NEW BOLIDEN

Tara Mines

Environmental Impact Assessment Report (EIAR)

Tailings Facility Embankment Buttress

Appendix 7.A

Water Framework Directive (WFD) Screening Assessment

Appeal Reference Number: ABP-315173-22

Submitted: February 2024

Boliden Tara Mines: Tailings Facility Embankment Buttress

Appendix 7A Water Framework Directive (WFD) Screening Assessment

Project number: 60628825

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Quality information

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Revision History

Revision	Revision date	Details	Authorised	Name	Position
0	06 February 2024	Draft for client comment	NDW	Neil Williams	Technical Director
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1. Introduction

Background

1.1 The Boliden Tara Mines (BTM) zinc-lead mine is situated 2 km west of Navan, County Meath, Ireland. The Randalstown tailings storage facility (TSF) is located approximately 2.8 km to the north of the mine and covers an area of circa 250 hectares. Approximately half of the tailings from the mine are currently separated by cycloning and used as mine backfill. The remaining tailings have been pumped from the processing mill site through a HDPE pipeline for containment in the Randalstown TSF. The site is operated under Industrial Emissions Licence (IEL) P0516-04. Since 2019, Stage 6 (Phase 1) of the TSF is being filled.

1.2 The TSF is constructed as a ring-dike configuration, Stages 1 to 5 are enclosed by earth fill embankment walls constructed from locally sourced natural materials, while Stage 6 is composite lined. The facility encloses an area of approximately 250 hectares and has been enlarged in a number of (# 6) lateral and vertical extensions over its 46 year existence using combinations of permanent and temporary embankment dams (Ref. 19).

1.3 A Perimeter Interceptor Chanel (PIC) encircles the stages 1 to 5 of the TSF embankments (Figure 1-1) and captures water from the embankment's internal drainage system, runoff from the embankment walls, underdrainage from the dam, and groundwater. The PIC, located at the toe of the embankment/ dam wall, acts to close the water drainage loop; all water collected by the PIC is pump returned to the tailings pond from a sump at the south of the facility.

1.4 The TSF is designed to operate as a large sedimentation/ aeration pond where solids settle and clear water at the surface is drawn off for recirculation to the Reclaim Water Pond at the mine site. Water stored in the TSF is either pump returned to the mine site for reuse or is discharged into the River Boyne under the conditions of the company's Industrial Emissions (IE) licence. The water to be discharged to the River Boyne overflows from the Reclaim Water Pond into a Clear Water Pond. A weir structure at the pond outlet measures the discharge to the River Boyne.

1.5 BTM is now planning to construct a reinforcement buttress to sections of the existing embankment walls of the TSF in order to adopt the Global Industry Standard on Tailings Management (GISTM) at the facility. The purpose of these works is to increase the Factor of Safety (FoS) at the downstream toe of the Stage 4 embankment to what is now required under the GISTM. AECOM Infrastructure & Environment UK Limited (AECOM) has been commissioned by BTM to undertake a Water Framework Directive (WFD) Assessment in support of the planning application for the construction of the buttress (the Proposed Development).

Proposed Development

1.6 The proposed works include:

- Preparatory works.
- The construction of a rockfill buttress to the entire length of the Stage 4 dam raise as well as to the Stage 1, 2 and 3 starter dams.
- Extensions to existing monitoring instrumentation to facilitate continued reading post construction of the buttress.
- Extension to the existing manholes which form part of the Stage 4 toe drain and weir monitoring system so that continued access can be guaranteed post construction of the buttress.
- Other ancillary works as may be required by Industrial Emissions Licence (IEL) Register Number P0516-04.

1.7 The proposed buttress is to be constructed on the downstream slope of and at the crest of the Stage 1, 2 and 3 starter embankments which encompass the eastern, southern and western boundaries of the TSF (Figure 1-1 and Appendix A.1). The proposed buttress will be

approximately 4 m wide at the base of the starter embankment slope and 12 m at the toe of the Stage 4 embankment. The proposed buttress will be constructed with surplus mine rock.

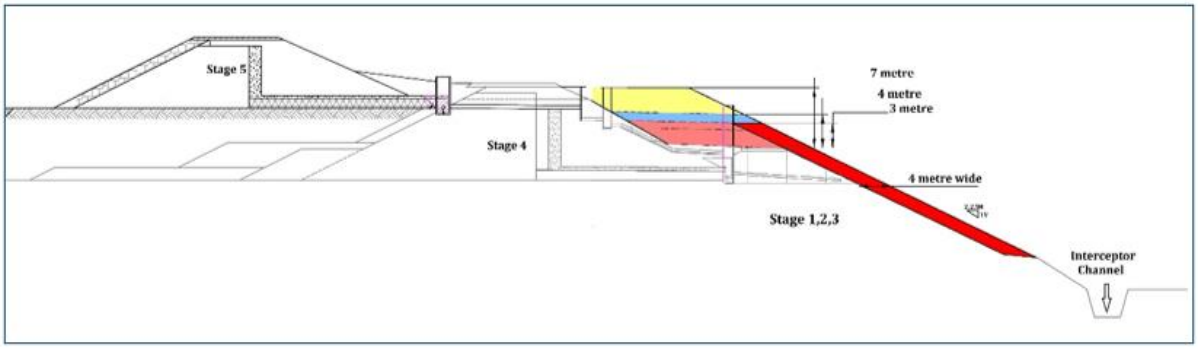


Figure 1-1: Cross section of existing embankment walls and proposed buttress.

1.8 The base of the proposed buttress raise side slopes are to extend over a section of the interceptor channel along the western and southern boundaries of the TSF. It is understood that this section of the interceptor channel was re-graded and installed with perforated pipe and filled with drainage stone, in 2023 (chainage 2625 to 3850). The drainage blanket is to consist of Type D1 material (100mm), consistent with he material used in the re-grading works.

1.9 The preparatory works will include the removal of topsoil and vegetation from the crest and the side-slopes over the footprint of the proposed buttress i.e., the starter embankments and Stage 4 embankment. The surface materials from a road along the crest of the starter embankments will also be removed. The topsoil and road surface materials will be stockpiled for re-use, where possible.

1.10 The footprint of the proposed buttress will then be graded and compacted prior to the placement of the fill. Any areas of soft or otherwise unsuitable ground will be excavated and replaced with suitable material and compacted or replaced with appropriate geosynthetics.

1.11 The removal of topsoil from the crest and the side-slopes over the footprint of the proposed buttress ie the starter embankments (stages 1,2 and 3) and part of the Stage 4 embankment will allow sub-surface water drainage in the section to drain into the Stage 1,2 and 3 chimney drain. This water will then report into the Perimeter Interceptor Channel (PIC) and from there will be returned back to the tailings facility.

Aim

1.12 The aim of this report is to summarise a WFD Screening Assessment and identify any potential risks that the Proposed Scheme could pose to the quality of the water environment.

Study Area

1.13 The Proposed Development is located approximately 2 km north-west of Navan, in County Meath, Ireland, within the catchment of the River Boyne. The centre point of the TSF is at approximately N 84953 71753.

1.14 The Proposed Development lies within two WFD river catchments:

- BLACKWATER (KELLS)_120 (WFD ID: IE_EA_07B011800).
- YELLOW (Blackwater Kells)_020 (WFD ID: IE_EA_07Y011100).

1.15 These WFD water bodies are composed of a large number of smaller surface water channels with a combined length of approximately 70 km. Of most relevance to this Screening Assessment are the Yellow River, which flows along the western perimeter of the TSF and is part of the YELLOW (Blackwater Kells)_020 water body, and the Simonstown stream, which flows along the eastern and southern perimeters of the TSF and the Doug stream to the south of the TSF, which are both part of the BLACKWATER (KELLS)_120 body. These streams are tributaries of the River Blackwater, which is also part of the BLACKWATER (KELLS)_120 water body.

1.16 The PIC, which encircles Stages 1 to 5 TSF embankments, is an entirely artificial channel and not a WFD water body, and it is not hydrologically connected to other WFD water bodies. Impacts on this channel are, therefore, not considered in this assessment. However, indirect impacts of proposed modifications to this channel on adjacent WFD water bodies are considered.

1.17 The Proposed Development extends across two WFD groundwater bodies:

- Wilkinstown (WFD ID: IE_EA_G_010).
- Athboy (WFD ID: IE_SE_G_001).

1.18 The study area, including relevant WFD water bodies, flow directions and confluences, is summarised in Figure 1-2 and Figure 1-3.

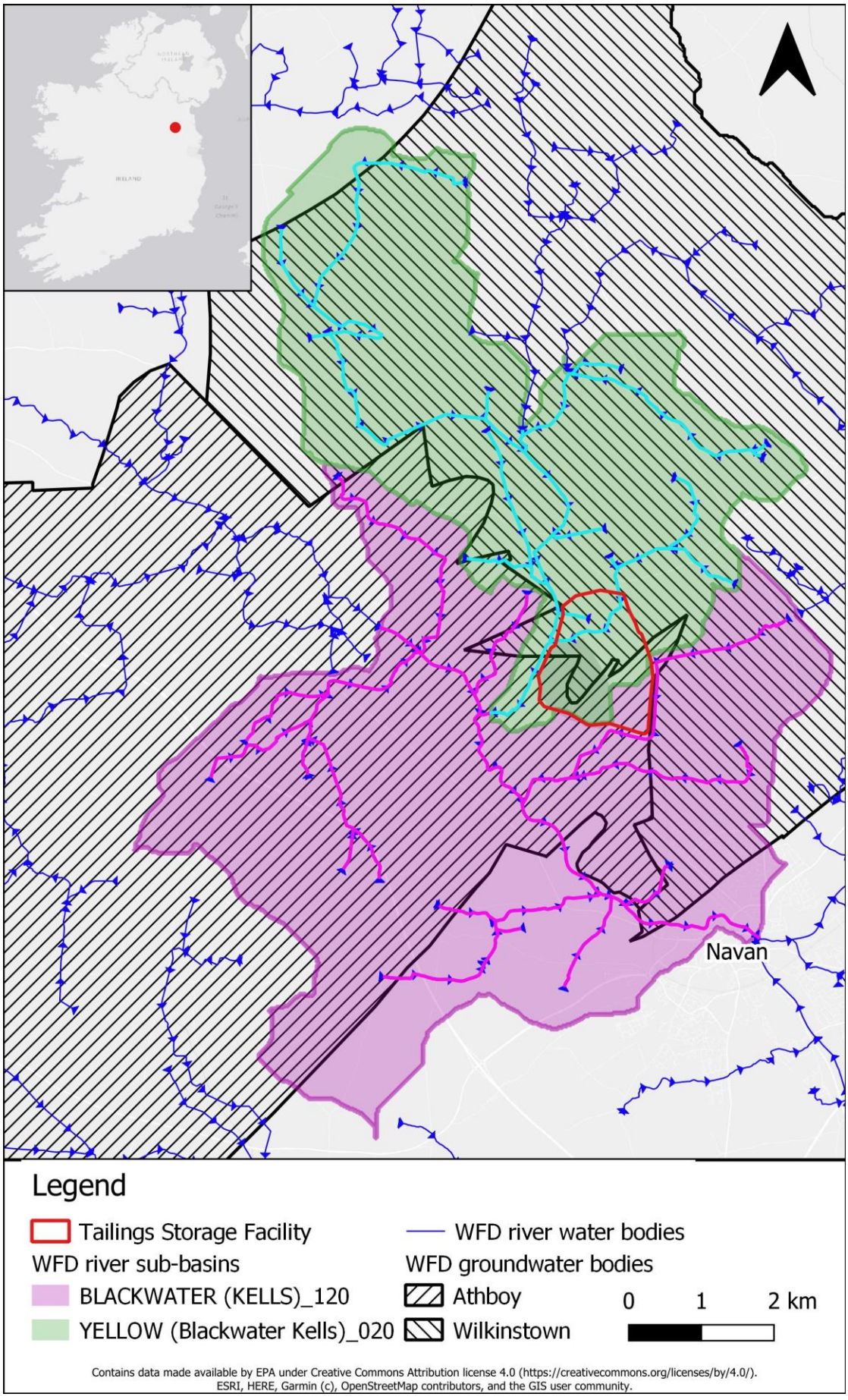


Figure 1-2 Site extent and WFD water bodies.

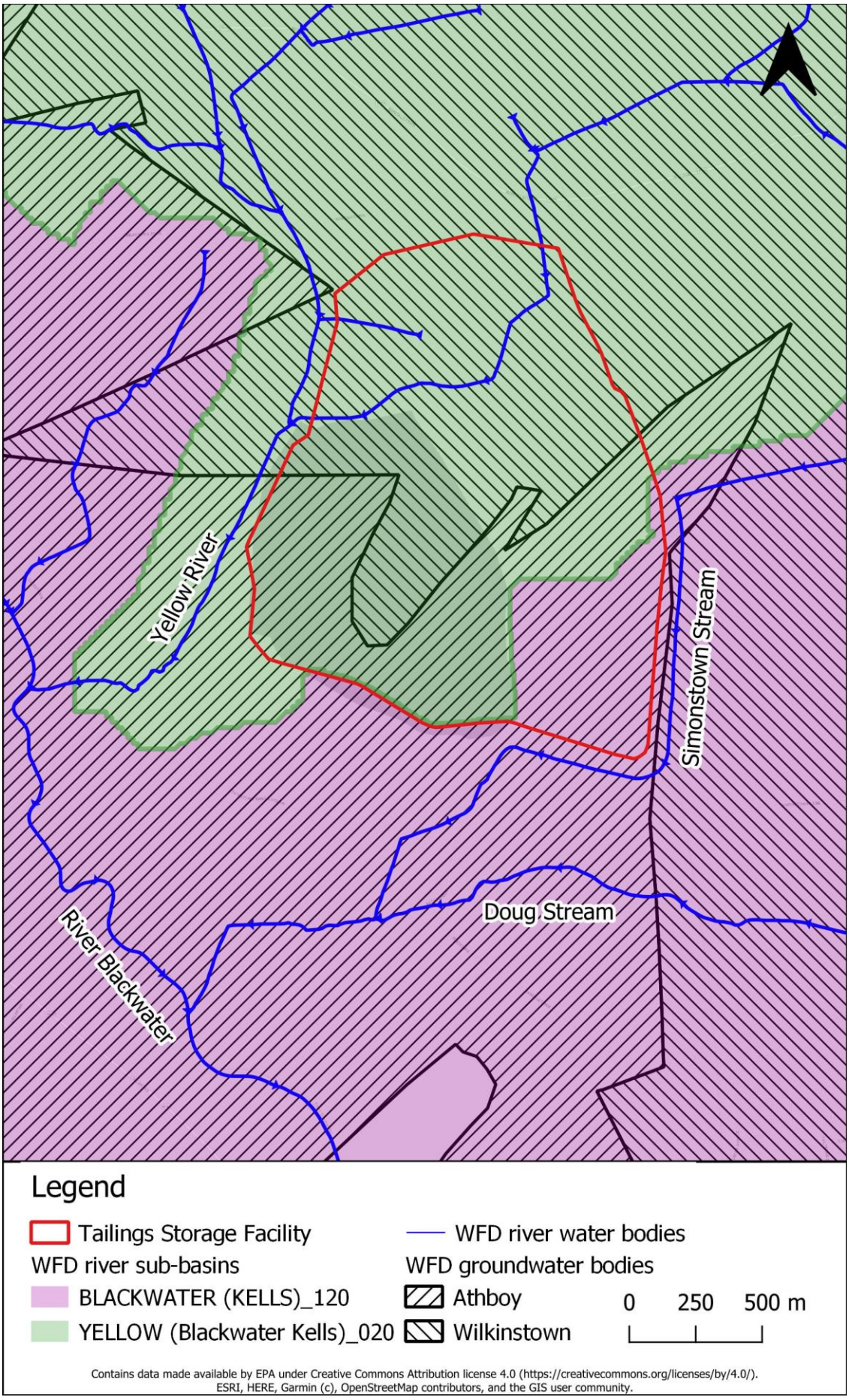


Figure 1-3 Detail of WFD water bodies adjacent to the TSF.

The Water Framework Directive

1.19 The European Union (EU) Water Framework Directive (2000/60/EC) as amended by Directives 2008/105/EC, 2013/39/EU and 2014/101/EU ('WFD') requires all Member States to protect and improve water quality in all waters so that they achieve good ecological status by 2015 or, at the latest, by 2027. Article 4 of the WFD states that Member States shall 'prevent deterioration of groundwater status and ensure a balance between abstraction and recharge of groundwater'. It was given legal effect in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003). It applies to rivers, canals, lakes, groundwater, and transitional coastal waters.

1.20 The Directive requires that management plans be prepared on a river basin basis and specifies a structured method for developing these plans. S.I. No. 77/2019 - European Union Env Objectives (Surface Waters) (Amendments) Regulations 2019 (Commenced 30th July 2009) sets out objectives in terms of surface water status for ecological, biological, morphological and physico-chemical status. S.I. No. 366/2016 - European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 (Commenced January 2010) sets out objectives in terms of groundwater status and physio-chemical threshold limits.

1.21 The WFD takes a holistic approach to sustainable management of the water environment by considering interactions between surface water, groundwater, and water-dependent ecosystems. Ecosystem conditions are evaluated according to interactions between classes of biological, chemical, physico-chemical and hydromorphological elements known as 'Quality Elements'.

1.22 Under the WFD, 'water bodies' are the basic management units, defined as all or part of a river system or aquifer. Water bodies form part of a larger 'river basin district' (RBD), for which 'River Basin Management Plans' (RBMPs) are used to summarise baseline conditions and set broad improvement objectives. RBMPs are produced every six years, in accordance with the river basin management planning cycle. The current RBMPs at the date of this assessment are the 2015 Cycle 3 plans, updated in 2021.

1.23 The WFD requires water bodies to be classified according to their current condition (i.e., the 'Status' or, in the case of heavily modified or artificial water bodies, the 'Potential') and to set a series of objectives for maintaining or improving conditions so that water bodies maintain or reach Good Status or Potential.

1.24 In Ireland, the Local Authority Waters Programme (LAWPRO) is a Local Authority (LA) shared service, responsible for coordinating the LA's response to the EU WFD statutory obligations placed on Member States and LAs. There are five local authority regional committees in Ireland, known as Water and Environment Management Committees. LAWPRO supports each one and they have responsibility for the co-ordinated delivery of measures at the regional and local level and for ensuring consistency of approach across the regions. The five regional committees are chaired at Chief Executive level, with active participation and technical advice from the Environmental Protection Agency (EPA).

1.25 In determining whether a development is compliant or non-compliant with WFD objectives for a water body, the conservation objectives of any Protected Areas (Special Areas of Conservation (SACs) and Special Protected Areas (SPAs)) and adjacent WFD water bodies, where relevant, should be considered.

2. Methodology

2.1 There are no fixed methods for the WFD assessment. The nature of the water environment and the breadth of the legislation mean that assessments are tailored to proposals on a case-by-case basis.

2.2 The following general guidance is available which has been applied for this assessment:

- EU-level guidance document Water Framework Directive Project assessment checklist tool (2018), published by the Joint Assistance to Support Projects in European Regions (JASPERS).
- Planning Inspectorate Advice Note 18: The WFD (PINS, 2017), which provides an overview of the WFD and provides an outline methodology for considering the WFD.

2.3 A stepwise approach consisting of screening, scoping and impact assessment phases is generally followed in order to: (a) rationalise the levels of WFD assessment and impact mitigation that are required; and (b) verify that proposals meet the requirements of the WFD. The general approach is described by The Planning Inspectorate (2017) and briefly summarised below.

2.4 This WFD comprises a Screening assessment, identifying the zone of influence of the Proposed Scheme, and whether the activities involved in the Scheme are going to negatively impact the water environment.

Stage 1 Screening

2.5 Screening identifies the zone of influence of a proposed development, and if proposed activities pose a risk to the water environment. It is used to identify if there are activities that do not require further consideration for WFD objectives, for example activities which have been ongoing since before the current RBMP cycle and which have thus formed part of the baseline.

Stage 2: Scoping

2.6 Scoping is used to identify any potential impacts of the proposed activities to specific WFD receptors and their water quality elements. This involves review of WFD impact pathways, shortlisting which WFD water bodies and quality elements could or could not be affected by proposed activities, and collecting baseline information from the relevant RBMP on the status and objectives for each water body.

Stage 3: Impact Assessment

2.7 This involves rationalised assessment of water bodies and quality elements that could be affected by proposed activities, in order to identify any areas of WFD non-compliance. Proposed activities are reviewed in terms of both positive and negative impacts, and the baseline mitigation measures, enhancements, and contributions to the WFD objectives described in the RBMP. Any proposed activities with potentially deleterious impacts are reviewed simultaneously with their corresponding mitigation proposals, to determine a net effect on WFD objectives.

Mitigation Commitments

2.8 Proposed mitigation activities relied upon to demonstrate compliance at any of the stages referred to above must be appropriately defined and sufficiently secured. Mitigation could be secured through planning or licence conditions, or other legally binding methods.

Further Assessments and Article 4.7

2.9 Where the potential for deterioration of water bodies is identified, and an overriding need is robustly proven, with regards to all relevant legislation and legal processes, that it is not realistically feasible to mitigate impacts to a level where deterioration or failure to improve can be avoided, the proposals would need to be assessed further in the context of WFD Article 4.7. Where an Applicant considers that a derogation case could be prepared, the Applicant will need to provide the necessary information to justify its case, bearing in mind that Applicants must always seek to avoid deterioration of the water environment. It is a matter for the EPA to consider whether derogation under Article 4.7 is justified in relation to a proposed development. At this stage a derogation under Article 4.7 is not considered necessary.

Desk Sources

2.10 A desk-based study was carried out to capture information pertaining to the Proposed Development that is not attainable through site survey. Review of relevant information relating to the study area was undertaken to develop a baseline for WFD catchments, watercourses, and surrounding areas. The following data sources were used for the desk study:

- WFD catchment data[1,2]
- Historical maps and aerial imagery[3]
- Climate Data (Ireland)[4]
- Geology and soil data[5]
- SPA and SAC data[6]
- Hydrological information[7, 8]

Limitations and Assumptions

2.11 This screening exercise is based on the Proposed Development planning and design information made available to AECOM in January 2024. Accordingly, some recommendations are made within this WFD Screening Assessment for checking and verifying WFD compliance when confirmed scheme designs become available.

2.12 WFD water body status has been based on the latest available information. However, there are gaps in the available information for certain WFD water bodies. In some instances, the only available information is the overall ecological status or potential. Available information for each water body is listed in Table 3-1. Thus, broad assumptions have been made for the water quality status.

[1] Data - Catchments.ie - Catchments.ie
[2] Download Data (epa.ie)
[3] Side by side georeferenced maps viewer - Map images - National Library of Scotland (nls.uk)
[4] Home | Climate Change Knowledge Portal (worldbank.org)
[5] EPA Maps
[6] EPA Maps
[7] Realtime waterlevel
[8] Historical Data - Met Éireann - The Irish Meteorological Service

3. Desk Study

Catchment Characteristics

General Characteristics

3.1 The two WFD catchments that the Proposed Development is located within are predominantly agricultural with pasture and arable land covering approximately 69% and 19% of the total catchment area, respectively. Urban development covers approximately 4% of the catchment area and is predominantly limited to the northern and western suburbs of Navan and the Tara Mines facility. A number of individual properties and homesteads are also present within 1 km of the Proposed Development.

3.2 There are no SPAs or SACs in the immediate footprint of the Proposed Development. However, the Simonstown stream, which flows along the eastern and southern perimeters of the Tara Mines TSF and is part of the BLACKWATER (KELLS)_120 water body, and the Yellow River, which flows along the western perimeter of the Tara Mines TSF and is part of the YELLOW (Blackwater Kells)_020 water body, are both tributaries of the River Blackwater which is part of the River Boyne and River Blackwater SPA and SAC.

3.3 The SAC designation owes to the presence of alkaline fens, alluvial forests, river lamprey (*Lampetra fluviatilis*), Atlantic salmon (*Salmo salar*), and otter (*Lutra lutra*), which are listed in Annexes I and II of the EU Habitats Directive. The SPA designation owes to the presence of a nationally important population of kingfisher.

3.4 The River Blackwater joins the River Boyne at Navan, approximately 4.4 km downstream of the Simonstown stream confluence. The River Boyne has been designated as a river capable of supporting salmonids under the European Communities (Quality of Salmonid Waters) regulations, 1988, and a Nutrient Sensitive River under the Urban Waste Water Treatment (UWWT) Directive 91/271/EEC.

3.5 The River Blackwater mainstem, which is part of the BLACKWATER (KELLS)_120 water body to the south of the Tara Mines TSF, and the Yellow River, which is part of the YELLOW (Blackwater Kells)_020 water body, are both monitored as part of the EPA's national WFD monitoring programme.

Catchment Geology and Soils

3.6 The bedrock of the local area comprises Carboniferous strata incorporating the Pale Beds (Meath Formation), Mixed Beds (Liscarton Formation) and Red Beds (Old Red Sandstone) underlain unconformably by the Lower Palaeozoic sequence (Rathkenny Formation). The TSF and the surrounding areas to the north and east are dominated by the Pale Beds and Lower Palaeozoic sequence. To the south and east the Shaley Pales (Moathill Formation) appear along with the Upper Dark Limestone (Ballysteen Formation). The TSF is located in an area of major faults, mainly trending north-east to south-west.

3.7 According to superficial deposit mapping compiled by the Geological Survey of Ireland (GSI), the TSF is underlain by sandstone and shale till on the western half, and alluvium on the eastern half. The alluvium is associated with the channels of Blake's Stream to the northeast of the TSF and Simonstown Stream to the east and south. There is also a thin strip of alluvium mapped along the Yellow River channel to the immediate west of the TSF. Along the southern boundary of the site, there is a pocket of limestone sands and gravels. The thickness of these deposits can vary from 5 m to more than 10 m.

Catchment Hydrology

3.8 The Wikinstown (Yellow River) (station ID 5301[9]) Met Éireann monitoring station has recorded rainfall in the Yellow River catchment, approximately 3.3 km north of the Tara Mines TSF, since

[9] https://www.met.ie/climate/available-data/historical-data

April 1998. The average annual rainfall for that station during the period of record is 791 mm, which is within the range of average values for eastern Ireland of 750 to 1000 mm per year (Met Éireann, 2023[10]).

3.9 The nearest Office of Public Works (OPW) hydrological gauging station to the Proposed Development is Licarton (07010) on the mainstem of the River Blackwater. Flow conditions at this location are unlikely to be representative of those within the study area since the rivers and their catchment areas are much smaller. There are no EPA or Office of Public Works (OPW) hydrometric stations located on the Yellow River, and therefore no continuous records of river flow.

3.10 In 2021, Boliden commissioned NVM Limited to carry out gauging of the Yellow River with the aim of establishing a relationship between the water level and the flow. This work was carried out as part of the *Yellow River Mass Balance* report (Ref. 8). Mass balance studies of the Yellow River are required to meet IE Licence P0516-04 Condition 6.13.7 to "*prepare and report a mass balance of seepage from the TMF once every three years to determine inputs into the Yellow River"* and had been previously carried out in 1995 and 2015.

3.11 These previous studies found that seepage inputs from the TSF to the Yellow River are likely to be predominantly indirect, via shallow groundwater. They also showed a decrease in flow between sites upstream of the TSF and those downstream, indicating a loss of water at the TSF. Data also showed that there is a pathway for seepage from the TSF and surrounding interceptor channel to enter shallow groundwater where the more permeable superficial deposits directly underlie or are adjacent to the TSF and the interceptor channel, and when the vertical or lateral hydraulic gradients allow.

Historical Channel Change

3.12 It is known that a number of river channels have been modified to accommodate construction and expansion of the Tara Mines TSF. For example, the Simonstown stream was diverted into a trapezoidal channel around the southeaster perimeter of the TSF in 1977, whilst Blake's stream now flows into the Simonstown stream.

3.13 The Yellow River to the west of the TSF and other sections of the Simonstown stream have low sinuosity and unnatural bend geometries indicating historical realignment, but any such modifications pre-date the earliest map data available (the Geographical Section, General Staff (GSGS) one inch to the mile map from the early 1940s). It is likely that historical channel realignment was conducted in conjunction with resectioning (i.e., increasing channel width and depth). Channel realignment and resectioning were commonly undertaken to facilitate agricultural intensification, land drainage, and development of the transport network and associated infrastructure.

WFD Status

WFD Status – Surface Water

3.14 WFD Status data for the nine WFD surface water bodies within the potential zone of influence of the Proposed Development are summarised in Table 1.

3.15 WFD Status data for the three WFD groundwater bodies within the potential zone of influence of the Proposed Development are summarised in Table 2.

[10] https://www.met.ie/climate/what-we-measure/rainfall

Table 1: Summary of WFD Surface Water Body status data

SWB	Overall Status (2010 – 2015)	Overall Status (2013 – 2018)	Overall Status (2016 – 2021)	Risk Status 3rd Cycle	Significant pressures
BLACKWATER (KELLS)_120	Moderate	Poor	Poor	At Risk	Agriculture, hydromorphology, urban runoff
YELLOW (Blackwater Kells)_020	Poor	Poor	Poor	At Risk	Agriculture

Table 2: Summary of WFD Surface Water Body status data

GWB	Overall Status (2010 – 2015)	Overall Status (2013 – 2018)	Overall Status (2016 – 2021)	Risk Status 3rd Cycle	Significant pressures
Athboy	Good	Good	Good	Not at Risk	Agriculture
Wilkinstown	Good	Good	Poor	At Risk	-

4. WFD Screening

WFD Screening

4.1 The purpose of the WFD screening stage is to identify a zone of influence of the Proposed Development and to determine whether that influence has the potential to adversely impact upon WFD water body receptors.

4.2 The screening stage also identifies specific activities of the Proposed Development and Overall Project that could affect receptor water bodies' WFD status and objectives.

Screening of WFD Water Bodies

4.3 The zone of influence of the Proposed Development has potential to interact with two WFD surface water bodies and two WFD groundwater bodies.

4.4 WFD Screening of the risk of impact to these water bodies is provided in Table 3.

Table 3: Screening of WFD Water Bodies Potentially Impacted by the Proposed Scheme

Water Body ID	Screening Outcome	Justification
BLACKWATER (KELLS)_120 (IE_EA_07B011800) YELLOW (Blackwater Kells)_020 (IE_EA_07Y011100)	In	These WFD water bodies may be directly impacted by the Proposed Development due to a range of activities which may interact with the local watercourse during the construction and operation phases, as well as the hydrological connection with the River Boyne and River Blackwater SPA and SAC
Athboy (IE_EA_G_001) Wilkinstown (IE_EA_G_010)	In	The Proposed Development is situated above both of these WFD groundwater bodies and so they may be affected by activities within the Proposed Development.

Screening of Activities

4.5 The Proposed Scheme comprises several activities that present a potential risk to the WFD status of the water bodies identified in the previous section.

4.6 For relevant water bodies, the screening assessment of activities pertaining to the Proposed Development is provided in Table 4.

Table 4: Screening of the Proposed Scheme's activities

Activity	Description	Screening Outcome	Justification
Preparatory work and construction	Removal and stockpiling of topsoil, vegetation and road surface material, and use of surplus mine rock to construct the proposed buttress.	**Screen in:** BLACKWATER (KELLS)_120 (IE_EA_07B011800) YELLOW (Blackwater Kells)_020 (IE_EA_07Y011100) Athboy (IE_EA_G_001) Wilkinstown (IE_EA_G_010)	**Water bodies screened in for the following reasons:** The removal of soil and vegetation on the extant embankment is likely to increase runoff from the embankment and associated surface erosion, potentially leading to increased flows and fine sediment loads entering adjacent water bodies. On the eastern boundary and the eastern half of the southern boundary of the TSF, the site is bounded by open sections of the PIC. As such, it is assumed that runoff from the site in these locations will be captured by the PIC, which is not a WFD water body, and returned to the tailings pond via pumping for further settlement. The PIC is designed to be a closed water cycle system, meaning that the risk of surface water runoff into adjacent WFD water bodies in these locations is minimal. The pumps on the interceptor channel also maintain water levels to a minimum, thus minimising the hydraulic head and reducing the risk of seepage to groundwater. However, where the PIC has been piped and the base of the proposed buttress raise side slopes will extend over the PIC, this mitigation will not be in place because the interceptor channel will be buried. Furthermore, the toe of the proposed extended embankment will be in very close proximity (<10 m) to the Yellow River (part of the YELLOW (Blackwater Kells)_020 WFD water body) on the western boundary of the TSF. In these locations, the risk of runoff from the site entering adjacent river water bodies and underlying ground water bodies is high. Given that the YELLOW (Blackwater Kells)_020 water body is a tributary of the BLACKWATER (KELLS)_120 water body, the risk also extends to this water body. The proximity of the embankment toe to the Yellow River on the western boundary of the site also means that works will take place within 10 m of this water body. This poses the risk of physical damage to the channel banks, sediment generation from movement of machinery, and associated hydromorphological harm. Risks to groundwater exist from seepage of contaminated water as a result of the removal of vegetation, topsoil, and underlying superficial deposits.

			It is anticipated that a Construction Environmental Management Plan (CEMP) will be prepared and implemented by the contractor for the protection of the water environment. This should include appropriate mitigation measures such as treating surface runoff, foul water and wastewater, and limiting the use of chemicals and onsite fuelling to bunded areas, to ensure that there will be no contamination during the construction of the proposed buttress. This would reduce the risk of surface and groundwater contamination from construction activities. Specific mitigation regarding the proximity of proposed works to the Yellow River will be required.
Activity	**Description**	**Screening Outcome**	**Justification**
Operation	Permanent presence of a new buttress constructed from surplus mine rock.	**Screen Out:** Athboy (IE_EA_G_001) Wilkinstown (IE_EA_G_010) **Screen In:** BLACKWATER (KELLS)_120 (IE_EA_07B011800) YELLOW (Blackwater Kells)_020 (IE_EA_07Y011100)	**Water bodies Screened Out: Risks Mitigated** The placement of a low permeability clay cap on the top and side slopes of the proposed buttress, and the use of mine rock with a low potential for leaching of sulphate and magnesium, would minimise the impacts on groundwater quality by leaching. All mine rock will be encapsulated in a soil layer. The proposed buttress will be constructed from surplus mine rock and a cap of low permeability Quaternary glacial till, with a similar permeability to the existing embankment walls of up to 10^{-9} m/s. As such, there is no anticipated change in material permeability, meaning that there should be no increase in the volume and rates of surface runoff so that groundwater recharge should be unaffected. **Water bodies screened in for the following reasons:** The replacement of the open interceptor channel with a buried pipe may result in a long-term change in runoff rates from these portions of the site. It is also the case that the toe of the raised embankment must be closer to the Yellow River on the western boundary where it has been extended over the channel. This implies a higher risk of the embankment being affected by potential, future geomorphological adjustment of the Yellow River (i.e., channel bank erosion, which might occur in response to climatically driven changes in flow regime). This not only poses a risk to the long-term structural integrity of the embankment, but also implies the possible requirement for bank protection to be installed on the Yellow River in future. Such works would pose a risk to the WFD status of the YELLOW (Blackwater Kells)_020 water body. However, a geomorphic risk assessment may

	be required to confirm this risk. If confirmed, the risk could be mitigated through a river restoration scheme that aims to move the Yellow River away from the boundary of the TSF and return it to a more natural form, but only if it is technically feasible and cost proportionate to do so. Lower-cost alternatives may include installation of green bank protection where the Yellow River is close to the embankment, subject to a geomorphic risk assessment confirming this is necessary and appropriate.

5. Construction Risks and Mitigation

5.1 Recommendations are provided below on potential risks to WFD objectives during construction, therefore the appropriate mitigation measures that need to be developed.

Potential Construction Phase Risks

5.2 During the construction phase, the following adverse impacts may occur:

- Construction activities such as earth works, excavations, site preparation, levelling and grading operations result in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction, and increased runoff rates. Surface runoff from such areas can result in high fine sediment loads in adjacent watercourse and attendant, negative impacts water quality, flora, and fauna. Material temporarily stored on site, which will most likely be loose and unconsolidated, is also a potential source of fine sediment during runoff events.
- The removal of the topsoil and exposure of the underlying superficial deposits in the footprint of the proposed buttress could lead to an increased risk of surface and groundwater contamination from construction activities, due to spillage of oils, fuels or other construction chemicals.
- The removal of vegetation from the construction works area could lead to an increase in surface runoff, a temporary increase in water levels in the interceptor and an increased risk of seepage to groundwater. The interceptor channel is known to be an intermittent source of groundwater contamination, with seepage occurring when adjacent groundwater levels are below the base of the interceptor channel. Should interceptor channel water levels rise temporarily during construction, there is an increased risk that seepage to groundwater could occur, which could impact on water quality in the underlying bedrock aquifer and the Yellow River, via the superficial deposits.
- The use of mine rock to construct the proposed buttress could lead to an increase in sulphate and magnesium concentrations, and reduction in groundwater quality through leaching by rainwater and by underdrainage from the existing dam, during the construction period. The tailings and tailings water is a known source of elevated sulphate and magnesium. The interceptor channel is designed to capture runoff, underdrainage from the dam and groundwater, but groundwater monitoring data for the site indicates that some seepage to groundwater is occurring.
- The removal of vegetation could lead to an increase in effective rainfall, and therefore an increase in volume and rate of surface water runoff from this area. This may also result in a reduction in effective rainfall reaching groundwater from this area and, therefore, a reduction in groundwater recharge.
- Proposed works will be in very close proximity (<10 m) to the Yellow River on the western boundary of the TSF. In this location there is a risk of direct, physical damage to the Yellow River and elevated risk of fine sediment runoff caused by ground disturbance.

5.3 The majority of the risks listed above are substantially reduced by the presence of the PIC, which will capture runoff and pollutants from the site and return it to the tailings pond via pumping for further settlement. However, this is not the case where the PIC has been piped and will ultimately run under the new embankment, including where works are likely to be within 10 m of the Yellow River on the western boundary of the TSF.

5.4 Whilst there are potential risks during the construction phase, the construction is only temporary, and when completed these risks will no longer be present, as they are also only temporary.

Construction Mitigation

5.5 Although the risk of contamination of water receptors is low due to the presence of the PIC, it is considered appropriate that mitigation measures are implemented to contain any potential losses of contaminants from the site of the Proposed Development.

5.6 Mitigation measures are already embedded within the Proposed Development. Specifically, the mine rock used to construct the buttress is to have a low potential for seepage of sulphate-rich water. This embedded design should minimise any potential construction impacts relating to the leaching of sulphate-rich water from the buttress into groundwater, and from there into the Yellow River and local groundwater bodies. All mine rock will be encapsulated with till material.

5.7 Prior to construction, a CEMP should be prepared by the Contractor in conjunction with the BTM environmental management team, to be approved by the planning authority. The CEMP should detail the measures necessary to avoid, prevent and reduce adverse effects where possible upon the local water environment.

5.8 The CEMP should take cognisance of the following best practice guidelines:

- CIRIA, Control of Water Pollution from Construction sites – Guidance for Consultants and Contactors, C532 (2001).
- Inland Fisheries Guidelines on the protection of fisheries during construction works in and adjacent to waters (2016).
- Eastern Regional Fisheries Board Guidance Notes ‘Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites’ (Eastern Regional Fisheries Board, 2006).
- SEPA guidance developed for engineering in the water environment, including but not limited to WAT-SG-23 Good Practice Guide – Bank Protection, WAT-SG-25 Good Practice Guide – river crossings and WAT-SG-26: Good Practice Guide - Sediment Management.

5.9 Measures for the management of fine sediment in surface water runoff as a result of construction activities to be included in the CEMP, but not limited to, are as follows:

- All reasonably practicable measures will be taken to prevent the deposition of fine sediment or other material in, and the pollution by sediment of, any existing water body, arising from construction activities. The measures will accord with the principles set out in industry guidelines including the CIRIA report 'C532: Control of water pollution from construction sites'.
- Where possible, earthworks will be undertaken during the drier months of the year. When undertaking earth moving works periods of wet weather will be avoided, if possible, to minimise the risk of generating runoff contaminated with fine particulates. However, it is likely that some working during wet weather periods will be unavoidable, in which case mitigation measures will be implemented to control fine sediment laden runoff.
- To protect water bodies from fine sediment runoff, topsoil/ subsoil will be stored a minimum of 20 m from watercourses on flat lying land (and further if the ground is sloping, subject to on-site risk assessment and observational monitoring). Where this is not possible, and it is to be stockpiled for longer than a two-week period, the material will either be covered with geotextile mats, seeded to promote vegetation growth. In all situation, runoff from the stockpile will be prevented from draining to a watercourse without prior treatment.
- Mud deposits will be controlled at entry and exit points to the construction works area using wheel washing facilities and / or road sweepers operating during earthworks activities or other times as considered necessary.
- Equipment and plant will be washed out and cleaned in designated areas within the construction works area where runoff can be isolated for treatment before drainage to the interceptor channel.

- Debris and other material will be prevented from entering surface water drainage, through maintenance of a clean and tidy site, provision of clearly labelled waste receptacles, grid covers and the presence of site security fencing.

5.10 Measures for the control of spillages and leaks as a result of construction activities to be included in the CEMP, but not limited to, are as follows:

- A Pollution Prevention Plan will be prepared and included alongside the CEMP. Spill kits and oil absorbent material will be carried by mobile plant and located at high risk locations across the construction works area and regularly topped up. All construction workers will receive spill response training and toolbox talks.
- All spills to be cleaned up immediately, with resultant wastes (soils, rags and absorbent material) appropriately stored and disposed of by an appropriately licensed waste contractor as controlled waste.
- All spills reported and investigated as required.
- Safety Data Sheets (SDSs) for all chemicals stored on-site will be kept on file and made available on-site.
- Drip trays to be used on stationary equipment if not internally bunded (e.g. generators).
- All plant and equipment will be regularly serviced to reduce emissions and the chance of leaks/spillage, ideally off-site. If servicing is required to be completed on-site, then control measures must be implemented to contain potential hydrocarbon leaks during servicing (e.g. drip trays when changing oil).
- Temporary environmental screens will be erected sufficient to prevent construction debris oils, chemicals or other construction materials from entering any watercourse/ drain for the duration of the works. The Contractor's method statement should make specific reference to measures for the protection of river quality.

5.11 The CEMP is to include for monitoring of pumped volumes and water levels in the interceptor channel to ensure that water levels are kept to a minimum i.e., the typical range established through monitoring and remaining below groundwater levels monitored in adjacent monitoring boreholes. Reference should be made to historic interceptor channel water level and groundwater level data available for the site.

5.12 Development and implementation of an appropriate CEMP is the responsibility of the appointed Contractor(s), and thus the details would not be developed until the detailed design phase and pre-construction period. It is reasonable to assume for planning submission purposes and for this WFD screening assessment that the outline CEMP for the proposed Development contains appropriate measures and the CEMP will be updated by the Contractor in the future (with agreement from Consenting Authority) and that objectives for managing temporary WFD objectives will be met.

5.13 Works will be carried out in accordance with established best practice and the outline CEMP, which will include information on:

- Permissions and Consents
- Management of Construction Site Runoff
- Management of Construction Site Spillage Risk
- Management of Flood Risks.

5.14 It is anticipated that all WFD construction risks could be adequately mitigated with appropriate planning and management.

5.15 Where work is proposed to occur within 10 m of a WFD water body, as is the case for the Yellow River along the western boundary of the TSF, additional mitigation must be implemented. This should include minimising the time that works within 10 m of the water body will take, and avoiding working very close to the river when the risk of runoff is likely to be much greater. Additional mitigation must also be put in place to prevent direct, physical damage to the river banks as a

result of machinery working in very close proximity to the river. Details of such mitigation must be included in the CEMP which is to be developed by the contractor.

5.16 Given that the Yellow River has been historically realigned, additional mitigation may include a pre-construction river restoration project which renaturalises the channel planform and moves it away from the boundary of the TSF. This would provide additional space for construction activities and could improve WFD status of the YELLOW (Blackwater Kells)_020 water body. However, this should only be considered if it is technically feasible and cost proportionate to do so, and if other construction mitigation measures cannot be implemented.

Summary

5.17 There will be no risks to WFD objectives subject to implementation of a CEMP. The CEMP is to be developed, finalised and implemented by the contractor, but in WFD terms would be based on typical construction site management with no unusual requirements for WFD compliance.

6. Operational Risks

6.1 Recommendations are provided below on potential risks to WFD objectives during operation and, therefore, the appropriate mitigation measures that need to be developed.

Potential Operational Phase Risks

6.2 The proposed buttress has the potential to result in a change in material permeability at the TSF site, which would in turn result in a long-term increase in the volume and rates of surface runoff.

6.3 The replacement of the open PIC with a pipe culvert (chainage 2023 to 3850) could result in a long-term increase in the volume and rates of surface runoff.

6.4 The use of mine rock to construct the proposed buttress could lead to an increase in sulphate and magnesium concentrations, and reduction in groundwater quality through leaching by rainwater and by underdrainage from the existing dam over the lifecycle of the proposed buttress. All mine rock with have geochemical testing and will approved for use as a construction material by the EPA under existing conditions in Industrial Emissions License P0516-04.

6.5 Where the proposed embankment raise results in the toe of the embankment being in very close proximity to the Yellow River on the western boundary of the TSF, there is an increased hydromorphological impact resulting from the channel being more constrained on its left bank. This means that high flows may be concentrated within the channel resulting in increased hydraulic forces and, consequently, channel boundary erosion. This could result in habitat degradation and increased supply of fine sediment (from bank erosion) to downstream reaches. There is also the risk that the embankment toe may be undermined as a result of lateral channel adjustment. These risks are compounded by possible increases in flows caused by climate change.

Operational Phase Mitigation

6.6 The proposed buttress is to be constructed from mine rock and a cap of low permeability Quaternary glacial till, ensuring a similar permeability to the existing embankment walls of up to 10^{-9} m/s. This embedded design should minimise any potential impacts relating to temporary or long-term increases in surface runoff and decreases in groundwater recharge, and any potential impacts relating to the leaching of sulphate-rich water from the buttress into groundwater.

6.7 The mine rock used to construct the buttress is to have a low potential for seepage of sulphate-rich water. This embedded design should minimise any potential operation impacts relating to the leaching of sulphate-rich water from the buttress into groundwater, and from there into the Yellow River and local groundwater bodies.

6.8 The CEMP should include details of post-construction water quality, water level and hydromorphological monitoring at the existing TSF monitoring network.

6.9 In addition, the routine ground and surface water, including the interceptor channel, monitoring programme as mandated in IE Licence No. P0516-04 will continue for the duration of the post-construction monitoring period.

6.10 The risks of elevated channel boundary erosion on the Yellow River caused by encroachment of the embankment into its floodplain could be mitigated by realigning the channel away from the TSF (i.e., moving it westward). This would also present the opportunity to restore a more natural channel form with improved geomorphological functioning. However, this should only be considered if it is technically feasible and cost proportionate to do so. Lower-cost alternatives may include installation of green bank protection where the Yellow River is close to the embankment, subject to a geomorphic risk assessment confirming this is necessary and appropriate.

Summary

6.11 The proposed embankment raising works and replacement of the open PIC with a pipe culvert on the southern and western boundaries of the TSF potentially pose a risk to WFD objectives by encroaching on the floodplain of the Yellow River and increasing runoff of surface water and pollutants. Appropriate mitigation may include reinstatement of an open surface water drain at the toe of the extended embankment to capture runoff, where space is available. Alternatively, realignment and restoration of the Yellow River could be considered, including whether it is technically feasible and cost proportionate to move the channel away from the toe of the embankment. This could improve the geomorphological functioning of the Yellow River, reduce the risk to the embankment from future channel adjustment, and provide space for the capture or filtration of runoff from the embankment. Ultimately, these improvements could enhance the WFD status of the YELLOW (Blackwater Kells)_020 water body.

7. Conclusion

7.1 This WFD Screening Assessment has been prepared by AECOM Ltd. On behalf Boliden Tara Mines (BTM) to assess the impacts of, and identify appropriate mitigation measures for, the proposed buttress construction.

7.2 The assessment has been made based on site and design information available in January 2024.

7.3 There are potential pollution risks associated with the construction of the Proposed Scheme. Most of these are common to many construction activities and it is assumed that a Construction Environment Management Plan (CEMP) will be developed and implemented by the contractor to mitigate against these.

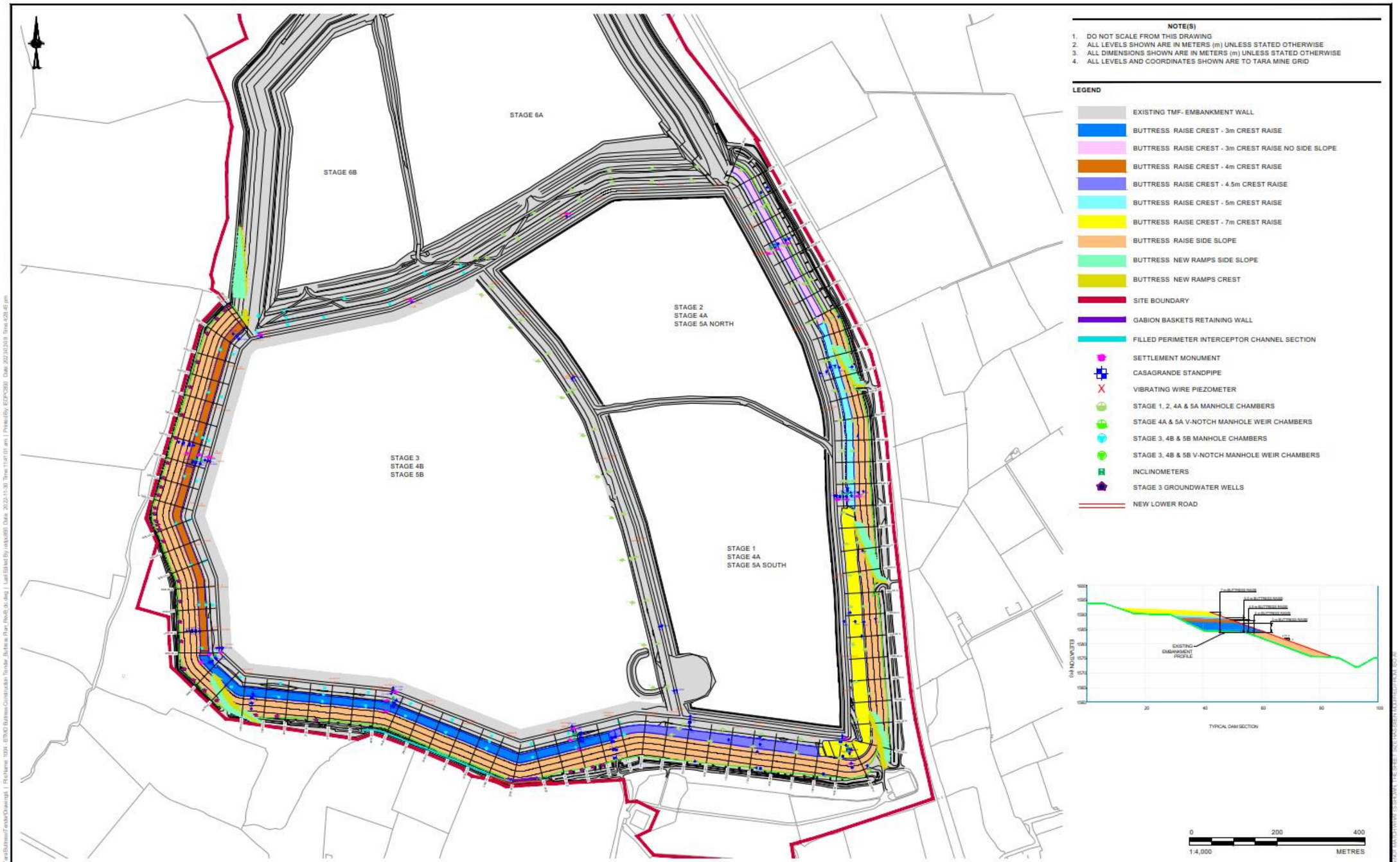
7.4 However, significant risks are posed to the BLACKWATER (KELLS)_120 (IE_EA_07B011800) and YELLOW (Blackwater Kells) _020 (IE_EA_07Y011100) surface water bodies by the close proximity (<10 m) of the work to the Yellow River along the western perimeter of the TSF. Additional, bespoke mitigation will be required in this location to prevent runoff of sediment and pollutants, including limiting working time and avoiding wet conditions.

7.5 Further mitigation will also be required to prevent direct, physical damage to the Yellow River as a result of machinery working in very close proximity to the channel. This could include pre-construction realignment and restoration of the Yellow River to move it away from the perimeter of the TSF, but this could only be considered if it is technically feasible and cost proportionate to do so, and if other construction mitigation measures cannot be implemented to prevent damage to the Yellow River.

7.6 It is considered that the Proposed Scheme poses a risk to the BLACKWATER (KELLS)_120 (IE_EA_07B011800) and YELLOW (Blackwater Kells) _020 (IE_EA_07Y011100) surface water bodies during its operation phase. This risk primarily owes to the extension of the embankment over the PIC on the southern and western boundaries of the TSF. This places the embankment within very close proximity of the Yellow River with potential impacts on the hydrological and geomorphological functioning of that river. There is also the risk that the embankment could be undermined by future channel adjustment.

7.7 Operational phase risks could be mitigated through the reinstatement of an open interceptor channel at the toe of the extended embankment to capture runoff and pollutants, or realignment of the Yellow River away from the perimeter of the TSF to facilitate more natural functioning of the channel and improve WFD status if this is technically feasible and cost proportionate.

A.1 Appendix 1 - Buttress construction plan



NOTE(S)

1. DO NOT SCALE FROM THIS DRAWING
2. ALL LEVELS SHOWN ARE IN METERS (m) UNLESS STATED OTHERWISE
3. ALL DIMENSIONS SHOWN ARE IN METERS (m) UNLESS STATED OTHERWISE
4. ALL LEVELS AND COORDINATES SHOWN ARE TO TARA MINE GRID

LEGEND

- EXISTING TMF- EMBANKMENT WALL
- BUTTRESS RAISE CREST - 3m CREST RAISE
- BUTTRESS RAISE CREST - 3m CREST RAISE NO SIDE SLOPE
- BUTTRESS RAISE CREST - 4m CREST RAISE
- BUTTRESS RAISE CREST - 4.5m CREST RAISE
- BUTTRESS RAISE CREST - 5m CREST RAISE
- BUTTRESS RAISE CREST - 7m CREST RAISE
- BUTTRESS RAISE SIDE SLOPE
- BUTTRESS NEW RAMPS SIDE SLOPE
- BUTTRESS NEW RAMPS CREST
- SITE BOUNDARY
- GABION BASKETS RETAINING WALL
- FILLED PERIMETER INTERCEPTOR CHANNEL SECTION
- SETTLEMENT MONUMENT
- CASAGRANDE STANDPIPE
- VIBRATING WIRE PIEZOMETER
- STAGE 1, 2, 4A & 5A MANHOLE CHAMBERS
- STAGE 4A & 5A V-NOTCH MANHOLE WEIR CHAMBERS
- STAGE 3, 4B & 5B MANHOLE CHAMBERS
- STAGE 3, 4B & 5B V-NOTCH MANHOLE WEIR CHAMBERS
- INCLINOMETERS
- STAGE 3 GROUNDWATER WELLS
- NEW LOWER ROAD

0 200 400
1:4,000 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2023-02-08	TENDER PACKAGE - FOR CONSTRUCTION ISSUE	DC	DC	BK	BK
B	2022-11-28	TENDER PACKAGE - FOR CLIENT REVIEW	DC	POB	BK	BK
A	2022-11-18	TENDER PACKAGE - FOR CONSTRUCTION REVIEW	DC	POB	BK	BK

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PROJECT
BUTTRESS CONSTRUCTION WORKS - TENDER DOCUMENTS

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BUTTRESS CONSTRUCTION PLAN

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