999. At the first pre-application meeting on 2 October 2017 NRW stated that the flooding in the village was caused by a lack of capacity in the Monks’ Ditch channel upstream of the Site (full description of flooding mechanisms provided on Page 3 of Appendix B.2). The Site is not located in any of the areas indicated by NRW to have been affected by known flooding events. NRW stated that it is not aware of any historical flood issues along the length of Monks’ Ditch within the Site (Appendix B.2).

The Product 4 data does not include any information on historical tidal flooding events.

4.1.2 Information from Newport City Council PFRA and FRMP

Figure 4.1 of the PFRA provides an overview of historic flooding incidents in the Newport City Council administrative area, collated from data provided by South Wales Fire and Rescue, Dwr Cymru Welsh Water (DCWW), and council-recorded surface water flooding incidents. This does not indicate any historical flooding at the Site. The nearest recorded flood incident is at the village of Bishton, 2km north of the Site. Section 7.12.2 of the FRMP identifies known flooding issues in Llanwern Village, and the report states this is likely to be related to “surface water flooding caused by Monks’ Ditch overflowing natural exceedance” or “surface water flooding/culvert flooding”.

4.2 Flooding from Main Rivers

As described in Section 1.2, Monks’ Ditch forms the eastern boundary of the Site.

The Monks’ Ditch is understood to be an important “high level carrier” reen, which transports water from the upstream catchment, through the Caldicot Levels to discharge at Goldcliff (Severn Estuary).

Two other Main Rivers (Liswerry Pill and Ridings/Hundred Perches Reen) run beyond the boundaries of the Site and it is understood that the Site is not affected by flooding from them (see NRW correspondence, Appendix B.2).

4.2.1 Information from NRW ‘Product 4’ data

Figure 5 of the Product 4 data provided by NRW (Appendix B.1) provides basic flood outlines produced using a national-scale flood model (JFLOW) for 0.1% AEP (1 in 1000) year fluvial flood event. This indicates that the Site is at risk of flooding from the Monks’ Ditch in this event.

4.2.2 Information from existing flood modelling studies

NRW does not hold a hydraulic model for Monks’ Ditch (Appendix B.2). However, NRW confirmed that a hydraulic model of Monks’ Ditch was produced by others (Atkins, 2002) to support the adjacent Glan Llyn development. NRW reviewed and accepted this model as adequate for FCA purposes at the time (Appendix B.2).
To assess whether the Atkins 2002 model could be used for this FCA, we completed a review of the model. The following aspects were identified for review and/or updating.

1. An update to the hydrological assessment should be undertaken for the Monks' Ditch. The assessment should cover a range of high fluvial flows up to and including the 0.1% Annual Exceedance Probability (AEP) event.

2. Appropriate climate change allowances should be applied. With reference to the Welsh Government’s latest advice on climate change on flooding consequences assessments, the correct climate change allowances should be applied to both fluvial and tidal inflows to the model.

3. The hydrological assessment should be undertaken for the following AEP fluvial events: 50%, 2%, 1%, 0.1%, and 1% plus climate change.

4. Atkins provided only the 1D element of the model, built using a combination of channel survey and LiDAR. The 2D flood plain needs to be added to the 1D element of the model.

5. Input data such as surveys and as-built drawings should be reviewed and updates to the 1D Monks' Ditch model should be undertaken where appropriate.

6. The existing model should be extended upstream to the Bishton Road Bridge (OS Grid Reference, ST 36852 88067) to capture the Station Road flooding mechanism that NRW has described in pre-application meetings (Appendix B.2).

4.2.3 Information from new flood modelling studies

Taking forward the above recommendations from the review of the Atkins 2002 model, we undertook a further hydraulic modelling study for Monks’ Ditch to support the FCA.

A new TUFLOW-Estry model was developed to show both “Baseline” (pre-development) and “Proposed” (post-development) scenarios. Appendix F contains a copy of the Hydraulic Modelling Report, which details the methodology used to develop the new model and summarises the results of the study. Figure 4.1 provides an overview of the key structures in the new Monks’ Ditch model. These include an inverted syphon under Tata Service Lines (67u) and a 900mm diameter culvert under the Network Rail main line (locally known as “Station Road culvert”) (Cu_MDB_217).

The Baseline and Proposed models were run for a range of flood events between 50% AEP and 0.1% AEP, as well as a scenario for the allowance of climate change for the 1% AEP.

Maximum flood extent maps for the Baseline scenario are provided within Appendix B of the Hydraulic Modelling Report, and indicate the following flood routing and flow paths that occur through increasing AEPs:

- Out of bank flow occurs for each flood event run in the Baseline scenario.
- For events equal to or exceeding 50% AEP, overtopping occurs along the left bank of Monks’ Ditch upstream of BRMD_400 bridge.
- In addition to the above, for events equal to or exceeding 2% AEP, overtopping also occurs along the left bank of Monks’ Ditch between the Station Road bridge and just north of Bishton Road bridge. Overtopping also occurs along the right bank of Monks’ Ditch between the Monks Pill Underbridge bridge and the 67u culvert.

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1 Welsh Government (2016). Climate change allowances for planning purposes. CL-03-16
In addition to the above, for the 0.1% AEP, the river is fully out of bank upstream of the Site, with overtopping occurring along the right bank of Monks’ Ditch between the upstream extent of the model and Monks Pill Underbridge bridge (effecting Llanwern Village).

**Figure 4.1: Overview of the key structures in the new Monks’ Ditch model**

A sensitivity analysis was performed on the Baseline scenario (Section 3.8 and Appendix B of the Hydraulic Modelling Report) which included simulating a 50% blockage of each of the hydraulic structures in the model in the 1% AEP event. This showed that the maximum depth of flooding at the Site is predicted to decrease (by up to 2cm) in this situation (see Section 3.10 and Appendix C of Hydraulic Modelling Report).

Comparisons of the Baseline and Proposed scenarios are provided in Section 5 (TAN15 acceptability criteria).

### 4.2.4 Information from other sources

The NRW Long Term Flood Risk online map indicates that the Site does not benefit from a fluvial flood warning service, though there is a tidal flood warning service in place.

The FRMP states that Newport City Council owns and maintains the trash screen at the upstream entry of the culvert that runs underneath the Network Rail lines in Llanwern Village (Cu_MDB_217). This report states that this trash screen is one of 10 screens considered as “critical due to the high risk of property or high-speed road flooding should they become blocked”. 

4.3 Flooding from the sea

The Site is at risk of flooding from the sea. NRW confirmed that tidal flooding is considered the predominant source of flood risk at this Site (Appendix B.2).

4.3.1 Information from NRW ‘Product 4’ data

The Product 4 data provided by NRW includes three sets of modelled tidal data. The Product 4 data are summarised as follows.

- Tidal flood data from the Newport Velocity Depth Mapping study (NRW, 2016). This study identifies the risk from the River Usk tidal estuary. It uses updated tidal level predictions derived from the Caldicot and Wentlooge Coastal study (see below), together with new updates to landform changes in the area. The baseline model includes the improved Riverside tidal defences completed in summer 2012 and the Caerleon defence improvements completed July 2016. This data identifies the risk from overtopping and does not assume there is any breach of defences. The model was run for undefended and defended tidal flood events for the current day (2015) and defended tidal events for the years 2090 and 2115 (with climate change). Median flow values (QMED) was used for fluvial inflows for all design runs.

- Coastal flood data from the Caldicot and Wentlooge Coastal Modelling (JBA, 2016). This study identifies the risk from the Severn Estuary. This study uses extreme combined wave overtopping, wind and tidal level predictions from a national data set published by the EA in 2011, together with new LiDAR data and information on changes to landforms in the area. The model was run for undefended and defended tidal flood events for the current day (2015) and defended tidal events for the years 2090 and 2115 (with climate change). This data identifies the risk from overtopping and does not assume there is any breach of defences.

- Coastal Breach scenarios (HR Wallingford, date of study not provided by NRW). Breach analysis of the embankments which form the coastal defences in the Caldicot and Wentlooge Levels was undertaken using a EMBREA (EMbankment BREach) model to simulate the breaching process for 12 embankments in the Caldicot model and five embankments in the Wentlooge model. Breach modelling was performed for a number of flood event scenarios for both the present day and future (year 2115) with climate change. Not all breaches were included in all events simulated; as the events increased in magnitude the number of defences at risk of breaching also increased.

It should be noted that the Product 4 data was requested for a larger area than the Site and includes land to the east of Monks’ Ditch. However, the data obtained from the Product 4 data request is considered suitable for use for the Phase 1 assessment.

Tables 4.1 to 4.4 summarise the key flood level data for the Site. The existing topography of the Site is between 6 m AOD and 6.5 m AOD. The proposed rail embankment varies between 6.33m AOD (east near Monks’ Ditch) rising to 7.73m AOD (western extent).

Table 4.1: Summary of key flood data for the Site in the 0.5% (1 in 200) AEP event for the current day assuming defences are in place.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Defences overtopped or breached?</th>
<th>Predicted flood level at the Site in metres above ordnance datum (m AOD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tidal event (River Usk)</td>
<td>Overtopped only</td>
<td>NULL</td>
</tr>
<tr>
<td>Tidal event (River Usk) 95%</td>
<td>Overtopped only</td>
<td>NULL</td>
</tr>
<tr>
<td>confidence bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario</td>
<td>Defences overtopped or breached?</td>
<td>Predicted flood level at the Site in metres above ordnance datum (m AOD)</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>----------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Coastal event (Severn Estuary)</td>
<td>Overtopped only</td>
<td>NULL</td>
</tr>
<tr>
<td>Coastal event (Severn Estuary) 95% confidence bound</td>
<td>Overtopped only</td>
<td>NULL</td>
</tr>
<tr>
<td>Coastal event (Severn Estuary)</td>
<td>Overtopped and 8 breaches</td>
<td>Not provided</td>
</tr>
</tbody>
</table>

Source: NRW Product 4 data, provided in Appendix B.1.

**Table 4.2: Summary of key flood data for the Site in the 0.5% (1 in 200) AEP event with climate change until 2090 assuming defences are in place.**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Defences overtopped or breached?</th>
<th>Predicted flood level at the Site in metres above ordnance datum (m AOD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tidal event (River Usk)</td>
<td>Overtopped only</td>
<td>NULL</td>
</tr>
<tr>
<td>Tidal event (River Usk) 95% confidence bound</td>
<td>Overtopped only</td>
<td>NULL</td>
</tr>
<tr>
<td>Coastal event (Severn Estuary)</td>
<td>Overtopped only</td>
<td>6.38</td>
</tr>
<tr>
<td>Coastal event (Severn Estuary) 95% confidence bound</td>
<td>Overtopped only</td>
<td>6.90</td>
</tr>
<tr>
<td>Coastal event (Severn Estuary)</td>
<td>Overtopped and 15 breaches</td>
<td>Not provided, 2115 figure is 7.50m AOD</td>
</tr>
</tbody>
</table>

Source: NRW Product 4 data, provided in Appendix B.1.

**Table 4.3: Summary of key flood data for the Site in the 0.1% (1 in 1000) AEP event for the current day assuming defences are in place.**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Defences overtopped or breached?</th>
<th>Predicted flood level at the Site in metres above ordnance datum (m AOD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tidal event (River Usk)</td>
<td>Overtopped only</td>
<td>NULL</td>
</tr>
<tr>
<td>Tidal event (River Usk) 95% confidence bound</td>
<td>Overtopped only</td>
<td>NULL</td>
</tr>
<tr>
<td>Coastal event (Severn Estuary)</td>
<td>Overtopped only</td>
<td>NULL</td>
</tr>
<tr>
<td>Coastal event (Severn Estuary) 95% confidence bound</td>
<td>Overtopped only</td>
<td>6.38</td>
</tr>
<tr>
<td>Coastal event (Severn Estuary)</td>
<td>Overtopped and 9 breaches</td>
<td>Not provided</td>
</tr>
</tbody>
</table>

Source: NRW Product 4 data, provided in Appendix B.1.

**Table 4.4: Summary of key flood data for the Site in the 0.1% (1 in 1000) AEP event with climate change until 2090 assuming defences are in place.**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Defences overtopped or breached?</th>
<th>Predicted flood level at the Site in metres above ordnance datum (m AOD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tidal event (River Usk)</td>
<td>Overtopped only</td>
<td>NULL</td>
</tr>
<tr>
<td>Tidal event (River Usk) 95% confidence bound</td>
<td>Overtopped only</td>
<td>Not provided</td>
</tr>
<tr>
<td>Coastal event (Severn Estuary)</td>
<td>Overtopped only</td>
<td>7.91</td>
</tr>
</tbody>
</table>
**Scenario** | **Defences overtopped or breached?** | **Predicted flood level at the Site in metres above ordnance datum (m AOD)**
---|---|---
Coastal event (Severn Estuary) 95% confidence bound | Overtopped only | Not provided
Coastal event (Severn Estuary) | Overtopped and 15 breaches | Not provided, 2115 figure is 8.42m AOD

Source: NRW Product 4 data, provided in Appendix B.1.

Data on rate of rise of flood waters (m/hr) and speed of inundation of flood risk (hrs) was not provided.

### 4.3.2 Information from other sources

The NRW Long Term Flood Risk online map indicates that the Site is within the “Coast from Aberthaw to Severn Bridge” Flood Alert Area and “Coast at the Caldicot Levels” Flood Warning Area.

### 4.4 Flooding from surface water (pluvial)

The NRW long term flood risk online map (reproduced in Figure 4.2) indicates that large parts of the Site area are at “medium” or “low” risk of surface water flooding.

“Low” risk means areas that each year have a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%) and “medium” risk means areas that each year have a chance of flooding between 1 in 100 (1%), and 1 in 30 (3.3%).

However, the maps do not take into consideration existing positive drainage networks. The Site has an established network of ditches (reens) that provide a positive drainage network. Therefore, it is expected that this risk is not unusual or exceptional and can be appropriately managed via the existing and proposed drainage system.
Figure 4.2: Surface water flood map (approximate Site boundary outlined in red)


4.5 Flooding from sewers

Flooding from sewers and drains is typically caused by blockages or hydraulic overload.

The GroundSure Insights Plan (Appendix E) provides details of public foul and surface water sewers. There are no records of sewers on the Site.

It is therefore considered that there is no risk of flooding from sewers.

4.6 Flooding from groundwater

Groundwater flooding occurs when water levels in the ground rise above surface levels. It is most likely to occur in areas underlain by permeable rocks, called aquifers.

The Newport City Council PFRA states that “On a strategic scale in Newport, groundwater is not considered to be a significant flood risk and is considered to rise and fall relatively slowly. In addition, the local geology is not considered to yield significant volumes of groundwater.” The Newport City Council FRMP states that there are “no recorded groundwater flood incidents” in the Llanwern Ward.

We have not found any records of groundwater flooding in the vicinity of the Site.

It is considered that, relative to other potential sources of flooding, the risk of flooding from groundwater at this location is low. Therefore, it may be expected that this risk is not unusual or exceptional and can be appropriately managed.
4.7 Flooding from reservoirs and canals

The NRW Long Term Flood Risk online map indicates that the Site is not within an area that could be flooded if a large reservoir were to fail and release the water it holds. It is therefore considered that there is no risk of flooding from reservoirs.

The nearest canal (Monmouthshire and Brecon Canal) is over 4 km away. It is therefore considered that there is not risk of flooding from a canal.

4.8 Flooding from local reen system

A map of IDD “Main Reens” is provided in Appendix B.3. It is understood that there are a number of IDD Main Reens that could potentially be impacted by the Scheme, as follows:

- Oxleaze Reen and Barn Reen, which drain a significant (approximately 80 ha) catchment to the north of the Site before connecting to the wider IDD reen system to the west of Monks’ Ditch.
- Longditch Reen, which lies at the western extent of the Site.

These Main Reens are linked to a wider IDD reen system. A plan showing the main existing surface water drainage (reen) system for the Site is provided in Appendix E.1.

NRW advised that it is not aware of an existing hydraulic model for the reen system and confirmed that it does not hold records of the reen drainage system within the Site (Appendix B.2).

4.9 Summary of flooding consequences

The Site is affected by fluvial, surface water (pluvial) and tidal flooding. Tidal flooding is considered the predominant source of flood risk at this Site. The Site is not considered to be at risk of flooding from canals or reservoirs, and ground water flooding is not considered a significant risk for this Site. NRW data indicates that the Site was not affected by flooding in Llanwern village in December 1999, and NRW has confirmed that the Site is not known to have been affected by historical flooding events that have occurred in Llanwern village.
5 TAN15 acceptability criteria

Where consideration of a development site can be justified, the development must then meet the acceptability criteria detailed in TAN15 Section 7 and Appendix 1.

5.1 Operational escape and evacuation routes

The Scheme will not provide rail facilities for public services or be accessible by the general public. However, the risk to a small number of operational personnel will be managed as follows.

5.1.1 Tidal or coastal flooding event

In the event of a tidal flood warning being issued, the operation of the Site will be suspended and any personnel already on-Site will be evacuated prior to any floods occurring. Procedures, roles, responsibilities, and triggers for evacuating the Site should be clearly set out in a Flood Emergency Plan. NRW confirmed that a flood warning is likely to be issued well in advance (1 to 2 days) of flooding occurring (Appendix B).

This action is critical as safe access and egress via the north of the Site will not be available under any circumstances due to the presence of the Network Rail main lines. Therefore the only available safe escape and evacuation route is to cross the Tata Service lines to vacant development land to the south, on to the new access road and then to the A4810 which runs south of the Llanwern Steelworks. As Figure 5.1 shows, this is in the direction of the Severn Estuary and River Usk (towards the source of flooding). The Site, and the land and roads to the south of the Site, have a flood hazard rating of between 1 and 2 ("Danger for most – includes general public") and in some locations exceeding 2 ("Danger for all – includes the emergency services").
5.1.2 Fluvial flooding event (Monks’ Ditch)

As there is no fluvial flood warning service available for the Monks’ Ditch, it is possible that the operation of the Site will not be suspended, nor personnel evacuated, prior to flooding from Monks’ Ditch occurring.

Figure 5.2 presents an extract of the flood hazard maps created for the 0.1% AEP flood event (Hydraulic Modelling Report, Appendix F). This indicates that the Site has a hazard rating of “Danger for most – includes general public”. This suggests that it will be possible for the emergency services to access the Site to assist escape and/or evacuation of operational personnel.

Once away from Site and the new access road, the route is free from flooding from the Monks’ Ditch all the way to the A4810.
5.2 Flood free during the threshold frequency and meeting tolerable conditions in extreme floods

Tidal flooding is considered the predominant source of flood risk at this Site and tidal levels are likely to exceed the fluvial level for the "Threshold Frequency" and "Extreme" events. NRW has advised that the Caldicot and Wentlooge Coastal Modelling data should be used in the first instance to determine the level of the threshold frequency event and the predicted conditions for more extreme flood events (Appendix B.2.)

Where the Caldicot and Wentlooge Coastal Modelling data does not provide information on a particular flood condition, data from the Monks’ Ditch Hydraulic Modelling has been adopted.

To meet TAN 15 A1.14 acceptability criteria, the levels of the MESL will need to be constructed above the indicative threshold frequency flood level wherever possible.

To meet TAN 15 A1.15 acceptability criteria, “beyond the threshold frequency, proposed development would be expected to flood under extreme conditions”. TAN 15 provides indicative values for tolerable flood conditions and values for general infrastructure developments are given in Table 5.1.

Table 5.1: Indicative value for tolerable flood conditions (in events beyond the “threshold frequency”)

<table>
<thead>
<tr>
<th>Type of Development</th>
<th>Maximum depth of flooding (mm)</th>
<th>Maximum rate of rise of flood waters (m/hr)</th>
<th>Maximum speed of inundation of flood risk (hrs)</th>
<th>Maximum velocity of flood water (metre/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Infrastructure</td>
<td>600</td>
<td>0.3</td>
<td>2</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Source: Section A1.15 TAN 15

5.2.1 Threshold frequency flood level

The 0.5% AEP (1 in 200 year) level, in 2090, including an appropriate allowance for sea level rise, is 6.90m AOD (Table 4.2).
The hydraulic modelling for Monks’ Ditch indicated that the 1% AEP (1 in 100 year) level including an appropriate allowance for climate change, is 5.82m AOD (Hydraulic Modelling Report).

As such the 0.5% AEP (1 in 200 year) tidal level, in 2090 has been adopted as the threshold frequency flood level for the Site.

5.2.2 Maximum depth of flooding

The 0.1% AEP (1 in 1000 year) level, in 2090, including an appropriate allowance for sea level rise, is 7.91m AOD. This is adopted as the extreme flood level against which tolerable conditions are assessed (Appendix B.2).

Given that the extreme flood level is 7.91m AOD, if the MESL is set at a level of at least 6.90m AOD then the maximum depth of flooding in events beyond the “threshold frequency” will be 1.01m. This exceeds the maximum depth tolerances provided in Section A1.15 of TAN 15 (and summarised in Table 5.1). To meet the indicative guidance on tolerable conditions for the maximum depth of flooding, the minimum level would need to be 7.31m AOD.

The proposed MESL (west) track levels vary between 7.74mOD in the west and 6.33m AOD at the point of the proposed cross over to the Tata service lines. Figure 5.3 shows the proposed embankment elevations in terms of TAN15 A1.14 and A1.15 criteria.

The proposed rail embankment is coloured-code to show:

- **Red**: Embankments below the Threshold Frequency flood level (6.90m AOD) and does not meet TAN15 A1.14 or A1.15.
- **Orange**: Embankments above the Threshold Frequency flood level (6.90m AOD) but lower than level required to meet TAN15 A1.15 tolerable depths of flooding in “Extreme” events (7.31m AOD). Meets TAN15 A1.14 but not A1.15.
- **Green**: Embankments that are at or exceed the levels required to meet TAN15 A1.15 tolerable depths of flooding in “Extreme” events (7.31m AOD). Meets both TAN15 A1.14 and A1.15.
Figure 5.3: Embankment heights, colour-coded to show achievement against Threshold Frequency (TAN15 A1.14) and tolerable conditions in extreme floods (TAN15 A1.15) criteria.

Source: Mott MacDonald, 2018

The figure shows that most of the track (over 50% of the track length) will not meet TAN15 A1.14 or A1.15 criteria. However, it is considered that the proposed levels of the new track are maximised, and it would not be practicable to increase them, due to the following Site and development constraints.

- It is necessary for the proposed MESL to tie in with existing infrastructure, namely where it meets the existing Tata service line which is at a level of 6.33m AOD at that location.
- Rail design standards require that the gradients of stabling lines must not exceed 1 in 500. This means that the rate of rise of the MESL away from its tie-in to the Tata service line, cannot be increased.
- The MESL cannot be located further north as this would encroach upon an existing 132Kv underground electric cable (See 367590-MMD-48-XX-DR-C-0006, Appendix A).
- Higher (and subsequently wider) embankments are likely to have greater fluvial flood risk and environmental impacts and require additional and/or longer crossings/diversions of local reens.
5.2.3 Maximum rate of rise, speed of inundation and velocity of flood waters

5.2.3.1 Tidal flood risk
The Product 4 data provided by NRW indicates that mean flood water velocities of around 0.7 m/s are predicted to occur in the 0.1% AEP event with climate change in 2090. This does not meet TAN15 A1.15 criteria.

Data on the rate of rise of flood waters (m/hr) and speed of inundation of flood risk (hrs) was not provided.

5.2.3.2 Flood risk from Monks’ Ditch
Table 5.2 provides a summary of inundation and velocity of flood waters for the 0.1% AEP event on the Monks’ Ditch in both Proposed and Baseline scenarios.

Table 5.2: Comparison of inundation and velocity of flood waters for fluvial flooding from Monks’ Ditch for the Baseline and Proposed scenarios in the 0.1% AEP event

<table>
<thead>
<tr>
<th>Type of Development</th>
<th>Maximum period of inundation of flood risk (hrs)</th>
<th>Maximum velocity of flood water (metre/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline scenario</td>
<td>3.25</td>
<td>1.42</td>
</tr>
<tr>
<td>Proposed scenario</td>
<td>3.25</td>
<td>1.43</td>
</tr>
<tr>
<td>Change from Baseline scenario</td>
<td>No Change</td>
<td>+0.01</td>
</tr>
<tr>
<td>TAN15 indicative guidance values for “General infrastructure”</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>Baseline scenario meets TAN15?</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Proposed scenario meets TAN15?</td>
<td>No</td>
<td>No and negligible difference to Baseline scenario</td>
</tr>
</tbody>
</table>

Source: Hydraulic Modelling Report and Appendix F and Section A1.15 TAN 15. Criteria for “General Infrastructure”

Figures comparing velocity changes in other AEP events are provided in Appendix B of the Hydraulic Modelling Report.

5.2.3.3 Summary
It is considered that the new track has been elevated as far as is practicable, accounting for the constraints outlined in Section 5.2.2. Despite this, the development will not meet TAN15 A1.15 criteria in either fluvial or tidal flooding (Table 5.2). However, TAN15 does state that the values provided are not definitive; that they are indicative and reflect conditions in which, given the presence of adequate warnings and preparation, appropriately equipped personnel could undertake emergency activities. TAN15 goes on to state that each site must therefore be considered individually, and a judgement taken in the context of the particular circumstances which could prevail at that site. The arrangement for warnings, preparations and emergency activities are described in other sections of this report.

5.3 Structural integrity and flood resilience
TAN 15 guidance encourages the incorporation of flood resilient construction measures within new developments to mitigate against flooding. Flood resilient infrastructure is designed and constructed to reduce the impact of flood water so that no permanent damage is caused, and the infrastructure can be returned to normal use as quickly as possible following a flood event. Examples of flood resilience measures include raised electrical systems and water-resistant flooring.
As presented in Section 5.2, the proposed levels of all built infrastructure are maximised within the constraints of the Scheme, which will act as a flood proofing mitigation. The proposed track will be of typical construction (rails laid upon ballast, then embankments underlain by a foundation subgrade). Ballast is not damaged by water, and it will allow flood water to percolate through this element of the embankment, which will limit permanent damage caused by flooding and ensure the track can be returned to normal use as quickly as possible following a flood event.

5.4 The Scheme does not increase flood risk elsewhere

The Scheme may occupy space that would otherwise be available for storage or conveyance of flood water, when channel capacity is exceeded. This has been assessed for the following flood sources.

5.4.1 Monks’ Ditch

Maximum flood extent maps for the Proposed scenario are provided within Appendix E of the Hydraulic Modelling Report and indicate very similar conditions to the Baseline scenarios, key observations being:

- No change in the predicted frequency threshold of flooding in the Proposed scenario (remains as per the Baseline scenario as events equal or exceeding 50% AEP).
- No significant change in the maximum extent or depths of flooding in the Proposed scenario (no new areas of flood risk when compared to the Baseline scenario).

Figure 5.4 and Table 5.3 below provide a comparison of Baseline and Proposed flood extents and depths for events up to and including 0.1% AEP. Figures comparing the flood extent of other AEP events are provided in Appendix B of the Hydraulic Modelling Report.
Figure 5.4: Comparison of Baseline (red hatched) overlain by Proposed (blue) for the 0.1% AEP flood extent

Table 5.3: Comparison of water levels at key location points (shown in Figure 5.4) and any differences

<table>
<thead>
<tr>
<th>Model</th>
<th>Flood Event</th>
<th>Water levels in m AOD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>West_001</td>
</tr>
<tr>
<td>Baseline</td>
<td>50% AEP 1 in 2</td>
<td>-</td>
</tr>
<tr>
<td>Proposed</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Baseline</td>
<td>2% AEP 1 in 50</td>
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<tr>
<td>Baseline</td>
<td>1% AEP 1 in 100</td>
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<tr>
<td>Proposed</td>
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<td>5.48</td>
</tr>
<tr>
<td>Baseline</td>
<td>1% AEP+CC 1 in 100+CC</td>
<td>5.63</td>
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<tr>
<td>Proposed</td>
<td>5.63</td>
<td>5.63</td>
</tr>
<tr>
<td>Baseline</td>
<td>0.1% AEP 1 in 1000</td>
<td>6.03</td>
</tr>
<tr>
<td>Proposed</td>
<td>6.01</td>
<td>6.01</td>
</tr>
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</table>

The hydraulic modelling confirms that the Scheme will have negligible effects on the water levels on-Site, in Llanwern village, and the area south and east of the Site. The largest differences between the Baseline and Proposed modelled water levels are in the west spill area (West_001 and West_002, Figure 5.4), where a decrease in water level (50mm max in 1% AEP) is recorded as the new rail embankment forces the flood water to spread very slightly further west across the Site.

The assessment demonstrates that the flood water that could be displaced by the new development located in the Monks’ Ditch floodplain will not significantly nor detrimentally change the flood risk posed to key receptors, such as north of the Site (Llanwern village) or adjacent Glan Llyn development. The modelling has indicated that the flood extents and levels may change very slightly in the strip of land between the Tata Service lines and the Network Rail mainlines; however, this will not be used or occupied by any people or property and will be acquired by the developer prior to the commencement of the development.

5.4.2 Local reen system

The MESL will intersect several reens and ditches. The proposed drainage strategy (drawing number 367590-MMD-48-XX-DR-C-0300 and 367590-MMD-48-XX-DR-C-0301, Appendix G.2) identifies four locations where reens will need to be infilled (shortened) to accommodate the development proposals.

NRW confirmed that the storage capacity of the reens should be maintained wherever crossings or diversions are proposed. NRW has indicated that any diversions would need to be open water features, i.e. a culverted diversion is not likely to be acceptable (Appendix B.2).

Other than the drainage strategy for the adjacent Glan Llyn Development (Appendix G.1), there was very little information on the existing reen system within the Site, available to inform the FCA. For example, there is no topographic survey to confirm exact locations or dimensions of the reens.

Further information on the capacity and geometry of the reens, and the flow regime of the reen system in locations where new culverts or diversions are proposed, will be obtained. This will be used to develop a detailed drainage design which will be submitted to Newport City Council (as LLFA) for approval, prior to commencement of any parts of the Scheme.

Prior to preparing the detailed designs, further consultation will be undertaken with NRW and Newport City Council (as LLFA) especially where the detailed designs of the drainage system require culvert extensions, infilling or diversions. Land Drainage consent will also need to be obtained from NRW for any reen infilling, diversion or culverting.

We accept that where culvert extensions, infilling or diversions are proposed, compensatory storage is likely to be required to ensure no detriment is caused as a result of the Scheme.

The MESL will terminate before Longditch Reen at the western extent of the Site and it is proposed that a buffer of 7m will be retained between Longditch Reen and the MESL, such that NRW can continue to maintain the reen (Appendix B.2).

5.4.3 Tidal flooding

Figure 5.5 shows the extent of cut and fill proposed to create the rail embankment for the MESL line. This represents a net infill volume of around 7,900m³.
The total volume available for tidal flood storage within the local flood cell (land between the Tata Services Lines and Network Rail mainline) is estimated to be of the order of 400,000 m$^3$. The volume of proposed net infill in the local flood cell represents around 2% of this.

However, the local flood cell is part of a much larger coastal flood cell (Caldicot Levels), and the local flood cell contributes a small percentage of the total available for storage in the wider coastal flood cell. It is considered that this scale of infilling is not significant in terms of the local and wider flood cell and as such compensatory flood storage for this increase is not proposed.

### 5.4.4 Surface water management

Section 8 of TAN 15 defines the surface water requirements for new developments.

The Scheme may result in an increase in impermeable area compared to the existing situation. The current drainage strategy (Appendix G.2) will be used as a starting point for a more detailed SuDS drainage design. As described in Sections 1.2 and 5.4.2, this can only be completed once topographic information of the Site and reen system is obtained.

It is therefore proposed that the strategy is developed into a more detailed drainage once this information is obtained. When this drainage system is put in place, the post-development risk of surface water flooding to the Scheme and elsewhere, as a result of the development, will be acceptable in terms of planning policy.

It is noted that if the Scheme is submitted after 7 January 2019, when schedule 3 of the Flood and Water Management Act 2010 is commenced in Wales, the surface water management...
design will need to be approved by a SuDS Approving Body (SAB) within the Lead Local Flood Authority, Newport City Council. Any SAB approval will be needed in addition to planning permission and prior to the commencement of construction.

5.5 Flood Defences

TAN15 advises that a FCA must show that flood defences will be structurally adequate particularly under extreme overtopping conditions (i.e. that flood with a probability of occurrence of 0.1%).

The Site currently benefits from flood defences situated along the Severn and Usk Estuaries. These defences are maintained by NRW.

NRW has permissive powers (but not a duty) to carry out flood and coastal risk management work, including maintenance of flood defences. There are two strategic plans that indicate whether these flood defences will be maintained by NRW in the long-term:

- Eastern Valleys and Wye and Usk Catchment Flood Management Plan (CFMP).
- Severn Estuary Shoreline Management Plan 2 (SMP2).

NRW confirmed that the strategy outlined in the above plans for this area is to continue to maintain (and possibly improve) the defences. NRW also confirmed that as the Site is north of the proposed M4 relief road, the Site should benefit from the flood protection works proposed as part of that scheme. (Appendix B.2).

5.6 Future cost of maintaining mitigation proposed

The cost of future maintenance for all new/approved flood mitigation measures, including defences must be accepted by the developer.

The following flooding-related development constraints, and mitigation measures have been identified for the development proposals.

- The proposed MESL has been designed to be above the threshold event flood level wherever possible (flood proofed). The standard design (ballast upon sub-base) will allow the passage of flood water through the embankment, which will limit permanent damage caused by flooding and ensure the track can be returned to normal use as quickly as possible following a flood event.
- The implementation of a SuDS drainage system, will mitigate the risk of surface water flooding.
- A Flood Emergency Plan will be developed to set out the procedures, roles, responsibilities, and triggers for actions to be undertaken in the event of an actual or forecast flood event.

It is confirmed that the future cost of maintenance for any of the proposed mitigation measure will be met by the developer and future operator (TFW).

The MESL line will terminate before Longditch Reen at the western extent of the Site and it a buffer of at least 7 m will be retained between the MESL and the reen to allow access for NRW’s maintenance activities.

5.7 Flood warnings

TAN15 requires that the FCA demonstrates that effective flood warnings are provided at the site. The Site benefits from NRW’s Flood Warning Service (Section 4.3.2) for tidal flooding. NRW confirmed that a flood warning is likely to be issued well in advance (1 to 2 days) of flooding occurring (Appendix B.2).
5.8 Movement of goods away from the Scheme

The Scheme will not provide rail facilities for public services or be accessible by the public. The goods that may be present within the Site are trains (rolling stock). These can be moved via connection to existing Tata Service and Network Rail mainline tracks, and it will be reasonably practicable to do so upon the receipt of a flood warning for the Site and prior to the onset of tidal flooding.

5.9 Residual risks

It is not possible to completely eliminate future flood risk. There is always a residual risk of flooding on any development. For this Site, the risk may arise from the breach or overtopping of tidal flood defences, a failure of the flood warning system, or localised flooding caused by a blockage in the local drainage or watercourse systems.

5.9.1 Sensitivity to blockage – Monks’ Ditch

A sensitivity analysis was performed on the Proposed scenario which included simulating a 50% blockage of each of the hydraulic structures in the model in the 1% AEP event. This showed that the expected maximum depth of flooding at the Site is likely to decrease (by up to 2cm) in this scenario and replicated the results of the Baseline scenario (see Section 5.3 and Appendix C of Hydraulic Modelling Report).

The developer and future operator (Transport for Wales) will undertake routine maintenance on the hydraulic structures under the developer’s control (e.g. inverted syphon under Tata Service lines, Monks’ Ditch)
6 Conclusions and recommendations

6.1 Suitability of the Site for development

The Site is at risk of fluvial, surface water (pluvial) and tidal flooding. Tidal flooding is considered the predominant source of flood risk.

All the Site area falls within development advice zone C1 and the LPA should accept the principle of the development subject to parts (i) or (ii) and (iii) and (iv) of the TAN 15 Justification Test being passed.

If the principle of development at this Site is accepted by the LPA then, in order for the development to proceed, it will be necessary to demonstrate that the potential consequences of flooding as a result of the development are acceptable in terms of the criteria set out in TAN 15 (Part (iv) of the Justification Test).

● All criteria in A1.12 have been satisfied bar two which are:
  – “Escape and evacuation routes shown… to be operational under all conditions”. The development will not provide rail facilities for public services or be accessible by the general public. However, the risk to a small number of operational personnel will be managed through early evacuation in response to a flood warning (tidal flooding) or evacuation by site operational personnel or emergency services (fluvial event, Monks’ Ditch).
  – “no flooding elsewhere”. The proposed embankment in the floodplain of the Monks’ Ditch will cause a minor change to fluvial flood risk in the locality of the development but no significant increases to third parties or flood-sensitive receptors such as Llanwern Village or the adjacent Glan Llyn development. The construction of the rail embankment will result in net infilling, but this is not considered significant in terms of the local and wider tidal flood cell.

● It is not possible to meet A1.14 and A1.15 criteria. The proposed levels of all built infrastructure are maximised as far as is reasonably practicable within the constraints of the site, i.e. the need to tie in with existing infrastructure and meet rail design standards. Also, a higher (and subsequently wider) embankment would have greater fluvial flood risk and environmental impacts and require additional crossings/diversions of local reens.

● In relation to A1.15 criteria, TAN15 states that the values provided for tolerable conditions are not definitive. Rather, they are indicative and reflect conditions in which, given the presence of adequate warnings and preparation, appropriately equipped personnel could undertake emergency activities. The developer and operator will ensure that arrangements for receiving flood warnings, and preparations for emergency activities for flood events, are in place prior to the development being operational.

● Section 8 will be satisfied subject to the proposed surface water drainage strategy being developed into an appropriate detailed SuDS drainage design, once topographical survey and dimensional information of the existing drainage and reen system is obtained (see recommendations below).

6.2 Recommendations

The assessment has identified the following activities that will be required to be undertaken.
● Further information on the capacity and geometry of the reens and how the water flows through the system in locations where new culverts or diversions are proposed should be obtained. This information will be used to develop a detailed SuDS drainage design which will be submitted to Newport City Council (as Lead Local Flood Authority) for approval, prior to commencement of any parts of the development.

● Further consultation should be undertaken with NRW and Newport City Council (as Lead Local Flood Authority) especially where the detailed designs of the drainage system propose culvert extensions, infilling or diversions. Land Drainage consent will need to be obtained from NRW for any infilling, diversion or culverting of a reen, (temporary or permanent).

● If the planning application for the development is submitted after 7 January 2019, when schedule 3 of the Flood and Water Management Act 2010 is commenced in Wales, the surface water management design will need to be approved by a SuDS Approving Body (SAB) within the Lead Local Flood Authority, Newport City Council. Any SAB approval will be needed in addition to planning permission and prior to the commencement of construction.

● Prior to the Site being operational and utilising the information in this FCA (e.g. hydraulic modelling), a Flood Emergency Plan should be developed to set out the procedures, roles, responsibilities, and triggers for evacuating the Site.

6.3 Conclusion

Subject to the principle of the Scheme being accepted at this location, and the implementation of the recommendations outlined above, the flood risks and consequences to and from the Scheme will be limited and managed as far as is reasonably practicable within the Site and development constraints. From a flood risk standpoint, we envisage that there is no reason for the Scheme not to proceed.
Appendices

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A. Proposed development

Site Location Plan 367590-MMD-48-XX-DR-C-0001
General Arrangement Sheet 1 of 4 367590-MMD-48-XX-DR-C-0002
General Arrangement Sheet 2 of 4 367590-MMD-48-XX-DR-C-0003
General Arrangement Sheet 3 of 4 367590-MMD-48-XX-DR-C-0004
General Arrangement Sheet 4 of 4 367590-MMD-48-XX-DR-C-0005
Cross Sections 367590-MMD-48-XX-DR-C-0006

Proposed levels of embankment and track 367590-MMD-48-XX-DR-TR-0400
1. Do not scale any information from this drawing.
2. The service information supplied in this drawing is indicative only and should not be relied upon. Mott MacDonald cannot take any liability or responsibility for the accuracy of this information.
3. Where the layout may be affected by the presence of existing services, the location of such services should be confirmed on site prior to finalising the development.
4. This design has been undertaken using 1m Digital Terrain Model (DTM) LiDAR information available from 'Lle Geo-Portal'. Information was accessed 14th March 2017.

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Wood Street
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Cardiff, CF24 0EL
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Ordnance Survey 100026791

© 2017 South Wales Metro - Task Order 048
Llanwern Rail Facilities - Phase 1
General Arrangement Plan
Sheet 1 of 4

Mott MacDonald
1:5000
02.10.2018
RT
Pre-Application Consultation
Advisors
Mott MacDonald

Reference drawings
367590-MMD-48-XX-DR-C-0001 - Site Location Plan
367590-MMD-48-XX-DR-C-0003 - General Arrangement Plan Sheet 2 of 4
367590-MMD-48-XX-DR-C-0004 - General Arrangement Plan Sheet 3 of 4
367590-MMD-48-XX-DR-C-0005 - General Arrangement Plan Sheet 4 of 4
367590-MMD-48-XX-DR-C-0006 - Cross Sections
367590-MMD-48-XX-DR-C-0200 - Landscape Mitigation Plan Sheet 1 of 2
367590-MMD-48-XX-DR-C-0201 - Landscape Mitigation Plan Sheet 2 of 2
367590-MMD-48-XX-DR-C-0300 - Proposed Track Drainage Sheet 1 of 2
367590-MMD-48-XX-DR-C-0301 - Proposed Track Drainage Sheet 2 of 2
Existing Northern Service Line

40.000m Transition C g= 0 Re= 0mm/s Rd= 24.926mm/s

Up Main (90mph)

Material data.

SCALE 1:500

Proposed Vertical Schematic

TP Level = 6.610m

Lines assumed to be jointed track.

Datum 6.000m
B. Correspondence with NRW

B.1 Product 4 data

Reference number ATI-13364a

Tidal flood data from the Newport Velocity Depth Mapping version 6, undertaken by NRW in September 2016.

Figure 1: Current Floodmap (version 201707).

Figure 2: Depth Grid for 0.5% AEP (1 in 200) year event – defended excluding upper confidence intervals (2090 Commercial).

Figure 3: Depth Grid for 0.5% AEP (1 in 200) year event – defended including upper confidence intervals (2090 Commercial).

Figure 4: Hazard Grid for 0.5% AEP (1 in 200) year event – defended including upper confidence intervals (2090 Commercial).

Figure 5: Historic Floodmap (v201707)
1.0 Current Flood Map

Figure 1 shows the current Flood Map (version 201707) at this location. The Flood Map represents a combination of the undefended fluvial and tidal flood extents derived from a combination of detailed local and generalised national model data.

More information on the Flood Map can be obtained from the Natural Resources Wales website http://www.naturalresources.wales/floodriskmap

2.0 Local Flood Risk Mapping Study

Model Summary

This study (v6) was commissioned to update the Newport flood model. This study uses new tidal level predictions derived from the Caldicot and Wentlooge Coastal study, together with new updates to landform changes in the area (ref 5).

The baseline model included the improved Riverside tidal defences complete in summer 2012 and the Caerleon defence improvements completed July 2016.

The model was run for undefended and defended tidal flood events for 2015 and defended tidal events with climate change. QMED was used for fluvial inflows for all design runs.

Changes in sea level used in the model are shown in Table 1 (ref 2).

Table 1: Sea Level Rise (mm per year)

<table>
<thead>
<tr>
<th>Assumed vertical land movement</th>
<th>1990-2025</th>
<th>2025-2055</th>
<th>2055-2085</th>
<th>2085-2115</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.5</td>
<td>3.5</td>
<td>8.0</td>
<td>11.5</td>
<td>14.5</td>
</tr>
</tbody>
</table>

Results

The shape for the site has been used to query the elevation, depth, velocity and hazard grids to provide the results in Tables 3, 4 & 5. These results all relate to a base year of 2015.

The depth grids for the defended tidal 1 in 200 (2115) excluding confidence intervals and 1 in 200 (2115) including confidence intervals, are shown in Figures 2 and 3.

The hazard grid for the defended 1 in 200 year with future climate change including confidence interval is shown in Figure 4.

Table 2: Legend for Hazard Grids

<table>
<thead>
<tr>
<th>Flood Hazard Rating (HR)</th>
<th>Colour Code</th>
<th>Hazard to People Classification (ref 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 0.75</td>
<td></td>
<td>Very low hazard – Caution</td>
</tr>
<tr>
<td>0.75 to 1.25</td>
<td></td>
<td>Danger for some – includes children, the elderly and the infirm</td>
</tr>
<tr>
<td>1.25 to 2.0</td>
<td></td>
<td>Danger for most – includes the general public</td>
</tr>
<tr>
<td>More than 2.0</td>
<td></td>
<td>Danger for all – includes the emergency services</td>
</tr>
</tbody>
</table>
**Model Results - the Site**

*Null values show that the site is flood free for that return period.*

**Table 3: Defended Model Results – Median values**

<table>
<thead>
<tr>
<th></th>
<th>Defended (excluding upper confidence interval)</th>
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<th></th>
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<tr>
<td></td>
<td>Defended (excluding upper confidence interval)</td>
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<tr>
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**Table 4: Defended Model Results – Upper Confidence**

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<tr>
<td>Hazard, max</td>
<td>NULL</td>
<td>NULL</td>
<td>NULL</td>
<td>NULL</td>
<td>NULL</td>
<td>NULL</td>
</tr>
</tbody>
</table>

**Table 5: Undefended Model Results – Median Values**

<table>
<thead>
<tr>
<th>Undefended (2015)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 in 200</td>
<td>1 in 1000</td>
</tr>
<tr>
<td>Model Grid Size (m)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Wet Cells</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Elevation, mean (mAOD)</td>
<td>NULL</td>
<td>NULL</td>
</tr>
<tr>
<td>Elevation, max (mAOD)</td>
<td>NULL</td>
<td>NULL</td>
</tr>
<tr>
<td>Depth, mean (m)</td>
<td>NULL</td>
<td>NULL</td>
</tr>
<tr>
<td>Depth, max (m)</td>
<td>NULL</td>
<td>NULL</td>
</tr>
<tr>
<td>Velocity, mean (m/s)</td>
<td>NULL</td>
<td>NULL</td>
</tr>
<tr>
<td>Velocity, max (m/s)</td>
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<td>NULL</td>
</tr>
<tr>
<td>Hazard, mean</td>
<td>NULL</td>
<td>NULL</td>
</tr>
<tr>
<td>Hazard, max</td>
<td>NULL</td>
<td>NULL</td>
</tr>
</tbody>
</table>
3.0 Additional Information

Historic flooding near the site is shown in Figure 5.

The local authority may be able to provide information on issues such as localised flooding from sewers, drains and culverts.

4.0 References

2. Flood and Coastal Defence Appraisal Guidance: FCDPAG3 Economic Appraisal. Supplementary Note to Operating Authorities – Climate Change Impacts; October 2006; Department for Environment, Food and Rural Affairs.
5. Supplementary note on flood hazard ratings and thresholds for development planning and control purpose, May 2008

5.0 Notes

Undefended scenarios are provided as being a possible worst case scenario in the event of defence failure. They are used as the basis of the Flood Map.

The scope of the model is the mapping of flood risk, it is not intended for detailed design. The model should be considered as the starting point for more detailed modelling, commensurate with the consequences of flooding at the site of interest.

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If the data is used in support of an FCA, please include the reference number.

Please refer to NRW standard terms and conditions.

Flood Risk Analysis
01/08/2017
Figure 1: Current Floodmap [v201707]

Legend
- Site
- Defences
- Main Rivers
- Areas Benefiting from Defences
- Flood Storage Areas
- Flood Zone 3
- Flood Zone 2

Project
Llanwern Steal Works, Newport (ATI-13364a)

Drawing
Figure 1: Current Floodmap [v201707]

Date 01 Aug 2017
Scale 1:25,000
Figure 2: Depth Grid for 0.5% AEP (1 in 200) year event - defended excluding upper confidence intervals (2090 Commercial)

Legend

- Site
- T200 2090 (Depth)
  - < 0.3
  - 0.3 - 0.6
  - 0.6 - 1.0
  - 1.0 - 2.0
  - > 2

Project

Llanwern Steal Works, Newport (ATI-13364a)

Drawing

Figure 2:
Depth Grid for 0.5% AEP (1 in 200) year event - defended excluding upper confidence intervals (2090 Commercial)

Date

01 Aug 2017

Scale

1:25,000
Figure 3: Depth Grid for 0.5% AEP (1 in 200) year event - defended including upper confidence intervals (2090 Commercial)
Figure 4: Hazard Grid for 0.5% AEP (1 in 200) year event - defended including upper confidence intervals (2090 Commercial)

Legend

- **Site**
- **T200 2090 +CI (Hazard)**
  - Blue: < 0.75
  - Yellow: 0.75 - 1.25
  - Orange: 1.25 - 2.00
  - Red: > 2.00

Project
Llanwern Steal Works, Newport
(ATIC-13364a)

Drawing
Figure 4: Hazard Grid for 0.5% AEP (1 in 200) year event - defended including upper confidence intervals (2090 Commercial)

Date
01 Aug 2017

Scale
1:25,000
Historic Floodmap (v201707)

Site

Legend
- Site
- Historic Flood Map

Project
Llanwern Steel Works, Newport (ATI-13364a)

Drawing
Figure 5: Historic Floodmap (v201707)

Date
01 Aug 2017

Scale
1:25,000
Reference number ATI-13364b (coastal flood data)

Coastal flood data from the Caldicot and Wentlooge Coastal Modelling, version 1, undertaken by JBA for NRW in June 2016.

Figure 1: Current Floodmap (version 201707).

Figure 2: Depth Grid for 0.5% AEP (1 in 200) year event – defended excluding upper confidence intervals (2090 Commercial).

Figure 3: Depth Grid for 0.5% AEP (1 in 200) year event – defended including upper confidence intervals (2090 Commercial).

Figure 4: Hazard Grid for 0.5% AEP (1 in 200) year event – defended including upper confidence intervals (2090 Commercial).

Figure 5: Historic Floodmap (v201707)
1.0 Current Flood Map

Figure 1 shows the current Flood Map (version 201707) at this location. The Flood Map represents a combination of the 
undefended 
fluvial and tidal flood extents derived from a combination of detailed local and generalised national model data.

The current tidal flood map in this area was updated by NRW in 2013 (ref 1) based on the set of extreme sea levels generated by the EA in 2011 (ref 2).

More information on the Flood Map can be obtained from the Natural Resources Wales website http://www.naturalresources.wales/floodriskmap

2.0 Local Flood Risk Mapping Study

Model Summary
This study was commissioned to update the coastal flood model in the area. This study uses extreme combined wave overtopping, wind and tidal level predictions together with new LiDAR data and information on changes to landforms in the area (ref 5).

The model was run for undefended and defended tidal flood events for 2015 and defended tidal events with climate change.

Changes in sea level used in the model are shown in Table 1 (ref 2).

<table>
<thead>
<tr>
<th>Assumed vertical land movement</th>
<th>1990-2025</th>
<th>2025-2055</th>
<th>2055-2085</th>
<th>2085-2115</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.5</td>
<td>3.5</td>
<td>8.0</td>
<td>11.5</td>
<td>14.5</td>
</tr>
</tbody>
</table>

Results
The shape for the site has been used to query the elevation, depth, velocity and hazard grids to provide the results in Tables 3, 4 and 5. These results all relate to a base year of 2015.

The depth grids for the defended tidal 1 in 200 (2090) excluding confidence intervals and 1 in 200 (2090) including confidence intervals, are shown in Figures 2 and 3.

The hazard grid for the defended 1 in 200 year with future climate change including confidence interval is shown in Figure 4.

<table>
<thead>
<tr>
<th>Flood Hazard Rating (HR)</th>
<th>Colour Code</th>
<th>Hazard to People Classification (ref 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 0.75</td>
<td></td>
<td>Very low hazard – Caution</td>
</tr>
<tr>
<td>0.75 to 1.25</td>
<td>!</td>
<td>Danger for some – includes children, the elderly and the infirm</td>
</tr>
<tr>
<td>1.25 to 2.0</td>
<td>!</td>
<td>Danger for most – includes the general public</td>
</tr>
<tr>
<td>More than 2.0</td>
<td>!</td>
<td>Danger for all – includes the emergency services</td>
</tr>
</tbody>
</table>
**Model Results - the Site**

Null values show that the site is flood free for that return period.

**Table 3: Defended Model Results – Median values**

<table>
<thead>
<tr>
<th></th>
<th>1 in 200</th>
<th>1 in 1000</th>
<th>1 in 1000</th>
<th>1 in 1000</th>
<th>1 in 1000</th>
<th>1 in 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Grid Size (m)</td>
<td>2015</td>
<td>2090</td>
<td>2115</td>
<td>2015</td>
<td>2090</td>
<td>2115</td>
</tr>
<tr>
<td>Wet Cells</td>
<td>2015</td>
<td>2090</td>
<td>2115</td>
<td>2015</td>
<td>2090</td>
<td>2115</td>
</tr>
<tr>
<td>Elevation, mean (mAOD)</td>
<td>NULL</td>
<td>6.11</td>
<td>6.85</td>
<td>NULL</td>
<td>7.43</td>
<td>7.91</td>
</tr>
<tr>
<td>Elevation, max (mAOD)</td>
<td>NULL</td>
<td>6.38</td>
<td>6.90</td>
<td>NULL</td>
<td>7.44</td>
<td>7.91</td>
</tr>
<tr>
<td>Depth, mean (m)</td>
<td>NULL</td>
<td>0.82</td>
<td>1.27</td>
<td>NULL</td>
<td>1.75</td>
<td>2.17</td>
</tr>
<tr>
<td>Depth, max (m)</td>
<td>NULL</td>
<td>3.02</td>
<td>3.49</td>
<td>NULL</td>
<td>4.07</td>
<td>4.55</td>
</tr>
<tr>
<td>Velocity, mean (m/s)</td>
<td>NULL</td>
<td>0.14</td>
<td>0.52</td>
<td>NULL</td>
<td>0.70</td>
<td>0.48</td>
</tr>
<tr>
<td>Velocity, max (m/s)</td>
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<td>1.54</td>
<td>2.55</td>
<td>NULL</td>
<td>2.93</td>
<td>2.59</td>
</tr>
<tr>
<td>Hazard, mean</td>
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<td>1.72</td>
<td>NULL</td>
<td>2.17</td>
<td>2.33</td>
</tr>
<tr>
<td>Hazard, max</td>
<td>NULL</td>
<td>2.63</td>
<td>5.15</td>
<td>NULL</td>
<td>5.70</td>
<td>5.50</td>
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</tbody>
</table>

**Table 4: Defended Model Results – Upper Confidence**

<table>
<thead>
<tr>
<th></th>
<th>1 in 200</th>
<th>1 in 1000</th>
<th>1 in 1000</th>
<th>1 in 1000</th>
<th>1 in 1000</th>
<th>1 in 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Grid Size (m)</td>
<td>2015</td>
<td>2090</td>
<td>2115</td>
<td>2015</td>
<td>2090</td>
<td>2115</td>
</tr>
<tr>
<td>Wet Cells</td>
<td>2015</td>
<td>2090</td>
<td>2115</td>
<td>2015</td>
<td>2090</td>
<td>2115</td>
</tr>
<tr>
<td>Elevation, mean (mAOD)</td>
<td>NULL</td>
<td>6.11</td>
<td>6.85</td>
<td>NULL</td>
<td>7.43</td>
<td>7.91</td>
</tr>
<tr>
<td>Elevation, max (mAOD)</td>
<td>NULL</td>
<td>6.38</td>
<td>6.90</td>
<td>NULL</td>
<td>7.44</td>
<td>7.91</td>
</tr>
<tr>
<td>Depth, mean (m)</td>
<td>NULL</td>
<td>0.82</td>
<td>1.27</td>
<td>NULL</td>
<td>1.75</td>
<td>2.17</td>
</tr>
<tr>
<td>Depth, max (m)</td>
<td>NULL</td>
<td>3.02</td>
<td>3.49</td>
<td>NULL</td>
<td>4.07</td>
<td>4.55</td>
</tr>
<tr>
<td>Velocity, mean (m/s)</td>
<td>NULL</td>
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<td>0.70</td>
<td>0.48</td>
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<td>Velocity, max (m/s)</td>
<td>NULL</td>
<td>1.54</td>
<td>2.55</td>
<td>NULL</td>
<td>2.93</td>
<td>2.59</td>
</tr>
<tr>
<td>Hazard, mean</td>
<td>NULL</td>
<td>1.28</td>
<td>1.72</td>
<td>NULL</td>
<td>2.17</td>
<td>2.33</td>
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<td>Hazard, max</td>
<td>NULL</td>
<td>2.63</td>
<td>5.15</td>
<td>NULL</td>
<td>5.70</td>
<td>5.50</td>
</tr>
</tbody>
</table>

**Table 5: Undefended Model Results – Median Values**

<table>
<thead>
<tr>
<th></th>
<th>1 in 200</th>
<th>1 in 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Grid Size (m)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Wet Cells</td>
<td>18560</td>
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</tr>
<tr>
<td>Elevation, mean (mAOD)</td>
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</tr>
<tr>
<td>Elevation, max (mAOD)</td>
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<td>Depth, mean (m)</td>
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<td>Depth, max (m)</td>
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<tr>
<td>Velocity, mean (m/s)</td>
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<td>1.52</td>
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<tr>
<td>Velocity, max (m/s)</td>
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<td>4.86</td>
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<td>Hazard, mean</td>
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<tr>
<td>Hazard, max</td>
<td>8.53</td>
<td>9.50</td>
</tr>
</tbody>
</table>
Model Results – Emergency Access to Site

A suitable access route has not been provided

3.0 Additional Information

Figure 5 shows the approximate outline of the December 1999 flood event.

The local authority may be able to provide information on issues such as localised flooding from sewers, drains and culverts.

4.0 References

1. Tidal Flood Mapping Study (Aberthaw to Undy), Study report Issue 2, NRW June 2013
   Tidal Flood Mapping Study (Penarth to Chepstow), Atkins July 2008
3. Flood and Coastal Defence Appraisal Guidance: FCDPAG3 Economic Appraisal. Supplementary Note to Operating Authorities – Climate Change Impacts; October 2006; Department for Environment, Food and Rural Affairs.
6. Supplementary note on flood hazard ratings and thresholds for development planning and control purpose, May 2008

5.0 Notes

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Flood Risk Analysis
23/08/2017
Figure 1: Current Floodmap

Legend
- Site
- Defences
- Main Rivers
- Areas Benefiting from Defences
- Flood Storage Areas
- Flood Zone 3
- Flood Zone 2

Project
Llanwern Steel Works, Newport
[Ref: ATI-13364b]

Drawing
Figure 1:
Current Floodmap
[v201707]

Date 23 Aug 2017
Scale 1:25,000
Figure 2: Depth Grid for 0.5% AEP (1 in 200) year event - defended excluding upper confidence intervals (2090 Commercial)
Figure 3: Depth Grid for 0.5% AEP (1 in 200) year event - defended including upper confidence intervals (2090 Commercial)
Figure 4: Hazard Grid for 0.5% AEP (1 in 200) year event - defended including upper confidence intervals (2090 Commercial)
Reference number ATI-13364b (breach scenarios)

Breach scenarios modelled data undertaken by HR Wallingford for NRW [date of study not provided by NRW].

Figure 1: Breach Locations.

Figure 2: Breach Depth Grid for 0.5% AEP (1 in 200) year event - defended excluding upper confidence intervals (2115).

Figure 3: Breach Depth Grid for 0.1% AEP (1 in 1000) year event - defended excluding upper confidence intervals (2115).

Figure 4: Breach Hazard Grid for 0.1% AEP (1 in 1000) year event - defended excluding upper confidence intervals (2115).
Breach Scenarios

Breach analysis of the embankments which form the coastal defences in the Caldicot and Wentlooge Levels was undertaken to aid in the understanding of future flood risk. This analysis was carried out by the HR Wallingford using the EMBREA (EMbankment BREaCh) model to simulate the breaching process for 12 embankments in the Caldicot model and 5 embankments in the Wentlooge model (See Figure 1 for breach locations near your site).

Breach modelling was performed for a number of present day events and climate change events (2115). Not all breaches were included in all events simulated (this can be seen in the extract from the model report below Table 1). As the events increased in magnitude the number of defences at risk of breaching increased.

<table>
<thead>
<tr>
<th>Embankment number</th>
<th>Events 5-year</th>
<th>20-year</th>
<th>200-year</th>
<th>1,000-year</th>
<th>200-year CC</th>
<th>1,000-year CC</th>
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</tr>
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<td>19</td>
<td></td>
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<td>20</td>
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<td>Yes</td>
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<tr>
<td>32b</td>
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<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1</strong></td>
<td><strong>4</strong></td>
<td><strong>8</strong></td>
<td><strong>9</strong></td>
<td><strong>15</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

Breach Results

The shape for the site has been used to query the elevation, depth, velocity and hazard grids to provide the results in Table 2.

The depth grids for the defended tidal 1 in 200 plus Climate Change (2115) and 1 in 1000 plus Climate Change (2115) with multiple breaches, are shown in Figures 2 & 3.

The hazard grid for the defended tidal 1 in 1000 plus Climate Change (2115) with multiple breaches, is shown in Figure 4.
Table 2: Breach Scenarios

<table>
<thead>
<tr>
<th>Breach</th>
<th>T200cc</th>
<th>T1000cc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Grid Size (m)</td>
<td>Meters</td>
<td>Meters</td>
</tr>
<tr>
<td>Wet Cells</td>
<td>4.1384</td>
<td>5.0498</td>
</tr>
<tr>
<td>Elevation, mean (mAOD)</td>
<td>7.43</td>
<td>8.34</td>
</tr>
<tr>
<td>Elevation, max (mAOD)</td>
<td>7.50</td>
<td>8.42</td>
</tr>
<tr>
<td>Depth, mean (m)</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Depth, max (m)</td>
<td>1.79</td>
<td>2.67</td>
</tr>
<tr>
<td>Velocity, mean (m/s)</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>Velocity, max (m/s)</td>
<td>0.51</td>
<td>0.63</td>
</tr>
<tr>
<td>Hazard, Mean</td>
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<td>0.50</td>
</tr>
<tr>
<td>Hazard, Max</td>
<td>2.21</td>
<td>2.75</td>
</tr>
</tbody>
</table>

Flood Risk Analysis
29/08/2017
Llanwern Steel Works, Newport

Project
Llanwern Steel Works, Newport
[Ref: ATI-13364b]

Drawing
Figure 2:
Breach Depth Grid for 0.5% AEP
(1 in 200) year event-defended excluding upper confidence intervals (2115)

Date
29th August 2017

Scale 1:25,000
Figure 3: Breach Depth Grid for 0.1% AEP (1 in 1000) year event-defended excluding upper confidence intervals (2115)
Figure 4: Breach Hazard Grid for 0.1% AEP (1 in 1000) year event-defended excluding upper confidence intervals (2115)
Reference number ATI-13364b

Figure 1: JFLOW outlines for 0.1% AEP (1 in 1000) year event - fluvial flooding
Figure 1: JFLOW outlines for 0.1% AEP (1 in 1000) year event - fluvial flooding
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B.2 Pre-application meetings
**Agenda**

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<td>Natalie Haines</td>
<td>All attendees</td>
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<tr>
<th>Project title</th>
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<tr>
<td>Subject</td>
<td>Pre-application meeting with NRW – Flood risk</td>
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<tr>
<td>Location</td>
<td>Plas Yr Afon Meeting Room, NRW Offices, St Mellons, Cardiff</td>
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</table>
| Attendees           | Gary Purnell – Technical Specialist, Flood Risk Analysis  
Mark Groves – Engineer, Internal Drainage District  
Natalie Haines – MM Flood Risk Technical Lead  
Harriet Goddard – MM Civil Apprentice |
| Apologies           | Richard Morris – MM Project Manager |
| Division            | BNI-Western-Cardiff |
| Project number      | 367590 |
| Date of meeting     | 10/10/17 @ 1:30 |

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<td>Planning context</td>
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<td>Confirm expected lifetime of the development</td>
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<td>Extreme flood – with or without climate change?</td>
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<td>Suitability of using NRW vs Halcrow tidal data (developed for the St Modwen Development)</td>
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<td>Confirm levels of “threshold frequency” and “extreme” flood event</td>
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<td>Overview of existing arrangements</td>
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<td>Changes proposed by St Modwen Development</td>
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<td>Suitability of using Atkins 2002/2016 model (developed for the St Modwen Development) for the FCA</td>
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<td>Confirm modelling and assessment requirements for FCA</td>
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<td>Confirm rail crossing requirements</td>
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<td>Acceptability of proposals for crossing and diversions</td>
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<td>The “flood-free” level and what aspects of the development need to be “flood free”</td>
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<td>Confirmation of approach to analysing tolerable conditions</td>
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<td>Flood defences structurally adequate</td>
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<td>Future maintenance of defence and mitigation measures</td>
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<td>Occupants aware of flood risk</td>
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<td>Flood Warnings to site</td>
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<td>Development flood proofing/resilience</td>
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<td>No flooding elsewhere</td>
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<td>Pre-application submission of draft FCA for NRW review</td>
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<td>Pre-application consultation on Land Drainage consent</td>
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<td>Confirm supporting documents or assessments that will be required for either FCA or Land Drainage Consent.</td>
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Attachments with Agenda:

- Draft alignment of new railway (drawing number 367590-MMD-26-XX-DR-C-0001)
- Atkins Updated Modelling Memo for the St Modwen’s Development (dated: 17 May 2017)
- Reen location and catchment plan
Record of meeting

Project title: Cardiff Metro (Llanwern Station)

Subject: Pre-application meeting with NRW – Flood Risk

Location: Plas Yr Afon Meeting Room, NRW Offices, St Mellons, Cardiff

Date/time of meeting: 2nd October 2017, 13:30

Project number: 367590

Attendees:

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<tr>
<td>Gary Purnell</td>
<td>GP</td>
<td>Technical Specialist, Flood Risk Analysis</td>
<td>NRW</td>
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<td>Mark Groves</td>
<td>MG</td>
<td>Engineer, Internal Drainage District</td>
<td>NRW</td>
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<td>Natalie Haines</td>
<td>NH</td>
<td>Mott MacDonald Flood Risk Technical Lead</td>
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<td>Harriet Goddard</td>
<td>HG</td>
<td>Mott MacDonald Civil Apprentice</td>
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Apologies:

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<td>Richard Morris</td>
<td>RM</td>
<td>Mott MacDonald Project Manager</td>
<td>MM</td>
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Recorded by: HG and NH

Papers for meeting:

- Draft General Arrangement (drawing number 367590-MMD-26-XX-DR-C-000), Atkins Technical Note on Monks’ Ditch modelling for the St Modwen’s Development (dated: 17 May 2017) and reen location and catchment plan (provided by MG).

Item | Text | Action
--- | --- | ---
1.0 | **Introduction** | NH introduced the meeting, explaining that the purpose of the meeting is to discuss with NRW the work planned for the project. NH explained that the project is at an early stage there is limited detail on proposal at present.

2.0 | **Overview of proposal** | NH provided an overview of the proposal, outlined as:
- Two new passenger lines connecting from and to the existing South Wales Mainline. The passenger lines are called South Wales Metro Lines.
- A new “Park and Ride” Llanwern Station (unmanned). The platform is to be 150m long to begin, with provision to extend to 280m in future. The platform is accessed by passengers via a new footbridge to be constructed from a new car park to the south of the Tata Service Lines. The footbridge will include both steps and ramp access. The car park to the south will be sized to hold 1000 vehicles. The car park will be accessed via the new road being constructed for the Glan Lan commercial development, (via the Amazon warehouse roundabout).
- A stabling line for holding trains for use on event days. The stabling line is referred to as the MES (Major Events Stabling) Line.
- The MES is connected to the South Wales Metro Lines by 2 South Wales Metro Lines Crossovers and is also connected to the existing Tata Service Lines to the south by Connecting Lines.
GP expresses concerns that the entire strip between the existing Tata and Network Rail line would be infilled (and that land available for flood storage would be lost). NH reassured GP that there were no current plans to infill the whole area. NH states that she has visited site, however there is currently poor access to the site due to dense vegetation. NH states that the MM Ecologists have struggled to undertake surveys and there was no topographical survey at present as they couldn’t get on site. However, NH understood there were plans to clear some of the vegetation over winter to gain access and topographical survey will be completed in due course.

NH to confirm if MM can provide NRW with GIS files of proposed rail alignment and station location. However, NH explained that there is flexibility, and it is likely that the alignment/station design could change.

Planning context – NH confirmed that the planning application process for this project is undecided. It could be pursued via:

- Town and Country Planning (T&CP);
- Transport Works Act Order (TWAO); or,
- Development of National Significance (DNS).

NH advised that there are ongoing discussions with Newport City Council and Welsh Government to determine the route. NH states that once we know what route will be taken MM intend to engage with the wider NRW teams, via NRW’s SE Area Planning Team (contact Lindy Marshall).

Lifetime of the development. GP confirmed that this is a commercial development so the expected lifetime development with respect to TAN15 is 75 years. GP confirmed that NRW Product 4 flood data provided for the year 2090 is representative climate change data for this 75 year lifetime of development.

Extreme flood – GP confirmed NRW’s view that that with respect to the extreme flood, this is classed as the 1 in 1000 year plus climate change for tidal flooding and the 1 in 1000 year current day for the fluvial flooding.

3.0 Flood risk from tidal/coastal

NH advised that Product 4 data had been received. 3 sets of tidal flood data has been provided:

- Tidal flood data from the Newport Velocity Depth Mapping version 6, undertaken by NRW in September 2016.
- Coastal flood data from the Caldicot and Wentlooge Coastal Modelling, version 1, undertaken by JBA for NRW in June 2016.
- Breach scenarios modelled data undertaken by HR Wallingford for NRW

GP advised that the Caldicot and Wentlooge Coastal Modelling (JBA 2016) has been used for “Threshold Frequency” and “Extreme” events (as required by TAN15).

GP confirmed that tidal flooding is considered the predominant source of flood risk at this site.

4.0 Flood Risk from Monks’ Ditch

GP confirmed that NRW doesn’t currently hold a model for Monks’ Ditch.

Neither GP or MG are aware of any historical flood issues along the section of Monks’ Ditch that goes through the site.

Group discussed the suitability of using Atkins 2002/2016 model. NH is aware that Monks’ Ditch has been modelled by Atkins for St Modwen (Glan Lyn development). GP provided the following contacts at Atkins:
Record of meeting

- Mike Vaughan
- Dyfan Walters – modelling lead

GP confirmed that NRW has reviewed and accepted this model adequate for Flood Consequences Assessment (FCA) purposes. NH to speak to St Modwen/Atkins to obtain copy of model, to assess whether this model could be used to support the FCA for Llanwern Station. GP advised that the latest Atkins Technical Note report is dated 5th August 2016.

Overview of existing arrangements and changes proposed by St Modwen (Glan Lyn) development. NH has researched the planning application for the St Modwen site and the available information suggests that the surface water generated by the development is to be discharged via a new pumping station into the Monks’ Ditch (discharge point south of our site). GP confirmed this is proposed, however the pumping regime is being agreed with NRW. The modelling has indicated that the new Glan Lyn development will only be permitted to discharge to Monks’ Ditch during low flows and/or at low tides (no tidallock) to ensure flood risk in the Goldcliff area does not increase.

Flooding issues in Llanwern village - MG+GP confirmed there were known flooding issues in the village. They described that flooding was caused by the Monks’ Ditch spilling out of bank in the Bishton Road area and flowing overland (via agricultural fields and the main road in the village) until it reaches a system of reens near Station Road (known locally as the Station Road System) where it drains through a 900mm culvert underneath the NR line and eventually into the reen system in the land between the NR mainline and TATA service line (our site). GP explained that an existing NRW flood bank (located along the right /west bank of Monks’ Ditch, near Barn Farm, has historically been susceptible to erosion issues along its crest due to trampling by horses. This has now been remedied and reinstated, however, the reinstatement works were purely to maintain the existing crest level which is less than a 1 in 100 year standard of protection.

GP states that Newport Council (contact Matthew Jones would hold more information of the “Station Road system”. NH confirmed that she has already contacted Matthew, but did not receive this information as part of that contact, so will contact him again.

GP explained that the local community are very sensitive to drainage and flooding issues (due to flood history) and would have an interest to any modifications in the local reen system.

Both the Metro and MES lines will need to cross the Monks’ Ditch. NH outlined that the preferred option is for the three separate bridges, side-by-side, rather than a single bridge (due to asset ownership being different for the two bridges). NH outlined the current design assumption for the two bridges as:

- Clear span
- Soffit level not to exceed soffit level of NR bridge upstream
- Abutments and approaches may be in flood plain (if modelling shows there is a flood plain). If so compensatory flood storage may be required.

GP stated that tidal flooding is considered the predominant source of flood risk at this site and advised that the tidal levels are likely to exceed the fluvial level for the “Threshold Frequency” and “Extreme” events (as required by TAN15).

GP confirmed that there will be a need to get a flood risk activity permit (formerly a Flood Defence Consent) to work in, under, over and adjacent to the Monks Ditch main river watercourse.

All details in respect of these permits can be found on the following link:
6.0 Flood Risk from Liswerry Pill

NH explained that the MES would extend towards Liswerry Pill on the western extent of the site.

MG explained that in this area you have Liswerry Pill (NRW Main River) but also Longditch Reen (IDD Main Drain) which is east of Liswerry Pill.

NH explained the current proposal for the MES is that it will cross the Longditch Reen but stop before reaching Liswerry Pill.

GP stated that on this basis flood modelling Liswerry Pill would not be required for the FCA.

NH also explained there is possibility for the MES to stop before it crosses the Longditch Reen. MG states that this option would be his preference, as this would continue to provide access to the reen for NRW maintenance. MG advised to stay at least 7m to the east of Longditch Reen. NH to pass on NRW preferences to the MM design team.

7.0 Flood risk from reens

NH asked whether NRW hold any records of the reen drainage system within the project site. MG confirmed that NRW do not hold plans of the reens. MG confirm that maintenance is undertaken by the riparian owner (TATA and St Modwens) and NRW do not maintain these reens.

MG stated that MM would need to have an idea of volume/size of the reens and where the water flows in locations where crossings/diversion are proposed. This will have to be obtained from local investigation (request to TATA) as part of the project. NH suggested that the primary function of the reen is storage. MG confirmed that the storage and conveyance capacity of the reens should be maintained wherever crossings/diversions are proposed.

In terms of the proposed crossing and diversions, NH outline the following approximate extent of works currently envisaged:

- Up to 12 “simple” crossings at the west section of the site.
- Diversion of reens west of Monks’ Ditch to accommodate Metro and MES lines.
- Diversion of the reen to the north of the proposed platform to accommodate the new platform.
- Up to 19 “simple” crossings at the east section of the site.

MG confirm that any diversion or crossings would need consent

NH suggested the greatest potential concern would be the platform, as this is currently planned to be aligned directly over a reen. MG confirmed the diversion would need to be “open water” i.e. a culverted diversion is not likely to be acceptable.

NH explained that we need to review the ground conditions for diverted sections. NH mentioned that the ground investigation undertaken for the NR electrification is being sought.

MG explained that this is outside the SSSI however the water in these reens will eventually flow into the SSSI. MG outlined that the Glen Llyn site had been required to monitor water quality via a number of sampling points prior to connecting the new on-site ditches/drainage systems to the wider reen system.

NH noted this concern and will pick up with MM Contamination lead.
8.0 TAN15 acceptability criteria

NH asked GP to confirm what aspects of the development need to be “flood free”. GP confirmed that the car park would have already been raised to an acceptable level as part of the permission for the Glan Llyn Commercial Development. NH to seek proposed levels of car park to inform the FCA.

In terms of flood defences (structural adequacy and maintenance) GP confirmed that the strategy for the coastline is to continue to maintain the defences i.e. Hold the Line (Shoreline Management Plan 2). GP also confirmed that as the site is north of the proposed M4, the site would potentially benefit from the works/protection proposed as part of this scheme, should this be permitted in the future.

NH confirmed that the proposed escape and evacuation route would be south via the new access road and Amazon roundabout. NH to request additional Product 4 flood data for the access track to inform the FCA. NH explained that a pedestrian bridge to Llanwern village is being considered. If taken forward this would provide an additional pedestrian access away from the flood risk area.

In terms of flood warnings for the site, GP confirmed that the site benefits from NRW’s Flood Warning Service. However, this only covers tidal flooding risk. GP explained that a flood warning e.g. Flood Alert, is likely to be issued well in advance of possible tidal flooding occurring.

No other site-specific comments were provided on the remaining TAN15 acceptability criteria. However, these will need to be included in the FCA for completeness.

9.0 Next Steps

NH confirmed that MM intends to continue pre-application discussions with NRW and intends (subject to having time in the programme) to submit a draft FCA for NRW review. GP stated that this service is now chargeable and any request should be submitted via Lindy Marshall.

NH also confirmed that MM intends to continue pre-application discussions in relation to the land drainage consent required by the Internal Drainage District (IDD).

GP and MG outlined the typical information required for the Flood Risk Activity Permit (Main River) and Land Drainage consent (ordinary watercourse/reens) as:

- Supporting information on flood risk (i.e. FCA)
- Site plan
- Culvert/crossing design
- Diversion location / compensatory storage design
- Contractor method statement
- Details of any temporary works
- Detail of likely water quality impacts and monitoring proposed

MG advised that the Land Drainage byelaws for IDD ordinary watercourses had recently been updated. MG to provide MM with a copy of the updated byelaws.

GP and MG explained the charges for the Permits/Consents as:

- Land Drainage consent = £50 per structure – Structure defined as a physical element of an application concerning drainage regime for example, Single platform structure resulting in the need for:
  1. 1 x Culvert
  2. 1 x Outfall to discharge surface water
  ○ 1 x Section realignment of watercourse = 3 structures (£150.00 charge)
Flood Risk Activity Permit, charges are banded as follows. Low = £270, Medium = £360, and High = £540. With 2 or more similar structures, there is a 70% discount on the other structures, if they are deemed by NRW to be Multi Flood Risk Activity Permits.

In order to qualify for a Multi Flood Risk Activity Permit, the following conditions must be met:

- The application must be made by the same applicant;
- The application must be for the same activity;
- The applications must be received at the same time;
- The activities must be contained within the same vicinity/site;
- There must be the same site characteristics.

GP and MG confirmed that as a general rule clear span bridges are preferred over culverts. They also confirmed that pre-application advice for these consents is not chargeable and is currently built into the overall cost in respect of Flood Risk Activity Permits.

AOB

None

[circulated in draft on 13/10/17, update with comments received on 24/10/17]
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<td>All attendees</td>
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**Project title**  
Cardiff Metro (Llanwern Station)

**Subject**  
Pre-application meeting with NRW – Flood risk

**Location**  
Skype

**Attendees**  
- Gary Purnell – Technical Specialist, Flood Risk Analysis, nRW  
- Lindy Marshall – Planning, NRW  
- Natalie Haines – MM Flood Risk Technical Lead

**Apologies**  
Richard Morris – MM Project Manager

**Division**  
BNI-Western-Cardiff

**Project number**  
367590

**Date of meeting**  
20/07/18 @ 2pm

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<td>Next steps</td>
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</tr>
<tr>
<td></td>
<td>Pre-application review of baseline flood model for Monks Ditch</td>
<td>NH</td>
</tr>
<tr>
<td></td>
<td>Wider planning timescales</td>
<td>NH</td>
</tr>
<tr>
<td>6</td>
<td>AOB</td>
<td></td>
</tr>
</tbody>
</table>
Record of meeting

Project title  Cardiff Metro (Llanwern Station)

Subject  Pre-application meeting with NRW – Initial Designs

Location  Skype

Date/time of meeting  20th July 2018, 2pm

Project number  367590BA

Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Initials</th>
<th>Company/unit/division</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gary Purnell</td>
<td>GP</td>
<td>Technical Specialist, Flood Risk Analysis, NRW</td>
<td>NRW</td>
</tr>
<tr>
<td>Lindy Marshall</td>
<td>LM</td>
<td>Planning, NRW</td>
<td>NRW</td>
</tr>
<tr>
<td>Natalie Haines</td>
<td>NH</td>
<td>Flood Risk Technical Lead, Mott MacDonald</td>
<td>MM</td>
</tr>
<tr>
<td>Chris Kennedy</td>
<td>CK</td>
<td>Civil Engineer, Mott MacDonald</td>
<td>MM</td>
</tr>
<tr>
<td>Ruth Parker</td>
<td>RP</td>
<td>Design Manager, Mott MacDonald</td>
<td>MM</td>
</tr>
</tbody>
</table>

Apologies

<table>
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<tr>
<th>Name</th>
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<th>Company/unit/division</th>
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<tbody>
<tr>
<td>Richard Morris</td>
<td>RM</td>
<td>Project Manager, Mott MacDonald</td>
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</tbody>
</table>

Recorded by  NH. Circulated in draft on 31/07/2018. LM and GP confirmed that they have no comments on draft minutes on 13/09/2018.

Papers for meeting  Draft embankment location plan and heights, draft bridge drawing (drawing number MMD-367590-C-DR-26-XX-9999), draft culverting and diversion plans (drawing numbers MMD-367590-C-DR-26-XX-1430, MMD-367590-C-DR-26-XX-1431, MMD-367590-C-DR-26-XX-1432, MMD-367590-C-DR-26-XX-1433, MMD-367590-C-DR-26-XX-1434)

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<td>1.0</td>
<td>Introduction</td>
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<td>NH introduced the meeting, explaining that the purpose of the meeting is to discuss with NRW the initial designs of the project, with respect to flooding risk, in particular seeking the views of NRW as to whether the designs meet TAN15, A.1.14 and A1.15 requirements. NH explained that the design is at an early stage and subject to change.</td>
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</table>

2.0  Overview of proposal

NH provided an overview of the proposal, outlined as:

- Two new passenger lines connecting from and to the existing South Wales Mainline. The passenger lines are called South Wales Metro Lines
- A new “Park and Ride” Llanwern Station (unmanned). The platform is accessed by passengers via a new footbridge to be constructed from a new car park to the south of the Tata Service Lines. The footbridge will include both steps and ramp access. The car park will be accessed via the new road being constructed for the Glan Llyn commercial development, (via the Amazon warehouse roundabout).
A stabling line for holding trains for use on event days. The stabling line is referred to as the MES (Major Events Stabling) Line.

The MES is connected to the South Wales Metro Lines by a crossover (Metro Lines Crossover) and is also connected to the existing Tata Service Lines to the south by Connecting Lines.

NH provided a summary of flood risk correspondence with NRW to date, as:

- Meeting at NRW St Mellons Office in October 2017 to discuss initial proposals.
- Request for pre-application review of model conceptualisation report (withdrawn by MM due to programme constraints)
- Request for pre-application hydraulic model review, arranged and due to take place early August 2018.

Lifetime of the development. GP confirmed that this is a commercial development so the expected lifetime development with respect to TAN15 is 75 years. GP confirmed that NRW Product 4 flood data provided for the year 2090 is representative climate change data for this 75-year lifetime of development.

Discussion on draft design

1. New railway lines – embankment heights

NH advised that the Caldicot and Wentlooge Coastal Modelling (JBA 2016) has been used for obtaining levels relating to the “Threshold Frequency” and “Extreme” events (as required by TAN15). The assumed indicated value for tolerable flood condition (with respect to the depth of flooding) is 600mm (General Infrastructure).

Draft embankment location plan and heights has been coloured-coded to show:

- Red areas: Embankment lower than the Threshold Frequency event (6.90m AOD and does not meet TAN15 A1.14 or A1.15.
- Yellow area: Embankment higher than the Threshold Frequency event (6.90m AOD) but lower than level required to meet TAN15 A1.15 permissible depths of flooding in “Extreme” events (7.31m AOD). Meets TAN15 A1.14 but not A1.15.
- Green areas: areas that are at or exceed the levels required to meet TAN15 A1.15 permissible depths of flooding in “Extreme” events (7.31m AOD). Meets both TAN15 A1.14 but A1.15.

The drawings show only the central section of the line (adjacent to Monks’ Ditch) meets both TAN15 A1.14 but A1.15. Large areas of the track do not meet TAN15 A1.14 or A1.15.

NH asked GP to confirm the implication for any NRW replies to a potential, planning application:

- GP accepted that there was a practical restriction on how high the railway infrastructure could be raised. The FCA would need to provide a full “story” of how the designer had tried to raise the embankment wherever practically possible.
- If NRW do not believe the developer has explored all possible mitigations, then they will raise “significant concerns” at planning stage. In this situation, the developer is likely to be required to do further work to remove the “significant concerns” raised.
• If NRW accept that the developer has explored all possible mitigations, however the site still does not meet A1.14 criteria then they will raise an “objection” at planning stage. In this situation, the LPA (in our case Newport City Council) will decide whether the development can proceed or not.
• If NRW accept that the developer has explored all possible mitigations, and the site meets A1.14 criteria but does not meet A1.15 criteria, then NRW will not raise an objection and will advise the LPA of the situation, to assist the LPA’s decision on whether the development can proceed.

Other observations by GP with respect to this element of the development were:
• As part of the FCA, hazard mapping would be useful to illustrate the other A1.15 tolerable flooding conditions (depth, velocities, etc).
• Cross-section drawings would be useful to demonstrate the heights of new embankment relative to existing Network Rail and TATA lines. RP to action.
• As part of the FCA, it is expected that analysis is undertaken to demonstrate that tidal flood water is not displaced due to infilling in the flooding plain. GP confirmed that a more qualitative analysis (volume calculation) could be used to demonstrate the impact on the flood cell (Caldicot Levels) but a quantitative analysis (modelling) approach would probably be required to demonstrate the impact with the site.
• NH to obtain copy of NRW’s Caldicot and Wentlooge Coastal Modelling (JBA 2016) to use as baseline for this work.

2. Bridges over Monks’ Ditch

Discussion with reference to draft bridge drawing (drawing number MMD-367590-C-DR-26-XX-9999)

NH confirmed that NRW doesn’t currently hold a model for Monks’ Ditch and that MM have obtained the Atkins model (developed to support then Glan Llyn development) and are currently updating it.

Both the Metro and MES lines will need to cross the Monks’ Ditch. NH outlined that the preferred option is for the three separate bridges, side-by-side, rather than a single bridge (due to asset ownership being different for the bridges). NH outlined the current design assumption for the bridges as:
• Clear span.
• Soffit level not to exceed soffit level of Network Rail bridge upstream.
• Abutments and approaches may be continuous or separate. NH acknowledged that where they are in the Monks’ Ditch flood plain (if modelling shows there is a flood plain), compensatory flood storage may be required.

GP confirmed that there will be a need to get a flood risk activity permit to work with and around the main river.

3. Reen crossings and diversions
Discussion with reference to draft culverting and diversion plans (drawing numbers MMD-367590-C-DR-26-XX-1430, MMD-367590-C-DR-26-XX-1431, MMD-367590-C-DR-26-XX-1432, MMD-367590-C-DR-26-XX-1433, MMD-367590-C-DR-26-XX-1434). CK provided an outline of the approach to reen crossings and diversions.

- A number of existing culverts located underneath the Network Rail line will need to be extended these have currently been sized as 1050mm dia. on the basis that the Network Rail culverts are 900mm dia.
- In general (and different to the draft plans provided) the culverts crossings will be at 90 degrees to new rail lines (to maintain hydraulic efficiency and ensure access for maintenance).
- Diversions are preferred to new culverts.
- Ecological constraints (otter/water vole) are likely to mean that the proposed 1050 dia. crossings will be replaced with box culverts.

GP explained that in relation to infilling of watercourses, reens should be compensated by new reens of an equivalent length (not just volume).

GP explained that the local community are very sensitive to drainage and flooding issues (due to flood history) and would be very sensitive to any tweaks in the local reen system. Specifically, with respect to flooding issues in Llanwern village, the Station Road (known locally as the Station Road System) culvert (culvert reference number C08 on drawings)

NH explained that we need to review the ground conditions for diverted sections. NH mentioned that the ground investigation will be undertaken.

GP confirmed that any diversion or crossings would need land drainage consent from the IDD (NRW). GP explained that this is outside the SSSI however the water in these reens will eventually flow into the SSSI so water quality would be a key concern. GP also stated that the maintenance responsibilities would need to be identified and secured. GP also confirmed that their flood risk analysis team is undertaking land drainage consents on behalf of the IDD on a temporary basis, until new drainage engineer is appointed (likely to be September 2018). GP stated that pre-application discussions in relation to the land drainage consent is not chargeable.

4. Car park

CK and NH provided an outline of the approach to the car park design.

- Car park is proposed to be at a level of 6.35m AOD, as per the consented level for the Glan Llyn development.
- This is subject to change and will be reviewed once current remediation works by St Modwen have been completed and ground investigation has been received.

NH asked GP to confirm what aspects of the development need to be “flood free”. He stated that the car park should ideally be flood free in the Threshold Frequency wherever possible. If it was not possible, then it could be flooded to a depth of 300mm (on the basis that this water depth is considered low hazard). NH confirmed that this would equate
to a level of 6.60m AOD for the park and ride car park (i.e. Threshold Frequency event level of 6.90m AOD minus 300mm = 6.60m AOD).

NH confirmed that the proposed escape and evacuation route would be south via the new access road and Amazon roundabout and initial plans for a footbridge to Llanwern village are currently not being taken forward. In terms of flood warnings for the site, GP confirmed that the site benefits from NRW’s Flood Warning Service. However, this only covers tidal flooding risk. GP explained that a flood warning is likely to be issued well in advance (1-2 day) of flooding occurring. RP confirmed that once constructed and commissioned, the site would be passed to Network Rail, or other body as appointed by Transport for Wales, and flood emergency planning would be incorporated into their wider plans.

Next Steps

Planning context. LM asked if the planning date were still on target. NH confirmed that planning is due to be submitted December 2018.

NH confirmed that MM intends to continue pre-application discussions with NRW (as outlined in section 2).

AOB

None
B.3 Information from IDD
Hello Natalie,

Further to our telephone conversation, please find attached Land Drainage Byelaws and guidance notes for applicants along with the requested IDD boundary map for the area concerned.

Kind regards,

Mark

Mark Groves  BEng (Hons) MSc

Peiriannydd - Ardaloedd Draenio Mewnol / Engineer – Internal Drainage Districts
Cyfoeth Naturiol Cymru / Natural Resources Wales
Ffôn symudol / Mobile: 07827367341
E-bost: mark.groves@cyfoethnaturiolcymru.gov.uk / E-mail: mark.groves@naturalresourceswales.gov.uk

Ein diben yw sicrhau bod adnoddau naturiol Cymru yn cael eu cynnal, eu gwella a'u defnyddio yn gynaliadwy, yn awr ac yn y dyfodol.
Our purpose is to ensure that the natural resources of Wales are sustainably maintained, enhanced and used, now and in the future.

From: Haines, Natalie [mailto:natalie.haines@mottmac.com]
Sent: 23 August 2017 13:43
To: Groves, Mark <Mark.Groves@cyfoethnaturiolcymru.gov.uk>
Subject: FW: FCA for Llanwern Steelworks Railway - request for advice

Hi Mark
Would be good to talk about this one sometime this week if possible?
Could you give me a call on 029 2046 7871?
Thanks, Natalie
Hi Natalie (and Mark),

I have had a chat to the mapping team and they will provide you with a Product 4 from our coastal model to help inform the FCA as well as the flood outlines from the Monks Ditch JFLOW model.

Just to confirm that both the tidal and fluvial risk to the site would need to be modelled as well as any loss of flood storage from the new infrastructure.

It is also likely that a Flood Risk Activity Permit will be required as works will be carried out within 8 meters of our main rivers (Monks Ditch and Liswerry Pill). All guidance and application forms can be found on our website: https://naturalresources.wales/permits-and-permissions/flood-risk-activities/?lang=en.

The works you propose lie within the reen network so you need to liaise with Mark Groves directly (copied in) from the Internal Drainage District to establish if there are any requirements.

Regards

Jennifer Wilson
Dadansoddia Risl Lilfogydd/Flood Risk Analysis
Cyfoeth Naturiol Cymru / Natural Resources Wales
Ffon/Tel: 03000 65 3664
E-bost/E-mail: jennifer.wilson@cyfoethnaturiolcymru.gov.uk / jennifer.wilson@naturalresourceswales.gov.uk

Ein diben yw sicrhau bod adnoddau naturiol Cymru yn cael eu cynnal, eu gwella a'u defnyddio yn gynaliadwy, yn awr ac yn y dyfodol.

From 6th April 2016, the Flood Defence Consenting process changed, and you will need to apply for a Flood Risk Activity Permit if you wish to undertake any work in, over, under or adjacent to a main river.

Please use the following link for further information: https://naturalresources.wales/permits-and-permissions/flood-risk-activities/?lang=en

On 23rd August 2016 the Welsh Government published a Policy Clarification Letter regarding climate change allowances for planning purposes, supplemented by a guidance note and map. The letter and supporting documents supplement the policy advice provided in Technical Advice Note (TAN) 15: Development and Flood Risk. Local planning authorities, applicants and their consultants are expected to use these climate projections from 1st December 2016.

The documents are available via the following link: http://gov.wales/topics/planning/policy/policyclarificationletters/2016/cl-03-16-climate-change-allowances-for-planning-purposes/?lang=en
Can you please pick this up with Natalie

Regards

Eich Enw/ Carl Llewellyn  
Teitl swydd/ Dadansoddiad Risg Lifogydd / Flood Risk Analysis  
Cyfoeth Naturiol Cymru / Natural Resources Wales  
Ffôn/Tel: 03000 653092  
E-bost/E-mail:  
Carl.Llewellyn@naturalresourceswales.gov.uk

On 23rd August 2016 the Welsh Government published a Policy Clarification Letter regarding climate change allowances for planning purposes, supplemented by a guidance note and map. The letter and supporting documents supplement the policy advice provided in Technical Advice Note (TAN) 15: Development and Flood Risk. Local planning authorities, applicants and their consultants are expeected to use these climate projections from 1st December 2016.

The documents are available via the following link:  

From: Haines, Natalie [mailto:natalie.haines@mottmac.com]  
Sent: 17 August 2017 14:44  
To: Llewellyn, Carl <Carl.Llewellyn@cyfoethnaturiolcymru.gov.uk>  
Cc: Morris, Richard G <Richard.Morris@mottmac.com>  
Subject: FCA for Llanwern Steelworks Railway - request for advice

Hi Carl

Sorry to make first contact on this one via email but your phone rang through to answerphone.

Are you the correct person to speak to regarding FCAs in the Newport area?

We have been asked to prepare a flood consequences assessment for Llanwern Steelworks Railway. The development involves constructing a new rail line between the two existing lines and associated support building and structures. The details of the design are current being developed. Site location plan is attached.

We have already requested Product 4 flood data (received yesterday, also attached) however this only covers tidal flood risk and does not mentioned fluvial flood risk from the Main River (Monks Ditches) and several ditches and reens that run through the site.

Can you confirm whether:
- NRW hold flood modelling data for the Monks Ditch
- Would you expect site-specific flood modelling to be undertaken for Monks Ditch for the FCA?
- Would you expect site-specific flood modelling to be undertaken for the ditch / reens for the FCA?

There have been several recent developments in the vicinity (e.g. St Modwen homes) so perhaps there are existing third party data/modelling that you may already be aware of?

Thanks, Natalie
Natalie Haines (née Newton)
IEng MICE
Engineering Project Manager

D +44 (0)29 2046 7871 T +44 (0)29 2046 7800
F +44 (0)29 2047 1888
natalie.haines@mottmac.com

Mott MacDonald
Fitzalan House
Fitzalan Road
Cardiff CF24 0EL
United Kingdom

Website | Twitter | LinkedIn | Facebook | YouTube

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Application for Natural Resources Wales Land Drainage Consent

LAND DRAINAGE ACT 1991 & 1994

(Please tick relevant Internal Drainage District for your area)

- [ ] Caldicot & Wentlooge IDD
- [ ] Lower Wye IDD

IMPORTANT NOTE:

If you have any queries please contact us on 0300 065 3000 before submitting your Application.

Please take care when answering the questions on this form. A fully and accurately completed form will reduce delays in processing your Application.

Please complete in block letters using BLACK INK

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<thead>
<tr>
<th>1. Details of Applicant</th>
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<tbody>
<tr>
<td>Name:</td>
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<tr>
<td>Contact (if different):</td>
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<tr>
<td>Address:</td>
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<tr>
<td>Daytime Tel. No:</td>
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<tr>
<th>2. Agents Details (e.g. Consultant Land Agent - if applicable)</th>
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<tbody>
<tr>
<td>Name:</td>
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<td>Contact (if different):</td>
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3. **Applicants Interest in the Land**

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4. **Location**

Location of Proposed Works: ........................................................................................................................................

Name of Watercourse (if known): ..............................................................................................................................

Is Watercourse Main River?  Yes [ ]  No [ ]

District Council/Unitary Authority: ...........................................................................................................................

Parish/Community Council: ........................................................................................................................................

Ordnance Survey Grid Ref: ..........................................................................................................................................  

5. **Description & Purpose of Proposed Works**

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Number of Structures: [ ]

6. **Description & Reference Number of all Plans & Sections Submitted**

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7. **Construction Details**

State whether works are to be permanent or temporary: .................................................................

If temporary, state duration required: ................................................................................................

For all works, state anticipated construction start date: .................................................................

8. **Other Interests**

In addition to the works listed in Section 7, do the proposed works involve the following:

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
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<tbody>
<tr>
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<tr>
<td>Discharge of water?</td>
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<td>An impounding of a watercourse?</td>
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<tr>
<td>Abstraction of water from a watercourse?</td>
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<tr>
<td>Construction or landscaping works (temporary or permanent) within 7m of a watercourse?</td>
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(Further permissions may be required from Natural Resources Wales)

Please tick appropriate boxes

9. **If Planning Approval has been granted please state:**

Planning Authority: ............................................................................................................................

Application No: .................................................................................................................................

Approval Date: .................................................................................................................................

Conditions: .........................................................................................................................................

10. **Name, Address & Contact Details of Person or Organisation Responsible for Maintaining the Structure on Completion**

Name: ...................................................... Contact (if different): ......................................................

Profession: ...................................................... Daytime Tel. No: ......................................................

Address: ...................................................... Mobile No: ..............................................................

...........................................................................................................................................................

Fax No: ..............................................................

Post Code: ...................................................... E-mail Address: ......................................................
11. **Brief Details of Environmental Impact of Works Together with any Proposals for Amelioration and/or Compensatory Enhancement**

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12. **Brief Details of Flood Risk Considerations together with any Proposals for Mitigation**

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13. **Fees**

The fee is £50 for each structure associated with the application. If you are not clear what charge will apply, contact us before you send us this application.

14. **Checklist**

Please read through this list and tick the items you are sending with this application.

- 2 x Completed forms
- No. of Structures x Application Fee (if it applies)
- 2 x copies of Site/Area Plans
- 2 x copies of Detail Plan with Sections
- 2 x Method statement (if it applies)

15. **The Data Protection Act 1998**

We, the Natural Resources Wales, will process the information you provide so that we can deal with your enquiry. We may also process or release the information to:

- offer you documents or services relating to environmental matters;
● consult the public, public organisations and other organisations (for example, the Health and Safety Executive, local authorities, the emergency services, the Department for Environment, Food and Rural Affairs) on environmental issues;
● carry out research and development work on environmental issues;
● provide information from the public register to anyone who asks;
● prevent anyone from breaking environmental law, investigate cases where environmental law may have been broken, and take any action that is needed;
● assess whether customers are satisfied with our service, and to improve our service; and
● respond to requests for information under the Freedom of Information Act 2000 and the Environmental Information Regulations 2004 (if the Data Protection Act allows). We may pass the information on to our agents or representatives to do these things for us.

16. Declaration

If you make a statement that is false or misleading you may be committing an offence under the Land Drainage Act 1991 (subsequent Byelaws), the Environment Act 1995 or the Flood and Water Management Act 2010. I declare that as far as I know and believe, the information in this application is true. I understand that this application may be refused, or approval withdrawn, if I give false or incomplete information. Natural Resources Wales, by granting Consent under the Land Drainage Act 1991 for these works, accepts no liability for any loss or damage which may arise out of the design, construction, maintenance or use.

Tick this box to confirm that you understand and agree with the declaration above. ☐

Name: ......................................................................................................................................................
Signed: ......................................................................................................................................................
On behalf of: ..............................................................................................................................................
Date: ............................................................................................................................................................

17. Next steps

Please send this form together with any supporting documents to us at:

IDD Engineer
Pye Corner
Broadstreet Common
Nash
Newport
NP18 2BE

If you need help filling in this form, please contact the person who sent the form to you or phone us on our general enquiries number shown below.

General enquiries: 0300 065 3000 (Monday to Friday, 8am to 6pm)
Email: enquiries@naturalresourceswales.gov.uk
Website: www.naturalresources.wales

Please tell us if you need information in a different language or format (for example, in large print) so we can keep in touch with you more easily.
BYELAWS

The Caldicot and Wentlooge Levels Internal Drainage Board under and by virtue of the powers and authority vested in them by section 66 of the Land Drainage Act, 1991, do hereby make the following Byelaws which are considered necessary for securing the efficient working of the drainage system in their District:

INDEX

1. Commencement of Byelaws
2. Application of Byelaws
3. Control of Introduction of Water and Increase in Flow or Volume of Water
4. Control of Sluices, etc.
5. Fishing Nets and Angling
6. Diversion or Stopping Up of Watercourses
7. Detrimental Substances not to be put into Watercourses
8. Lighting of Fires
9. Notice to cut Vegetable Growths
10. No Obstruction within Seven Metres of the Edge of the Watercourse
11. Repairs to Buildings
12. Control of Vermin
13. Damage by Animals to Banks
14. Vehicles not to be Driven on Banks
15. Banks not to be used for Storage
16. Not to Dredge or Raise Gravel, Sand, etc.
17. Fences, Excavations, Pipes, etc.
18. Tidal Outfalls
19. Interference with Sluices
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21. Unattended Vessels
22. Removal of Sunken Vessels
23. Navigation of Vessels
24. Damage to Property of the Board
25. Defacement of Notice Boards
26. Obstruction of the Board and Officers
27. Savings for Other Bodies
28. Saving for Crown Lands
29. Arbitration
30. Notices
31. Limitation
32. Revocation
33. Interpretation

COMMON SEAL

PENALTY NOTE

1. Commencement of Byelaws
   The Byelaws shall come into operation at the expiration of one month beginning with the day on which they are confirmed by the Secretary of State.

2. Application of Byelaws
   (i) These Byelaws shall have effect within the District.
   (ii) The Watercourses referred to in these Byelaws (other than Byelaws 3, 4 and 9) are Watercourses which are for the time being vested in or under control of the Board.

3. Control of Introduction of Water and Increase in Flow or Volume of Water
   No person shall, without the previous consent of the Board, for any purpose, by means of any channel, siphon, pipeline or sluice or by any other means whatsoever, introduce any water into the District or, whether directly or indirectly, increase the flow or volume of water in any watercourse in the District.

4. Control of Sluices, etc.
   Any person having control of any sluice, slacker, floodgate, lock, weir, dam, pump, pumping machinery or other structure or appliance for introducing water into any watercourse in the District or for controlling or regulating or affecting the flow of water in, into or out of any watercourse shall use and maintain such sluice, slacker, floodgate, lock, weir, dam, pump,
pumping machinery, structure or appliance in accordance with such reasonable directions as may from time to time be given by the Board with a view to the prevention of flooding or any shortage in the flow or supply of water and to the efficient working of the drainage system in the District.

5. Fishing Nets and Angling

No person shall angle or set any nets or engines for the catching or keeping of fish in any watercourse in such a manner as to cause damage to or endanger the stability of the bank of the watercourse or to affect or impede the flow of water.

In this byelaw 'nets' includes:-

a) a stake net, bag or keep net
b) any net secured by anchors and any net or other implement for taking fish fixed to the soil or made stationary in any other way.
c) any net placed or suspended in any inland or tidal waters unattended by the owner or a person duly authorised by the owner to use it for fish, and any engine, device, machine or contrivance, whether floating or otherwise, for placing or suspending such a net or maintaining it in working order or making it stationary.

6. Diversion or Stopping Up of Watercourses

No person shall, without the previous consent of the Board, take any action, or knowingly permit or aid or abet any person to take any action to stop up any watercourse or divert or impede or alter the level of or direction of the flow of water in, into or out of any watercourse.

7. Detrimental Substances not to be Put Into Watercourses

No person shall, so as directly or indirectly to obstruct, impede or interfere with the flow of water in, into or out of any watercourse or so as to damage the bank:-

a) discharge or put or cause or permit to be discharged or put or negligently or wilfully cause or permit to fall into any watercourse any object or matter of any kind whatsoever whether solid or liquid.
b) allow any such object or matter as is referred in subparagraph (a) of this Byelaw to remain in proximity to any watercourse in such manner as to render the same liable to drift or fall or be carried into any watercourse.

Provided that nothing in this Byelaw shall be deemed to render unlawful the growing or harvesting of crops in accordance with normal agricultural practice.

8. Lighting of Fires

No person shall light or cause or permit to be lit or commit any action liable to cause to be lit, any fire on any land adjoining the watercourse where such action is liable to set on fire the peat lands forming the banks of the watercourse or any trees, willows, shrubs, weeds, grassed or any other vegetable growths growing on land forming the banks of the watercourse.

9. Notice to Cut Vegetable Growths

Any person having control of any watercourse shall, upon the receipt of a notice served on him by the Board requiring him so to do, cut down and keep cut down all trees, willows, shrubs, weeds, grasses, reeds, rushes or other vegetable growths growing in or on the bank of a watercourse, within such reasonable time as may be specified in the notice, and shall remove such trees.
willows, shrubs, weeds, grasses, reeds, rushes or any other vegetable growth from the
watercourse immediately after the cutting thereof.
Provided that, where a hedge is growing on the bank of a watercourse, nothing in this Byelaw
shall require more than the pruning of the hedge so as to prevent it from growing over or into the
watercourse, and the removal of the resultant cuttings.

10. No Obstruction within 7 Metres of the Edge of the Watercourse
No person without the previous consent of the Board shall erect any building or structure,
whether temporary or permanent, or plant any tree, shrub, willow or other similar growth within 7
metres of the landward toe of the bank where there is an embankment or wall, or within 7 metres
of the top of the batter where there is no embankment or wall, or where the watercourse is
enclosed within 7 metres of the enclosing structure.

11. Repairs to Buildings
The owner of any building or structure in or over a watercourse or on the banks thereof shall,
upon receipt of a notice from the Board that because of its state of disrepair:-

i) the building or structure is causing or is in imminent danger of causing an obstruction to the
flow of the watercourse, or

ii) the building or structure is causing or is in imminent danger of causing damage to the bank of
the watercourse,

carry out such reasonable and practicable works as are specified in the notice for the purpose of
remedying or preventing the obstruction or damage as the case may be within such reasonable
time as is specified in the notice.

12. Control of Vermin
The occupier of any bank of a watercourse or any part thereof shall, upon being required by the
Board by notice, within such reasonable time as may therein be specified, take such steps as are
specified in the notice, being such steps as the Board consider necessary and practicable for
preventing the bank from becoming infested by rabbits, rats, coypu, foxes and moles or any other
wild animal not being an animal listed in Schedule 5 or Schedule 6 to the Wildlife and
Countryside Act, 1981.

13. Damage by Animals to Banks
All persons using or causing or permitting to be used any bank of any watercourse for the
purposes of grazing or keeping any animal thereon shall take such steps including fencing as are
necessary and reasonably practicable and shall comply with such reasonable directions as may
from time to time be given by the Board to prevent the bank or the channel of the watercourse
from being damaged by such use.

Provided that nothing in this Byelaw shall be deemed to affect or prevent the use of, for the
purpose of enabling animals to drink at it, any place made or to be made or constructed as
approved by the Board.

14. Vehicles not to be Driven on Banks
No person shall use or drive or permit or cause to be used or driven any cart, vehicle or implement of any kind whatsoever on, over or along any bank of a watercourse in such manner as to cause damage to such bank.

15. Banks not to be Used for Storage

No person shall use or cause or permit to be used any bank of any watercourse for the purpose of depositing or stacking or storing or keeping any rubbish or goods or any material or things thereon in such a manner as by reason of the weight, volume or nature of such rubbish, goods, material or things causes or is likely to cause damage to or endanger the stability of the bank or channel of the watercourse or interfere with the operations or access of the Board or the right of the Board to deposit spoil on the bank of the watercourse.

16. Not to Dredge or Raise Gravel, Sand, etc.

No person shall without the previous consent of the Board dredge or raise or take or cause or permit to be dredged or raised or taken any gravel, sand, ballast, clay or other material from the bed or bank of any watercourse.

17. Fences, Excavations, Pipes, etc.

No person shall without the previous consent of the Board:

(a) place or affix or cause or permit to be placed or affixed any gas or water main or any pipe or appliance whatsoever or any electrical main or cable or wire in or over any watercourse or in, over or through any bank of any watercourse;

(b) cut, pare, damage or remove or cause or permit to be cut, pared, damaged or removed any turf forming part of any bank of any watercourse, or dig for or remove or cause or permit to be dug for or remove any stone, gravel, clay, earth, timber or other material whatsoever forming part of any bank of any watercourse or do or cause or permit to be done anything in, to or upon such bank or any land adjoining such bank of such a nature as to cause damage to or endanger the stability of the bank;

(c) make or cut or cause or permit to be made or cut any excavation or any tunnel or any drain, culvert or other passage for water in, into or out of any watercourse or in or through any bank of any watercourse;

(d) erect or construct or cause or permit to be erected or constructed any fence, post, pylon, wall, wharf, jetty, pier, quay, bridge, loading stage, piling, groyne, revetment or any other building or structure whatsoever in, over or across any watercourse or in or on any bank thereof;

(e) place or fix or cause or permit to be placed or fixed any engine or mechanical contrivance whatsoever in, under or over any watercourse or in, over or on any bank of any watercourse in such a manner or for such length of time as to cause damage to the watercourse or banks thereof or obstruct the flow of water in, into or out of such watercourse.

Provided that this Byelaw shall not apply to any temporary work executed in an emergency but a person executing any work so excepted shall, as soon as practicable, inform the Board in writing of the execution and of the circumstances in which it was executed and comply with any directions the Board may give with regard thereto.

18. Tidal Outfalls
No person shall place or cause to be placed or abandon or cause to be abandoned upon the foreshore any trees, roots of trees, branches, timber, tins, bottles, boxes, tyres, bricks, stones, soil, wire, rubbish or other object or matter whatsoever which (whether immediately or as a result of subsequent tidal action) may impede or be likely to impede the flow of water through the sluices or outfall pipes through the tidal banks or through the watercourses on such foreshore or impede or be likely to impede the operation of such sluices or outfall pipes or may cause or be likely to cause damage thereto.

19. Interference with Sluices

No person shall without lawful authority interfere with any sluice, slacker, floodgate, lock, weir, dam, pump, pumping machinery or any other structure or appliance for controlling or regulating the flow of water in, into or out of a watercourse.

20. Mooring of Vessels

No person shall moor or place any vessel in any watercourse or to or upon the bank of any watercourse in such manner or by such method as to cause or be likely to cause injury to such bank or in such manner as materially to obstruct or impede the free flow of water in, into or out of any watercourse.

21. Unattended Vessels

No person shall leave any vessel unattended without taking due care to prevent such vessel from materially obstructing or impeding the free flow of water in, into or out of any watercourse or any sluice in any bank.

22. Removal of Sunken Vessels

No person who is the owner of a vessel sunk, stranded, damaged or adrift in a watercourse or, in the case of a sunken vessel which is abandoned, who was the owner immediately before the abandonment shall, after ten days from the day on which the Board serves on him notice in writing that the vessel is causing obstruction, permit the vessel to remain in the watercourse in such a manner as to impede or harmfully divert the flow of water in, into or out of the watercourse.

23. Navigation of Vessels

No person shall navigate any vessels in such a manner or at such a speed as to injure the bank of any watercourse and where the Board have by notice erected at any place limited the speed of vessels passing such place no person shall navigate a vessel at a speed greater than the speed so limited.

Provided that the Board shall not exercise their powers under this Byelaw so as to limit the speed of:

(a) vessels in any tidal waters except after consultation with the Department of Transport; or

(b) vessels navigating waterways of the British Waterways Board for which speed limits are prescribed by the Byelaws of such Board.

24. Damage to Property of the Board
No person shall interfere with or damage any bank, bridge, building, structure, appliance or other property of or under the control of the Board.

**25. Defacement of Notice Boards**
No person shall deface or remove any notice board, notice or placard put up by the Board.

**26. Obstruction of the Board and Officers**
No person shall obstruct or interfere with any member, officer, agent or servant of the Board exercising any of his functions under the Act or these Byelaws.

**27. Savings Other Bodies**
Nothing in these Byelaws shall:
(a) conflict with or interfere with the operation of any Byelaw made by the Welsh Water Authority, and the National Rivers Authority or of any navigation, harbour or conservancy authority but no person shall be liable to more than one penalty or in the case of a continuing offence more than one daily penalty in respect of the same offence.
(b) restrict, prevent, interfere with or prejudice the exercise of any statutory rights or powers which are now or hereafter may be vested in or exercised by:
(i) any public utility undertaking carried on by a local authority under any Act or under any Order having the force of an Act.
(ii) the undertakings of the National Rivers Authority and of any water undertaker or sewerage undertaker;
(iii) British Gas plc;
(iv) any navigation, harbour or conservancy authority;
(v) the British Railways Board with respect to the construction, use or maintenance and repair of any railway property or so as to interfere with the free, uninterrupted and safe use of any railway of the British Railways Board and the traffic thereon and the use by passengers of railway property;
(vi) any local authority;
(vii) any highway authority for the purposes of the Highways Act 1980 (as amended by any subsequent enactment) in relation to any highway whether or not maintainable at public expense;
(viii) the Post Office;
(ix) any undertaking engaged in the operation of a telecommunication system;
x) the British Airports Authority;
x.) the Civil Aviation Authority;
(xii) the British Waterways Board;
(xiii) the British Coal Corporation;
(c) restrict, prevent, interfere with or prejudice any right of a highway authority to introduce into any watercourse surface water from a highway, for which it is the highway authority;
(d) restrict, prevent, interfere with or prejudice any right of a
licence holder within the meaning of Part I of the Electricity Act 1989 to do anything authorised by that licence or anything reasonably necessary for that purpose.

(e) affect any liability arising otherwise than under or by reason of these Byelaws.

28. Saving for Crown Lands

(a) Nothing in these Byelaws shall operate to prevent the removal of any substance on, in or under (or the erection of any structure, building or machinery or any cable, wire or pipe on, over or under) lands belonging to Her Majesty in the right of the Crown by any person thereunto authorised by the Crown Estate Commissioners.

(b) Nothing contained in any of the foregoing byelaws should be deemed to be or shall operate as a grant by or on behalf of the Crown as owner of the foreshore below high water mark of any estate or interest in or right over such foreshore, or any part thereof, nor shall anything contained in or done under any of the provisions of the foregoing byelaws in any respect prejudice or injuriously affect the rights and interests of the Crown in such foreshore, or prevent the exercise thereon of any public rights or prejudice or injuriously affect any right, power or privilege legally exercisable by any person in over and in respect of the seashore.

29. Arbitration

(a) Where by or under Byelaws 4, 9, 11, 12, 13 or 17 any person is required by a notice in writing given by the Board to do any work to the satisfaction of the Board or to comply with any directions of the Board, he may within 21 days after the service of such notice on him give to the Board a counter-notice in writing objecting to either the reasonableness of or the necessity for such requirement or directions, and in default of agreement between such person and the Board the dispute shall, when the person upon whom such notice was served is a drainage or local authority be referred to the Secretary of State whose decision shall be final, and in any other case shall be referred to the arbitration of a single arbitrator to be appointed in default of agreement by the President of the Institution of Civil Engineers on the application of either party. Where such a counter-notice has been given to the Board the operation of the notice shall be suspended until agreement has been reached or the dispute has been determined by arbitration in accordance with the provisions of this Byelaw.

(b) Where by or under these Byelaws any person is required by a notice in writing given by the Board to do any work to the satisfaction of the Board or to comply with any directions of the Board and any dispute subsequently arises as to whether such work has been executed or such directions have been complied with, such dispute if it arises between a drainage authority or local authority and the Board shall be referred to the Secretary of State whose decision shall be final, and in any other case shall be referred to the arbitration of a single arbitrator to be appointed in default of agreement by the President of the Institution of Civil Engineers on the application of either party.

(c) Where by or under Byelaws 3, 6, 10, 16 or 17 any person is required to refrain from doing any act without the consent of the Board such consent shall not be unreasonably withheld and may be either unconditional or subject to such reasonable conditions as the Board may consider appropriate and where any dispute arises as to whether in such a case the consent of the Board is being unreasonably withheld, or as to whether any conditions subject to which consent is granted are unreasonable, such dispute shall if it arises between a drainage authority or local authority and the Board be referred to the Secretary of State whose decision shall be final, and in any other case
such dispute shall be referred to the arbitration of a single arbitrator to be appointed in default of agreement by the President of the Institution of Civil Engineers on the application of either party.

30. Notices

Notices and any other documents required or authorised to be served or given under or by virtue of these Byelaws shall be served or given in the same manner prescribed by section 71 of the Act.

31. Limitation

Nothing in these Byelaws shall authorise the Board to require any person to do any act, the doing of which is not necessary for securing the efficient working of the drainage system of the District or to refrain from doing any act, the doing of which does not adversely affect the efficient working of the drainage system of the District.

If any conflict arises between these Byelaws and section 12 of the Act (which relates to the Board's duties with regard to the protection of the environment, nature conservation and amenity), the said Section shall prevail.

32. Revocation

The Byelaws made by the Board on the 29th July, 1958, are hereby revoked.

33. Interpretation

In these Byelaws, unless the context otherwise requires, the following expressions shall have the meaning hereby respectively assigned to them, that is to say:-


"Animal" includes any horse, cattle, sheep, goat, swine, goose or poultry.

"Bank" includes any bank, cross bank, wall or embankment adjoining or confining or constructed for the purpose of or in connection with any watercourse and includes all land between the bank and the low water mark or level of the water in the watercourse as the case may be and where there is no such bank, cross bank, wall or embankment includes the top edge of the batter enclosing the watercourse.

"Board" means the Caldicot and Wentlooge Levels Internal Drainage Board.

"Consent of the Board" means the consent of the Board in writing signed by the Clerk for the time being of the Board or other duly authorised officer.

"District" means the area under the jurisdiction of the Board.

"Secretary of State" means the Secretary of State for Wales.

"Occupier" means in the case of land not occupied by any tenant or other person the person entitled to the occupation thereof.

"Owner" includes the person defined as such in the Public Health Act 1936.

"Railway Property" means any railway of the British Railways Board and any bridges and works connected therewith or forming part thereof for the maintenance or operation of which the said Board are responsible and includes any land held or used by the Board for the purposes of such railway bridges or works.

"Vessel" includes any ship, hovercraft (as defined by the Hovercraft Act 1968), lighter, keel, barge, tug, launch, houseboat, pleasure or other boat, aircraft, randan, wherry, skiff, dinghy, shallop, punt, yacht, canoe, raft, float of timber or any other craft whatsoever, and howsoever worked, navigated or propelled.
And other expressions shall have the same meanings as in the Act.

The Common Seal of the Caldicot & Wentlooge Levels Internal Drainage Board was hereunto affixed on the 11th day of October 1993 in the presence of
Signed Chairman J.J Turner
Signed Clerk J Taynton-Evans

Seal of the Board

PENALTY NOTE
By section 66(6) of the Act every person who acts in contravention of or fails to comply with any of the foregoing Byelaws is liable on summary conviction in respect of each offence to a fine not exceeding the amount prescribed from time to time for level 5 on the standard scale referred to in section 37 of the Criminal Justice Act 1982 and a further fine not exceeding forty Pounds for every day on which the contravention or failure is continued after conviction. By section 66(7) of the Act if any person acts in contravention of or fails to comply with any of these Byelaws the Board may without prejudice to any proceedings under section 66(6) of the Act take such action as may be necessary to remedy the effect, of the contravention or failure and may recover the expenses reasonably incurred by it in doing so from the person in default. (N.B. This note accompanies the Byelaws, but it is not part of them.)
Natural Resources Wales

Land Drainage Consents - Guidance Notes for Applicants

1. Introduction

1.1 The purpose of this document is to provide general guidance on the procedures to be followed when making an application for works to IDD Reens and Ordinary Watercourses within the Caldicot and Wentlooge and Lower Wye Internal Drainage Districts under the provisions of the Land Drainage Act 1991.

1.2 Matters that the Natural Resources Wales will take into account when considering an application are also outlined.

2. Legal Requirements

2.1 Under the provisions of the Land Drainage Act 1991, Natural Resources Wales has a duty to exercise a general supervision over all matters relating to the drainage of land within their Drainage District. In addition to this, Byelaws made under Section 66 of the Act, further control works carried out and activities undertaken by others affecting watercourses within these Drainage Districts. In particular, the Byelaws permit Natural Resources Wales to control the rate of surface water run-off from development sites into the Drainage Districts.

2.2 To meet the requirements of the Act and the Byelaws, any person proposing to undertake any works affecting a watercourse within the Natural Resources Wales Internal Drainage Districts must submit details of their proposals to Natural Resources Wales. Before granting a Consent allowing the works to proceed, Natural Resources Wales may request any modifications to the proposals, which it considers necessary to satisfy its environmental duties and to control flood risk.

2.3 Riparian owners, developers, and all other persons proposing to carry out any works affecting a watercourse must, therefore, obtain Land Drainage Consent from Natural Resources Wales before the work commences.

2.4 There are three different classes of watercourses - Main River, Natural Resources Wales IDD Reens and Private Ordinary Watercourses, and different requirements apply to each.

3. Main Rivers

3.1 Main Rivers are designated as such on maps held by the Department for the Environment, Food and Rural Affairs (DEFRA) and by the Environment Agency England and Natural Resources Wales. Works in or near Main Rivers in Wales require the consent of Natural Resource Wales, either under Environment Act 1995, Flood Defence (Land Drainage) Byelaws/Sea Defence Byelaws, Flood and Water Management Act 2010 or under Section 109 of the Water Resources Act 1991.

These Guidance Notes do not cover works affecting Main Rivers.
4. Natural Resources Wales IDD Reens

4.1 Natural Resources Wales IDD Reens are ordinary watercourses under the direct operational control of the Natural Resources Wales. Natural Resources Wales has permissive (not mandatory) powers to carry out maintenance and improvement works on ordinary watercourses within Internal Drainage Districts in Wales.

4.2 In addition to the control of surface water run-off (See Paragraph 1.1 above) the Land Drainage Byelaws, which require persons to obtain Consent for all activities in or adjacent to Natural Resources Wales IDD Reens and their floodplains. Such activities include the erection of fences, the construction of culverts or bridges, the construction of outfalls, the placing of pipes or cables below the bed of Natural Resources Wales IDD Reens, tree planting, disposal of rubbish, and excavation which may affect the bed and banks of Natural Resources Wales IDD Reens.

5. “Ordinary” Watercourses

5.1 The term “Ordinary” watercourse describes all other remaining watercourses, streams, ditches, ponds, etc. within the Drainage District some of which may be tributaries of Main Rivers or Natural Resources Wales IDD Reens.

5.2 Natural Resources Wales has regulatory powers in respect of all “Ordinary” watercourses within its Drainage District and may also carry out works on any “Ordinary” watercourse if it so chooses.

6. Application Fees and Other Charges

6.1 Under Section 23 (2) of the Land Drainage Act 1991, Natural Resources Wales is authorised to charge an application fee in relation to an Application for Consent. The fee payable is to cover the cost of examining and approving the proposals. The fee amount is currently £50.00 (VAT exempt) and is payable in respect of each separate structure, channel, pond or other element forming the project.

6.2 Fees are non-refundable in the event that an application is refused.

6.3 The Consent Application Form should be completed, detailing the number of structures (e.g. culverts, outfalls, new or re-aligned channels, ponds, etc.) forming the elements of the project, as appropriate. Applicants are advised to confirm the fee payable with Natural Resources Wales before submitting an application.

7. How to Obtain Consent

7.1 Completed Application Forms should be submitted, with the appropriate fee and supporting drawings, calculations and other documentation to Natural Resources Wales. Upon receipt of a full and complete application and correct fee Natural Resources Wales has 8 full weeks in which to grant or refuse Consent (unless an extension of this time is agreed).

7.2 This time period does not start until Natural Resources Wales is satisfied that the application including, where necessary, all plans, drawings, flood risk assessments and design calculations, as may reasonably be required by Natural Resources Wales in order to properly assess the proposals, is complete in every respect.

7.3 2 No. copies of all drawings are required and these shall not exceed A1 in size.

7.4 The grant of Land Drainage Consent may be subject to Conditions such as to the time and manner in which the works are to be carried out, forms of construction, environmental mitigation works required, and the provisions to be made for future maintenance of the completed works.
Applicants are advised to discuss their proposals with Natural Resources Wales before submitting an application, to ensure they are aware of the principal requirements for the work envisaged.

A Consent granted by Natural Resources Wales is given solely for the purposes of the Land Drainage Act 1991 and Natural Resources Wales Byelaws, and should not be regarded by the applicant as in any way approving the design and soundness of any proposed structure, other than in relation to its impact on flows and its effects on the watercourse.

Natural Resources Wales accepts no liability for the structural integrity, the future stability or the future maintenance of any works for which Consent may be given. These matters are the sole responsibility of the applicant and his technical advisers.

Applicants are advised that a Land Drainage Consent does not override an adjacent landowner’s rights nor does it permit interference with legally protected wildlife habitats.

If Natural Resources Wales fails, two months after the receipt of a full and complete application, to notify the applicant in writing of their determination with respect to the application, then Natural Resources Wales is deemed to have granted Consent.

### 8. General Requirements

8.1 A 7 meter strip of land is to be left clear between the top of bank and any building or obstruction, along both banks of any Natural Resources Wales IDD watercourse. This is necessary so that a watercourse can be maintained with heavy machinery.

8.2 Any works must not compromise the stability of the bank or create a gradient of more than 1:20 towards the watercourse.

8.3 Absolutely no modification, culverting or in filling of any ditches/reens/watercourses within Natural Resources Wales internal drainage districts will be undertaken without a Land Drainage Consent from Natural Resources Wales.

8.4 Any works undertaken are to be in strict accordance with the proposals contained in the submitted drawings. Failure to do so may result in Court Action, forcing liable parties to undertake remedial works.

8.5 Precautions must be undertaken so that all existing surface water discharges flowing through the area are adequately catered for in any design proposals. This includes ensuring that there is no loss of capacity or connectivity in the reen system and allowing for the construction of storage lagoons/tanks as necessary to limit surface water discharges to greenfield rates.

8.6 It is essential that any watercourse connecting the surface water discharge of a development to Natural Resources Wales IDD ditch is adequately maintained to ensure that flooding of land does not occur in years to come.

8.7 Access arrangements to be provided to Natural Resources Wales personnel during the construction period to carry out maintenance operations and attend to flood emergencies etc.

8.8 One weeks notice to be given to Natural Resources Wales prior to commencement of any works affecting Natural Resources Wales IDD watercourses.

8.9 Adequate provision to be made for cater for any flood situation (over pumping) which may occur during the construction period e.g. due to heavy rainfall/obstruction to watercourses etc.

8.10 Adequate precautions to be taken to avoid pollution of the local land drainage system to the requirements of the Divisional Pollution Officer of Natural Resources Wales.
8.11 Adequate precautions to be taken to avoid any adverse impacts to the nature conservation interests in the area (including Site of Special Scientific Interest areas) to the requirements of Natural Resources Wales.

8.12 General compliance with the Natural Resources Wales Land Drainage Byelaws is essential. Copies are available on request.

8.13 All to the satisfaction of the Natural Resources Wales IDD Engineer

9. Standards of Protection

9.1 Where appropriate, and when required by Natural Resources Wales, applications for Land Drainage Consent shall include hydrological and hydraulic calculations.

9.2 The objectives of this procedure are:

- For storm water runoff discharged from urban developments to replicate or achieve a reduction from the ‘greenfield’ response of the site over an extended range of storm probabilities (return periods);

- To manage run-off on site for extreme events.

9.3 This requires:

- The peak rate of storm water run-off to be controlled;
- The volume of run-off to be reduced;
- The pollution load to the receiving waters from storm water run-off to be minimised;
- The assessment of overland flows and temporary flood storage across the site.

For the range of annual flow rate probabilities, up to and including the 1% annual probability (1 in 100 year storm event) the developed rate of run-off discharged from the site into a Natural Resources Wales ordinary watercourse shall be no greater than the undeveloped rate of run-off for the same event.

9.4 A minimum of three annual probabilities shall be considered:

- The 100% annual probability (1 in 1 year storm event)
- The 33.3% annual probability (1 in 30 year storm event)
- The 1% annual probability (1 in 100 year storm event)

9.5 The analysis of overland flows within the development site should use short high intensity rainfall events of between 15 and 60 minutes duration, with appropriate intermediate increments.

9.6 The potential effect of future climate change shall be taken into account by increasing the rainfall depth by 30% for computing storage volumes. No allowance for climate change shall be made in calculating the ‘greenfield’ run-off.

9.7 In no case shall the level of protection of the proposed works be lower than the existing level of flood protection.

9.8 Applicants are advised that where proposals involve new development, a copy of the Flood Risk Assessment undertaken for the site, in accordance with Natural Resources Wales TAN 15 – Development & Flood Risk Areas 2004, if appropriate, should be submitted with the Land Drainage Consent Application.
Applicants are also advised that Natural Resources Wales supports and advocates the use of sustainable drainage systems to minimise the impact of surface water run-off on the environment. Applications for Land Drainage Consent should, therefore, demonstrate that appropriate techniques have been applied to achieve flow reduction.

11. **Right of Appeal**

11.1 If an applicant believes that Land Drainage Consent had been unreasonably withheld, or that the conditions imposed are unreasonable, then the applicant has a right of appeal. This must be notified to the Engineer in the first instance. Under Section 23 of the Act, if agreement cannot be reached an independent arbitrator will be appointed to settle the matter.

12. **Failure to Obtain Land Drainage Consent**

12.1 The failure to obtain Land Drainage Consent prior to carrying out the works may be a criminal offence. Under Section 24 of the Land Drainage Act 1991, if works are executed in contravention of Section 23, or without first obtaining a formal Land Drainage Consent, Natural Resources Wales has the power to serve a Notice requiring abatement of the nuisance within a specified time.

12.2 Any person acting in contravention of Section 23 of the Land Drainage Act 1991, or any of Natural Resources Wales Byelaws, may be liable, on conviction, to fine not exceeding level 5 on the standard scale. Any further failure to comply may result in an additional fine not exceeding £40 per day for every day during which the default continues.

12.3 Under Section 24 of the Act, Natural Resources Wales may also remove, alter or pull down any unauthorised work and recover the expenses reasonably incurred in the process, from the person in default.

13. **Other Consents and Permissions**

13.1 The issue of a Land Drainage Consent by Natural Resources Wales does not absolve a person proposing to execute works from the need to obtain such other licences, consents or permissions which may be required by law.

13.2 If the consent or approval of a third party is required before the applicant is able to carry out any of the works proposed, documentary evidence of this consent or approval must be submitted with the application.

For further information and guidance in individual cases, please contact us.

**General enquiries:** 0300 065 3000 (Monday to Friday, 8am to 6pm)

**Email:** enquiries@naturalresourceswales.gov.uk

**Website:** www.naturalresources.wales
C. Consultation with Newport City Council (LLFA)
Good Afternoon Natalie,

In relation to your queries, please see my comments in red below.

Regards

Matthew

Matthew Jones Bsc (Hons) IEng FIHE
Principal Engineer (Assets)
Newport City Council
Streetscene
Civic Centre
Newport City Council
NP20 4UR
01633 656656

From: Haines, Natalie [mailto:natalie.haines@mottmac.com]
Sent: 08 September 2017 13:39
To: City Contact Centre
Cc: Matthew Jones (Principal Engineer Asset Management)
Subject: LLFA flood risk data request - Llanwern

FAO Matthew Jones – Flood (Street Scene)

Dear Matthew

We have been appointed to assist Transport for Wales on the construction of new railway tracked and associated building at Llanwern Steelworks, near Newport.

The site lies within DAM Zone C1 and we have been asked to prepare a Flood Consequences Assessment (FCA) to support the project.

A location plan for the site is attached.

To inform the assessment please can you, as Lead Local Flood Authority, provide:
- Any hydraulic modelling information or anecdotal information of historic flooding events either at or adjacent to the site
  - NCC does not have any hydraulic information or anecdotal information of historic flooding events for this site;

- A copy of a Strategic Flood Consequences Assessment (SFCA) for the council. Please can you advise whether one is available?
  - No. However, the Preliminary Flood Risk Assessment for Newport is available. See attached.
D. Site Visit Photographs
Figure D1: Monks Ditch, from TATA service lines, looking north

Source: Photo taken at ST 36627 87283 on 30 August 2017
Figure D2: IDD reen, at western extent of proposed station platform

Source: Photo taken at ST 37091 87288 on 30 August 2017
Figure D3: IDD reen, at eastern extent of proposed station platform

Source: Photo taken at ST 37137 87260 on 30 August 2017
E. Utilities layout plan
F. Hydraulic Modelling Report

Please see separate report reference 367590-WTD-CAR-2658
G. Drainage arrangements

G.1 Existing drainage (reen) arrangements
G.2 Proposed drainage arrangements

Track Drainage Sheet 1 of 2  367590-MMD-48-XX-DR-C-0300
Track Drainage Sheet 2 of 2  367590-MMD-48-XX-DR-C-0301